

BOILER REFRESHER TRAINING

Sponsored by:

The **S**chool **P**ool for **E**xcessive **L**iability **L**imits
Joint **I**nsurance **F**und

SPELL - JIF



COURSE OUTLINE

- **Format: Open discussion, shared experiences**
- **Compliance requirements**
- **Logbook entries**
- **Boiler types**
- **Basic boiler function**
- **Critical system components**
- **Best Practices**
- **Emergency Response Plan**

MODULE ONE - COMPLIANCE

- 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



8/4/2026



8/4/2026



8/4/2026

#1 – PROTECT LIFE!

#2 – PROTECT PROPERTY

BOILER EXPLOSION

'IGNORED WARNINGS': INVESTIGATORS RELEASE
VIDEO REPORT IN DEADLY 2017 BOILER EXPLOSION



WHAT DOES THE STATE OF NEW JERSEY REQUIRE?

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.

Depending on boiler size...

- ✓ Ensure that a licensed low-pressure boiler operator is in the facility **AT ALL TIMES** when 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.

IS THERE A WRITTEN REGULATION THAT
ESTABLISHES A SPECIFIC DATE WHEN
HEATING SYSTEMS SHOULD BE ENABLED IN
N.J. SCHOOLS?

NO!

THERE IS NO SPECIFIC DATE WRITTEN IN
CODE OR STATUTE AS TO WHEN HEATING
SYSTEMS MUST BE ENABLED IN N.J. SCHOOLS

§ 12:100-13.3 Compliance program

(a) The employer shall identify a designated person who is given the responsibility to assure compliance with this section. The employer shall assure that the designated person is familiar with the requirements of this subchapter. The designated person shall assure that at least the following actions are implemented and documented:

1. Establishing and following a preventive maintenance schedule in accordance with the manufacturer's recommendations or with accepted practice for the HVAC system. Scheduled maintenance of the HVAC system shall include checking and/or changing air filters, checking and/or changing belts, lubrication of equipment parts, checking the functioning of motors and confirming that all equipment is in operating order. Damaged or inoperable components shall be replaced or repaired as appropriate. Additionally, any parts of this system with standing water shall be checked visually for microbial growth;

2. Implementing the use of general or local exhaust ventilation where housekeeping and maintenance activities involve use of equipment or products that could reasonably be expected to result in hazardous chemical or particulate exposures, above the applicable Permissible Exposure Limit (PEL), as adopted by reference under *N.J.A.C. 12:100-4.2*, to employees working in other areas of the building or facility;

3. When the carbon dioxide level exceeds 1,000 parts per million (ppm), the employer shall check to make sure the HVAC system is operating as it should. If it is not, the employer shall take necessary steps as outlined in (a)1 above;

4. When temperatures in office buildings are outside of the range of 68 to 79 degrees Fahrenheit, the employer shall check to make sure the HVAC system is in proper operating order. If it is not, the employer shall take necessary steps as outlined in (a)1 above;

TITLE 12. DEPARTMENT OF LABOR
CHAPTER 100. SAFETY AND HEALTH STANDARDS FOR PUBLIC EMPLOYEES
SUBCHAPTER 13. INDOOR AIR QUALITY STANDARD

N.J.A.C. 12:100-13.1 (2007)

§ 12:100-13.1 Scope

This subchapter shall apply to matters relating to indoor air quality in buildings occupied by public employees during regular work hours.

§ 12:100-13.2 Definitions

The following words and terms, when used in this subchapter, have the following meaning unless the context clearly indicates otherwise.

"Air contaminants" refers to substances contained in the vapors from paint, cleaning chemicals, pesticides, solvents, particulates, outdoor air pollutants and other airborne substances which together may cause material impairment to employees working within the enclosed workplace.

"Building-related illness" describes specific medical conditions of known etiology which can be documented by physical signs and laboratory findings. Such illnesses include sensory irritation when caused by known agents, respiratory allergies, asthma, nosocomial infections, humidifier fever, Legionnaires' disease, and the signs and symptoms characteristic of exposure to chemical or biologic substances such as carbon monoxide, formaldehyde, pesticides, endotoxins, or mycotoxins.

"Building systems" includes the heating, ventilation and air-conditioning (HVAC) system, the energy management system and all other systems in a facility which may impact indoor air quality.

"Department" means the Department of Health and Senior Services.

"Designated person" means a person who has been given the responsibility by the employer to take necessary measures to assure compliance with this subchapter.

"Employee" means the term as defined at *N.J.A.C. 12:100-2.1*.

"Employer" means the term as defined at *N.J.A.C. 12:100-2.1*.

"HVAC system" means the collective components of the heating, ventilation and air-conditioning system including, but not limited to, filters and frames, cooling coil condensate drip pans and drainage piping, outside air dampers and actuators, humidifiers, air distribution ductwork, automatic temperature controls, and cooling towers.

"HVAC System Commissioning Report" means a document normally prepared by an architect or engineer that provides verification that the HVAC system is operating in conformity with the design intent.

"Office building" means a building in which administrative, clerical or educational activities are conducted. Examples of facilities and/or operations, which are not office buildings, include repair shops, garages, print shops and warehouses.

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 repairs and any repairs to associated systems. Retain all records for no less than three years.
- ✓ Preserve all inspection reports and 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 FACILITY?

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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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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.

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.

Logbook Type & Entries

- ✓ Must include bounded pages
- ✓ Record heating system information such as:
 - ❖ Boiler status
 - ❖ Pump status
 - ❖ Loop pressure & temperature
 - ❖ Outside air temperature
- ✓ Document and report any issues



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

DATE	NAMES OF SHIFT ENGINEER AND OTHER STAFF COMMENCING DUTY (PRINT)	SHIFT HOURS START	FINISH
------	---	----------------------	--------

4/14/25

com 38 Hws 161 Hwr 152 BST 158
cp# 15 #2 20

2pm 104 Hws 118 Hwr 116 BST 115
cp# 10 #2 20

SIGNATURE OF SHIFT ENGINEER OR OPERATOR

DATE	NAMES OF SHIFT ENGINEER AND OTHER STAFF COMMENCING DUTY (PRINT)	SHIFT HOURS START	FINISH
------	---	----------------------	--------

4/14/25

2pm Hws 118 Hwr 116 BST 115
#1 10 #2 20

10pm Hws 81 Hwr 80 BST 78
#1 10 #2 20

SIGNATURE OF

Each operator shall perform no less than three equipment checks during their respective shifts. First shift operators shall perform the initial equipment check within the first hour of their shift. The second equipment check shall be performed between the hours of 10:00 am and 11:00 am. The third equipment check shall be performed on, or about, 2:00 pm.

Second shift operators shall also perform three equipment checks. The first check shall be performed on, or about, 4:00 pm. The second check shall be performed on, or about, 7:00 pm. The final check shall be performed within an hour of shift end.

The hot water loop temperature range is: 110 degrees to 140 degrees.

The hot water loop pressure range is: 15 to 20 p.s.i.

Each boiler operator must enter all the system information below into the boiler logs during each and every equipment check. DO NOT use abbreviations. All entries must be spelled out. For example, enter “supply loop temperature” not “SLT”. Enter “supply loop pressure” not “SLP”.

1. Print your name, sign your name in the designated log location
2. Enter the date
3. Enter your shift time
4. Enter the time of the equipment check
5. Record the outside air temperature
6. Record status of all boilers. For example, boiler #1: enabled, boiler #2 disabled.
7. Record hot water loop temperature at (enter the desired temperature gauge for consistency)
8. Record the hot water loop pressure (again, for consistency, enter the location of the desired pressure gauge)
9. Record the status of all hot water circulating pumps. For example, pump #1: enabled, pump #2: disabled, pump #3: disabled
10. Record the status of all pump drives (VFD’s). For example: VFD #1: Auto, VFD #2: Auto, VFD #3: Auto
11. Record the percentage rate of all pump drives. For example, VFD #1: 60%, VFD #2: 0%, VFD #3: 0%
12. Record conditions of the boiler room. For example, “no leaks observed”, “no excessive materials stored”, “leak observed from pump #2”, etc.

If, at any time, a natural gas odor is detected (enter established district practices here)

The facilities supervisor shall be notified immediately if any of the following conditions are observed.

1. If all boilers are in “disabled” status
2. Hot water loop temperatures or pressures exceed the recommended ranges.
3. Observed water leaks from any location.
4. Unusual sound
5. Unusual odor (other than natural gas)
6. Pump drive status “off” or in “hand”
7. Loss of electrical power

Cell phone number of facilities supervisor:

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.

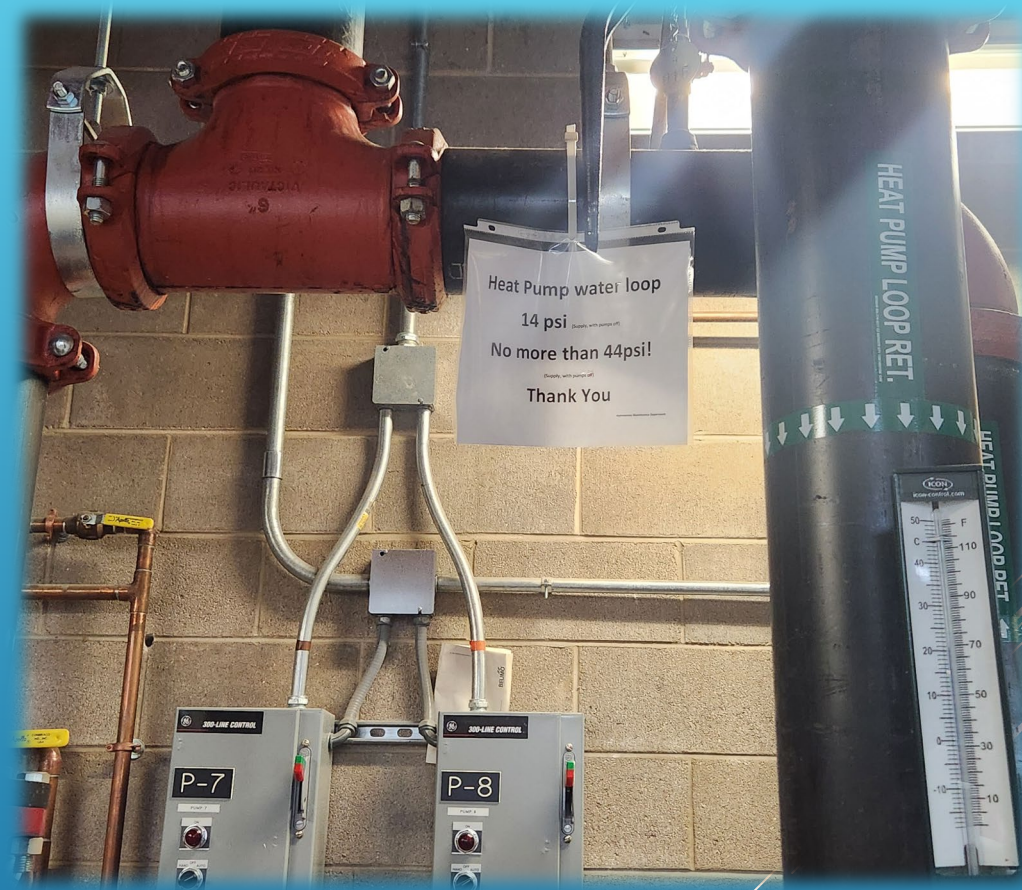
Step 6: Record Pump 1 Pressures (see example/picture 5). Normal
operating range; 12/80 PSI.

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





N.J. Admin. Code § 12:90-9.1 - Violations

[State Regulations](#) [Compare](#)

(a) This subchapter shall apply to:

1. Findings of violations of N.J.S.A. 34:7-1 et seq., and the issuing of penalties pursuant to N.J.S.A. 34:7-6 of, the Act on Licensing of Operating Engineers and Firemen and N.J.S.A. 34:7-14 et seq., and the issuing of penalties pursuant to N.J.S.A. 34:7-26 of, the Act on Inspection of Boilers, Pressure Vessels and Refrigeration Systems;

i. In accordance with N.J.S.A. 34:7-6 any person who shall violate any of the provisions of the Act on Licensing of Operating Engineers and Firemen shall be liable to a penalty of not less than \$ 500.00 nor more than \$ 5,000 per day for each violation.

ii. In accordance with N.J.S.A. 34:7-26 any owner, lessee, seller or operator of any steam or hot water boiler or similar equipment specified in N.J.S.A. 34:7-14, pressure vessel or refrigeration system who shall sell, use, cause or allow to be used such steam or hot water boiler or similar equipment specified in N.J.S.A. 34:7-14, shall be liable to a penalty of not less than \$ 500.00 nor more than \$ 10,000 for each first offense and not less than \$ 500.00 nor more than \$ 25,000 for each subsequent offense, to be collected by a civil action, or at the Commissioner's discretion;

OPEN DISCUSSION QUESTIONS?

MODULE TWO – SYSTEMS

- System Types
- System Components
- Safety Devices

BOILER TYPES...

...FROM THEN TO NOW



BOILER TYPES...

...FROM THEN TO NOW



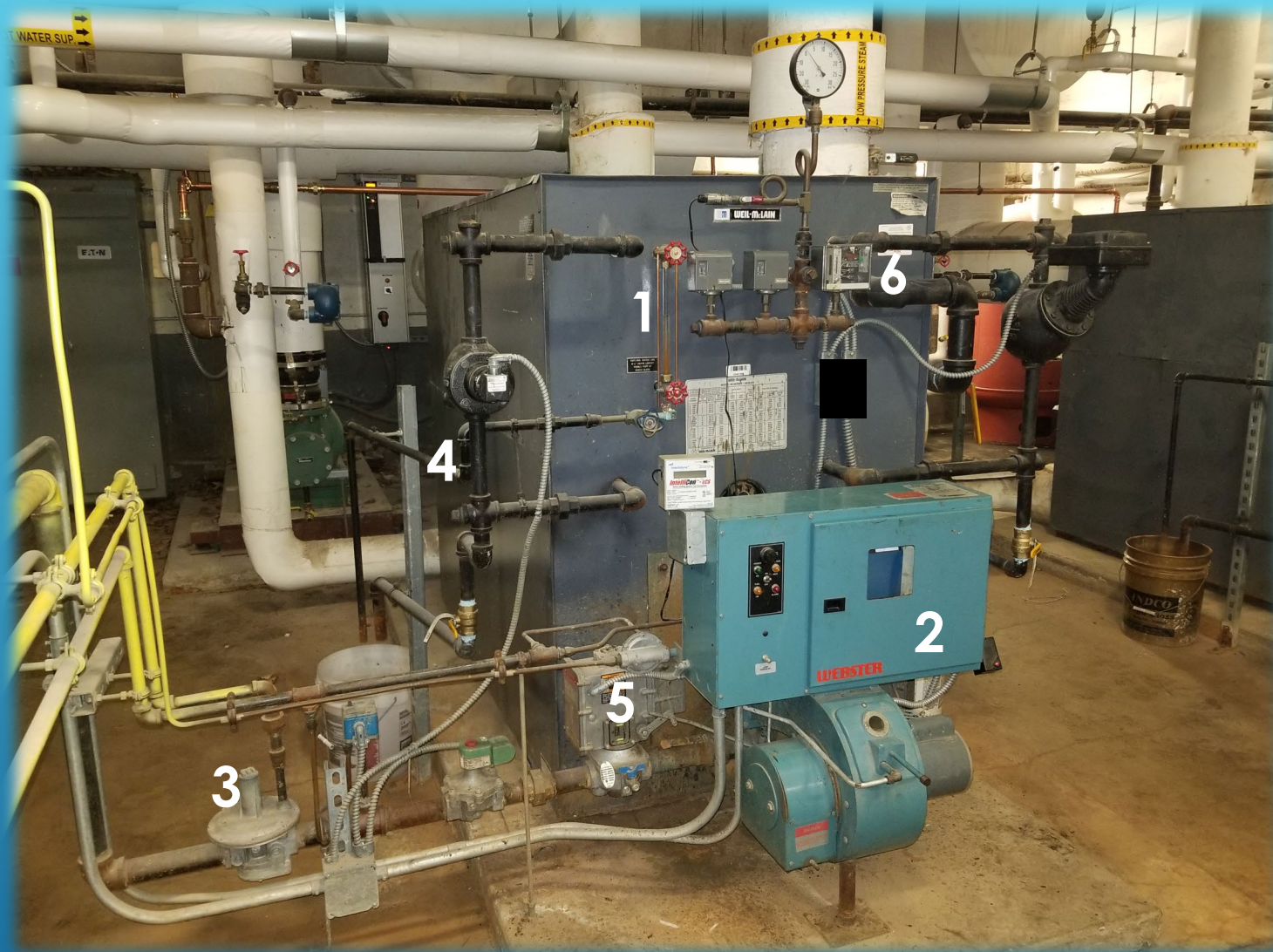
SYSTEM COMPONENTS





HOT WATER SYSTEMS

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____



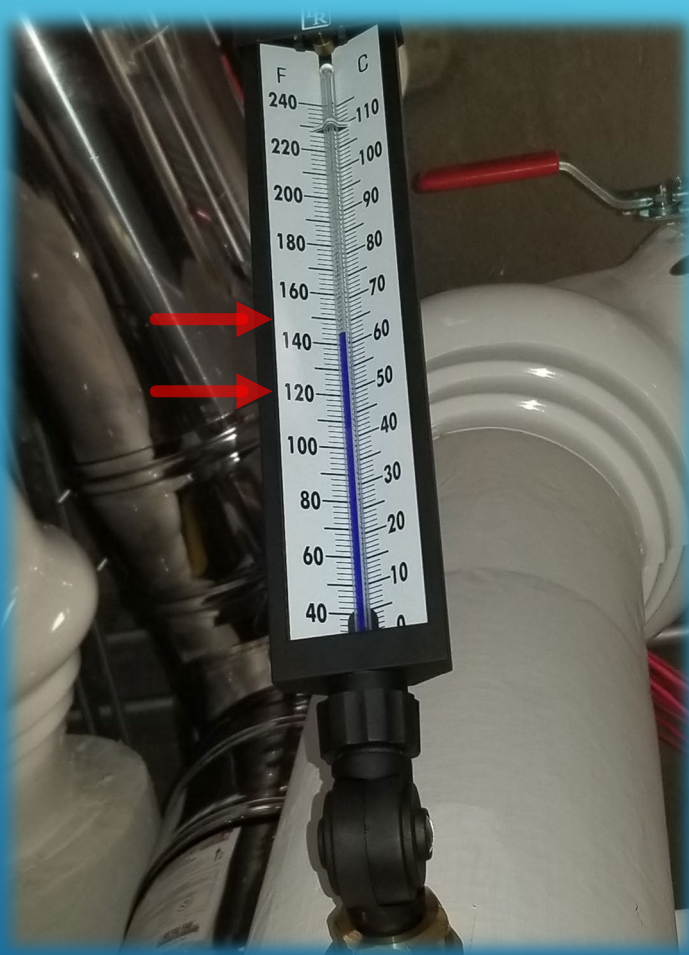
STEAM SYSTEMS

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

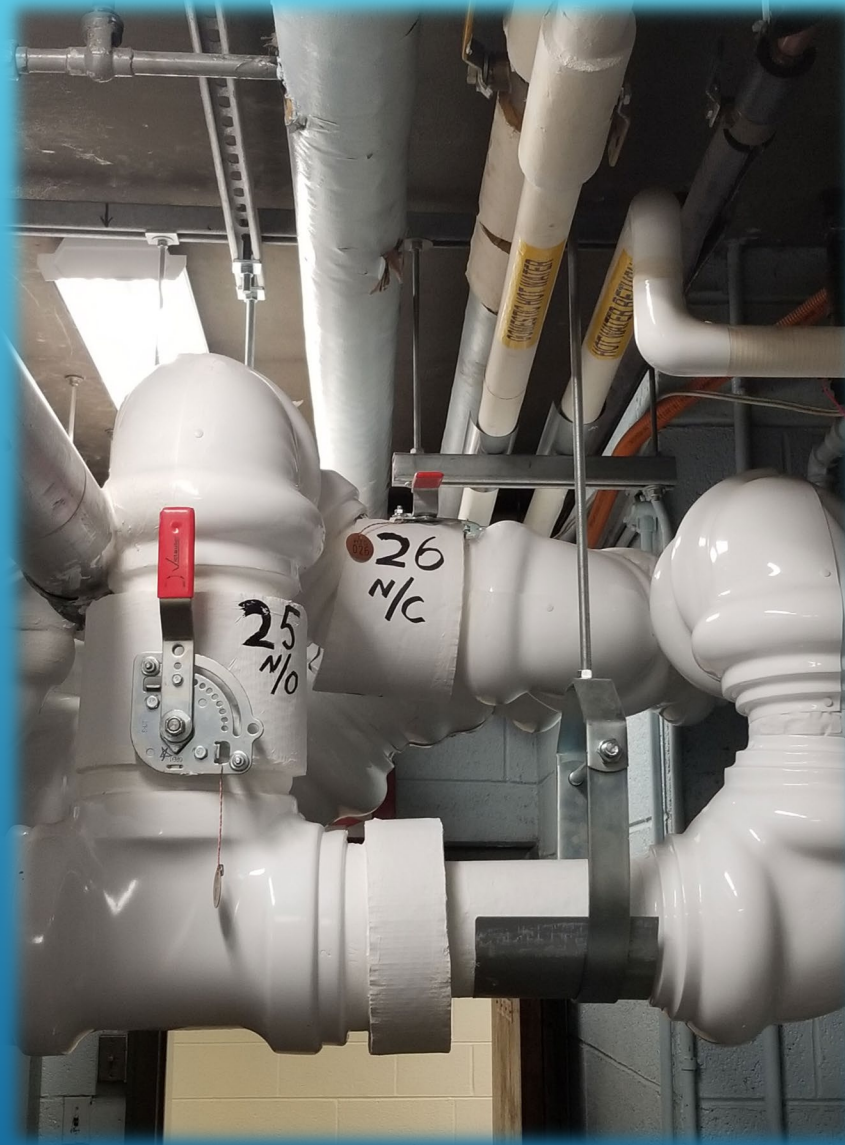
CIRCULATION PUMPS & PUMP DRIVES (VFD'S)



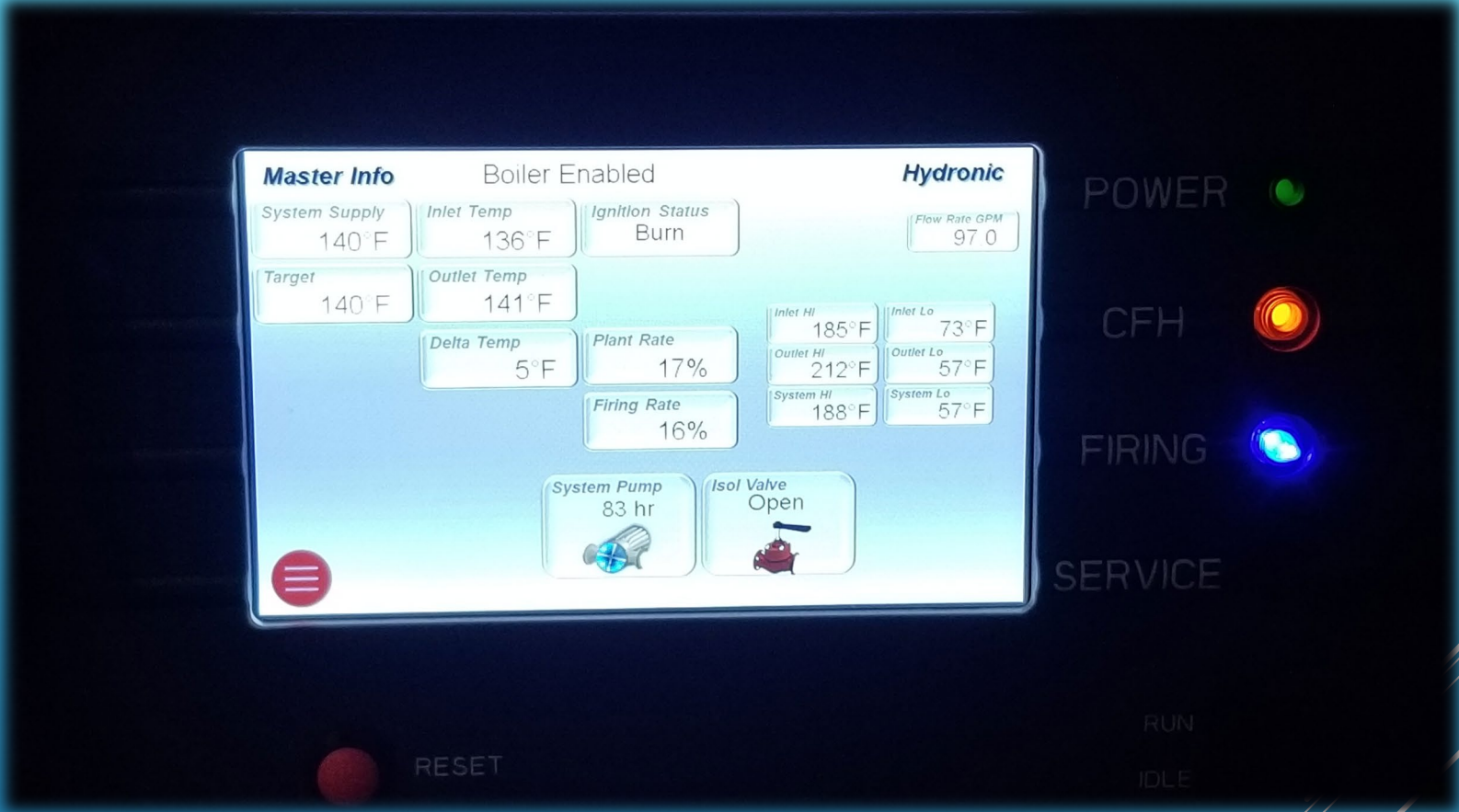
SYSTEM INFORMATION



ISOLATION VALVES



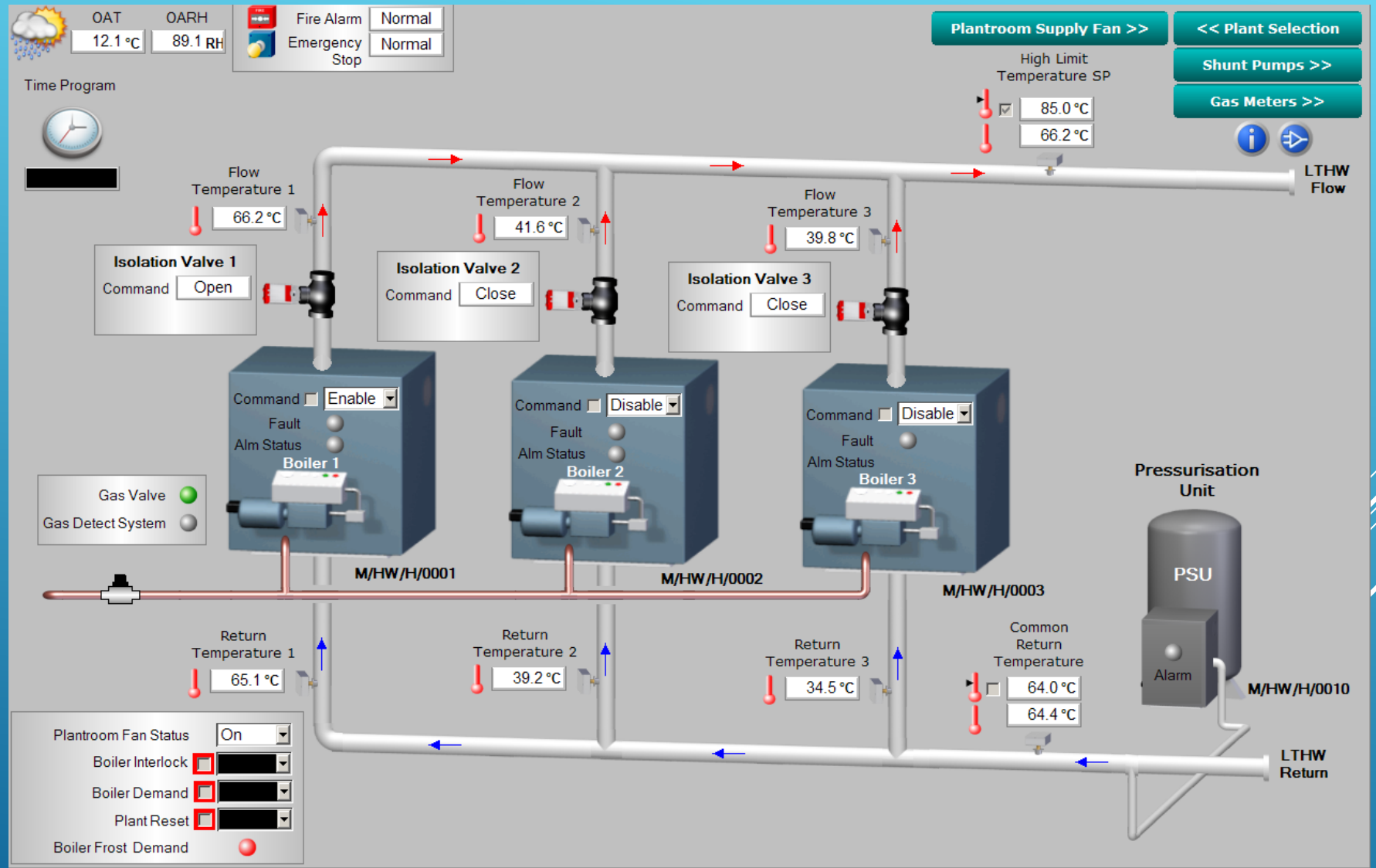
BOILER STATUS DISPLAYS



SYSTEM CONTROLS

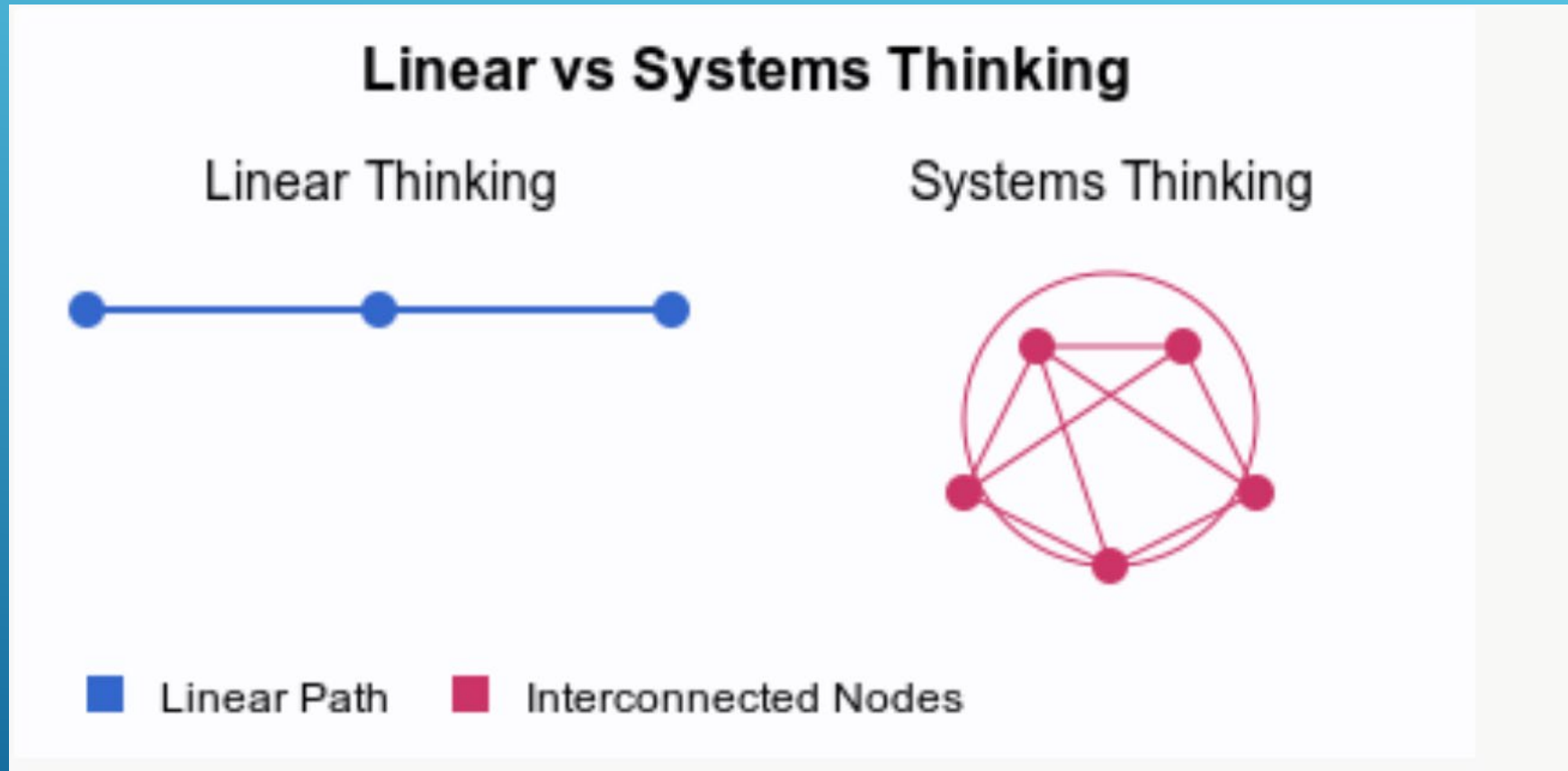


SYSTEM CONTROLS

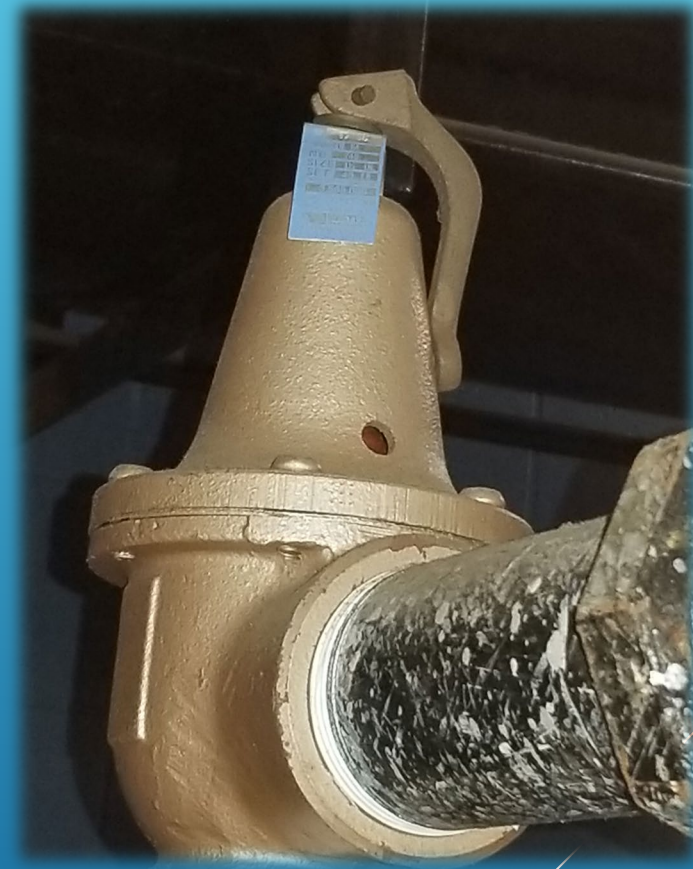


PROTECTION DEVICES & DEFICIENCIES

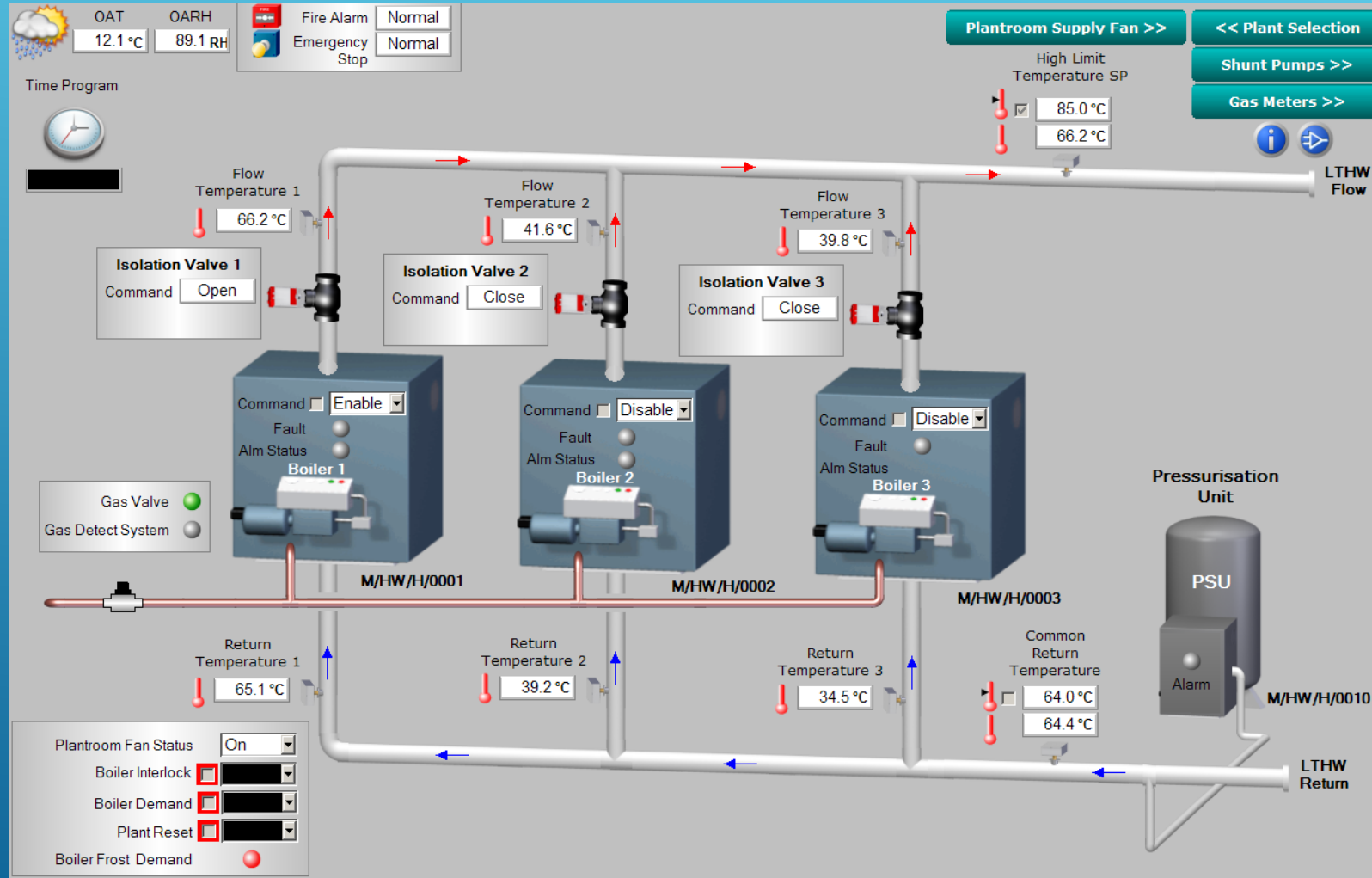
APPROACH LINEAR ~VS~ SYSTEMS



MECHANICAL PROTECTION DEVICES

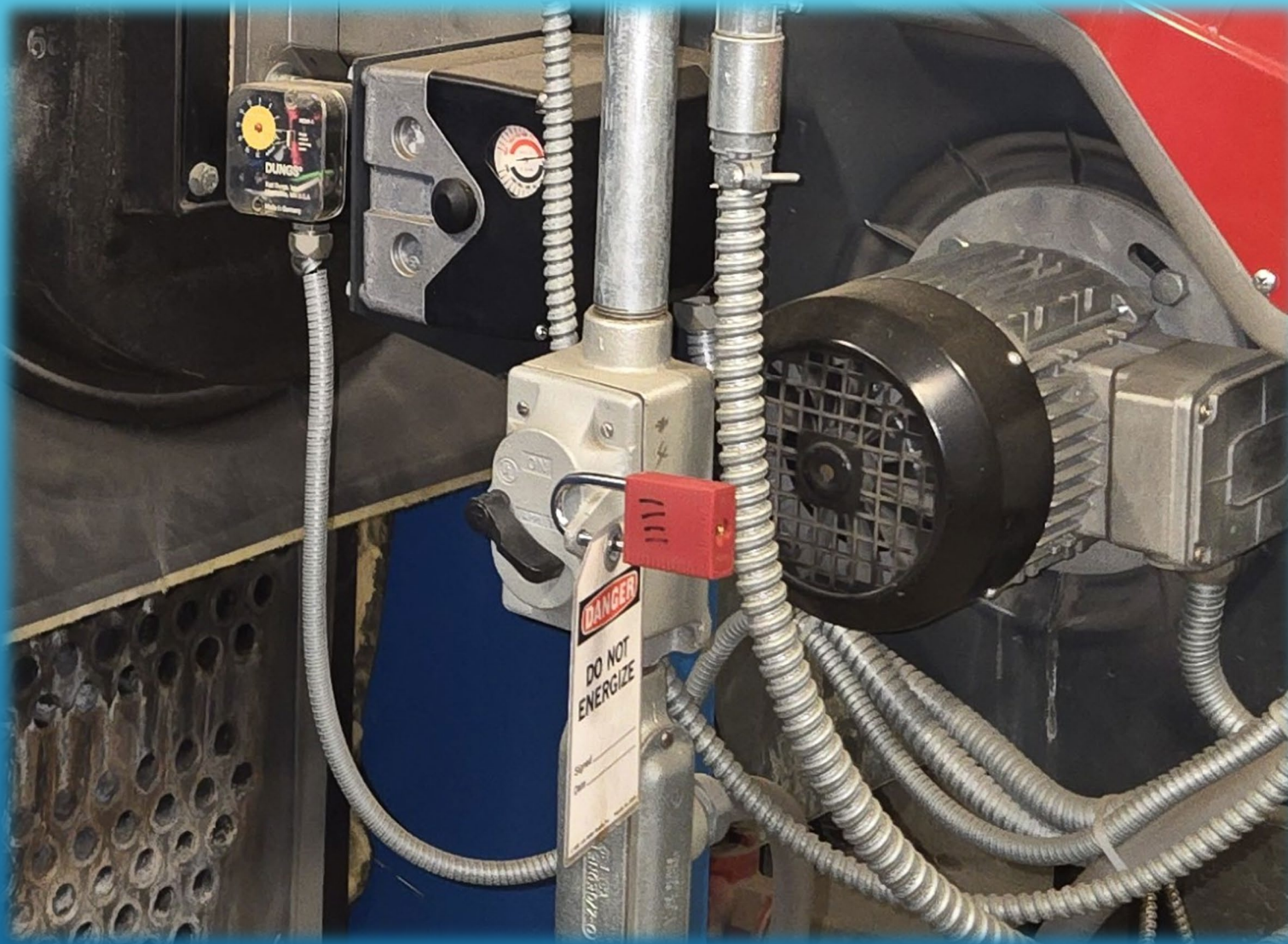


ELECTRONIC PROTECTION SYSTEMS





Lockout - Tagout



Lockout - Tagout



Lockout - Tagout



Environmental Issues



Environmental Issues



Environmental Issues

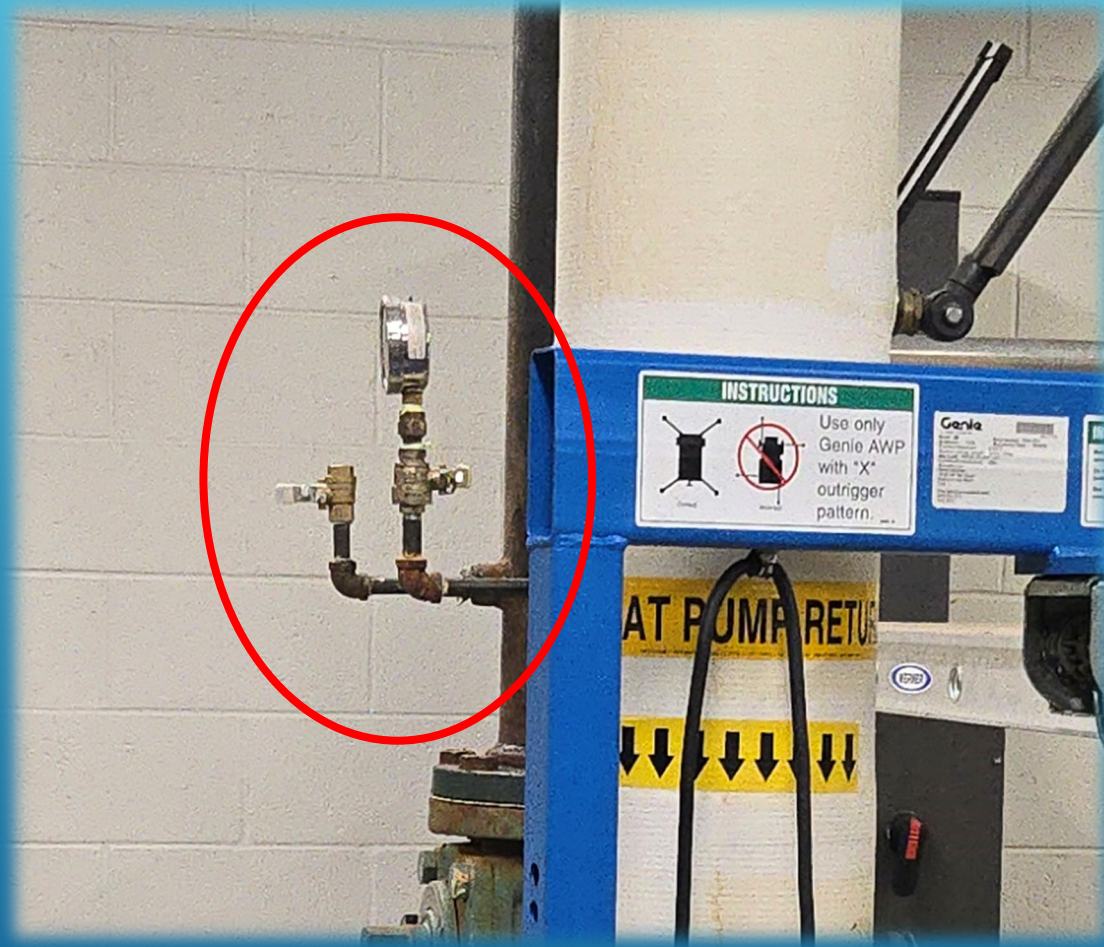
Examples of Plant Deficiencies



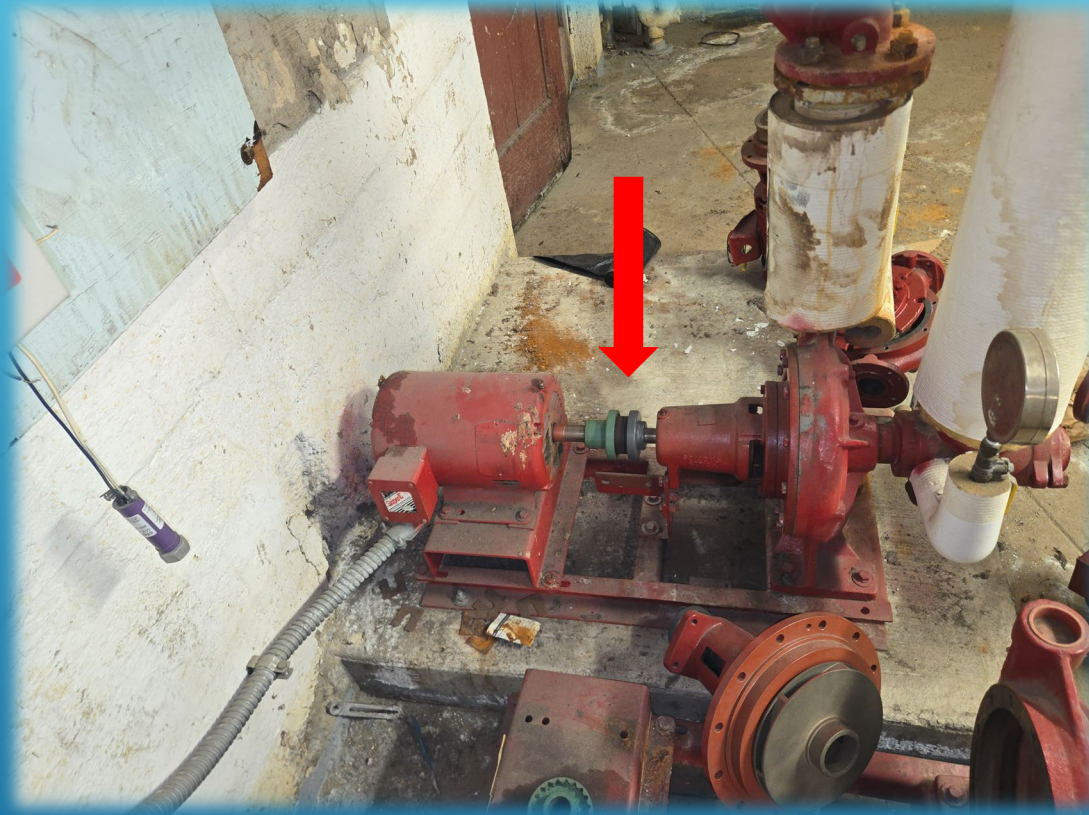
EXAMPLES OF PLANT DEFICIENCIES



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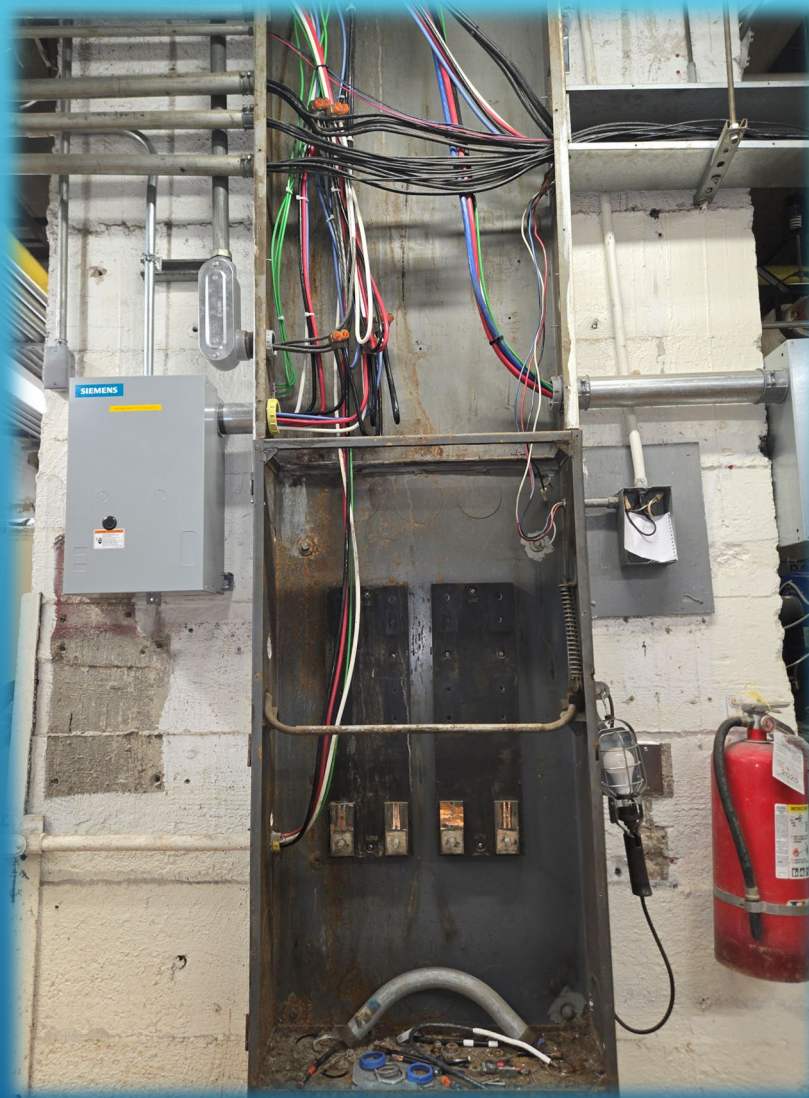
EXAMPLES OF PLANT DEFICIENCIES



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EXAMPLES OF PLANT DEFICIENCIES



OPEN DISCUSSION QUESTIONS?

MODULE THREE – BEST PRACTICES & EMERGENCY RESPONSE

Suggested Best Practices

- ✓ Become familiar with normal boiler room conditions
 - Sites
 - Sounds
 - Smells
- ✓ Know the location & function of all 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.

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. Consider training 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.

SPELL – JIF WEB SITES

[HTTPS://WWW.SPELLJIF.COM/TRAINING](https://www.spelljif.com/training)

SPELL SAFETY 360 RESOURCES WEB SITE

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						
Views Grid view Hide fields Filter Group Sort						
	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						
Copy base View larger version						

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OPEN DISCUSSION QUESTIONS?