



SNS COLLEGE OF TECHNOLOGY

AN AUTONOMOUS INSTITUTION



Approved by AICTE New Delhi & Affiliated to Anna University Chennai
Accredited by NBA & Accredited by NAAC with A⁺⁺ Grade Recognized by UGC

DEPARTMENT OF AGRICULTURAL ENGINEERING

COURSE CODE & NAME: 19AGT301 & HEAT POWER ENGINEERING

III YEAR / V SEMESTER

UNIT : V Boilers

TOPIC 8 :Boiler Maintenance



Boiler Safety

Developed by Western Iowa Tech Community College

This material was produced under a grant (SH-16634-07-60-F-19) from the Occupational Safety and Health Administration, U.S. Department of Labor. It does not necessarily reflect the views or policies of the U.S. Department of Labor, nor does the mention or trade names, commercial products, or organization imply endorsement by the U.S. government.



Boiler Room Hazards

- **A Risk Of Explosion Exists**
- **High Pressure steam**
- **Combustion Gases**
- **Chemicals**
- **Moving Machinery**
- **Hot Surfaces**





Communication is Critical

Boiler operation information is communicated to the boiler operator starting the shift to specify any special procedures required.



Boiler Log

The boiler room log lists boiler operation data that can be used to increase boiler safety and efficiency as well as identifying a potential malfunction.

BOILER ROOM LOG					
Month	Sunday	Monday	Tuesday	Wednesday	Thursday
BOILER OPERATION DATA					
Boiler on Line					
Pressure (psi)					
Stack Temp					
Condensate Return Temp					
Feedwater Heater Temp					
Fuel Oil Tank Temp					
Fuel Oil Pump Suction Pressure					
Fuel Oil Pump Discharge Pressure					
Fuel Oil Temp at Burner					
Outside Temp					
BOILER OPERATOR DUTIES					
Blowdown					
Gauge Glass					
Water Column					
Low Water Cutoff					
Test Flame Scanner					
Safety Valve Test*					
*Tested once a month when boiler is coming off the line					
Fuel Oil Accessories					
Change Over Strainer & Clean					
Clean Fuel Oil Burner					
Fuel Oil Gauge Readings					
Start of Shift					
End of Shift					
Gal. Consumed					
Operator's Initials					
Special Instructions:					



Water Level

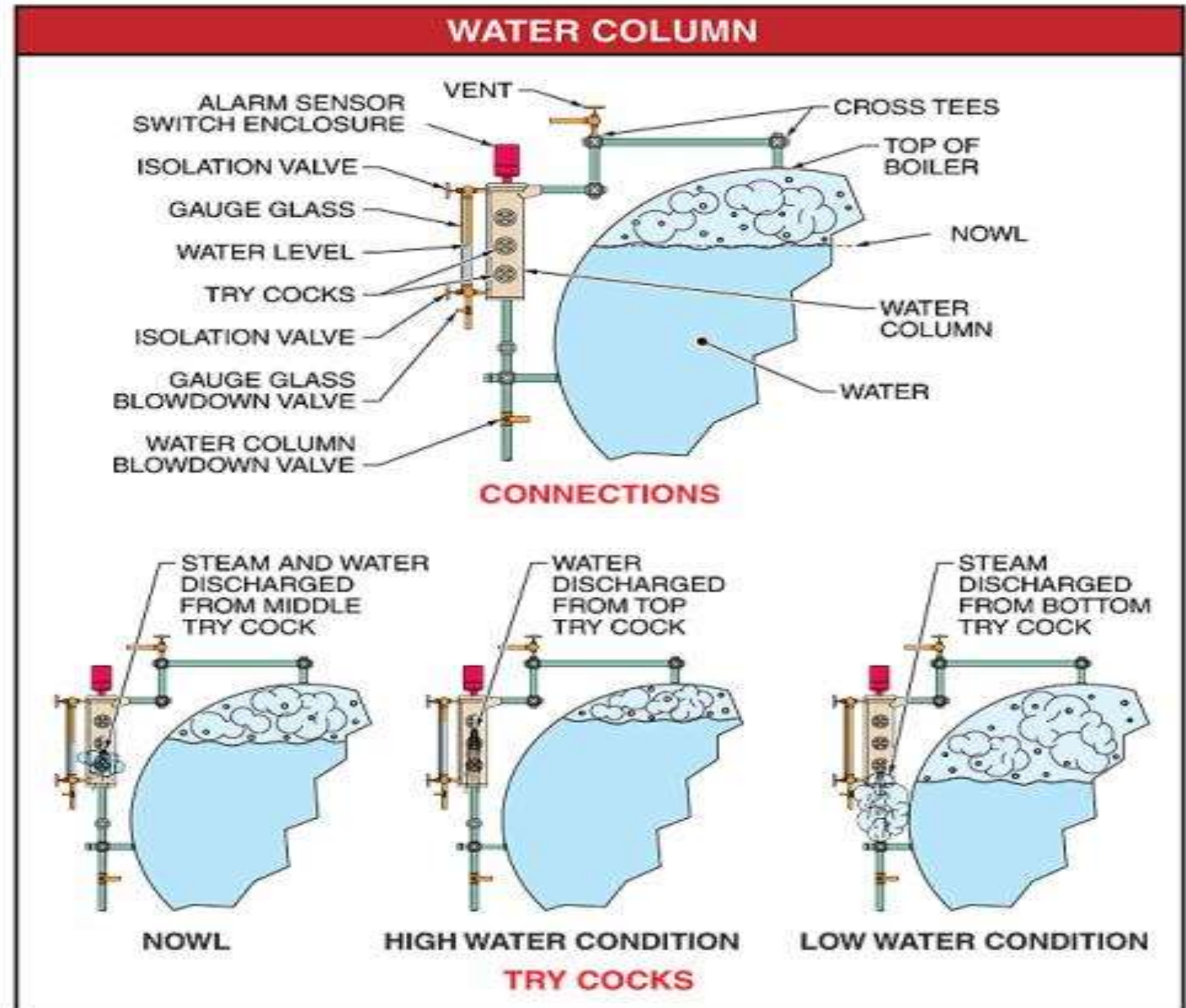
The Normal Operating Water Level (NOWL) should be approximately in the middle of the gauge glass.





Try Cocks

Try cocks are used to determine the boiler water level if the gauge glass is not functional.





Water Column And Gauge Glass Blowdown

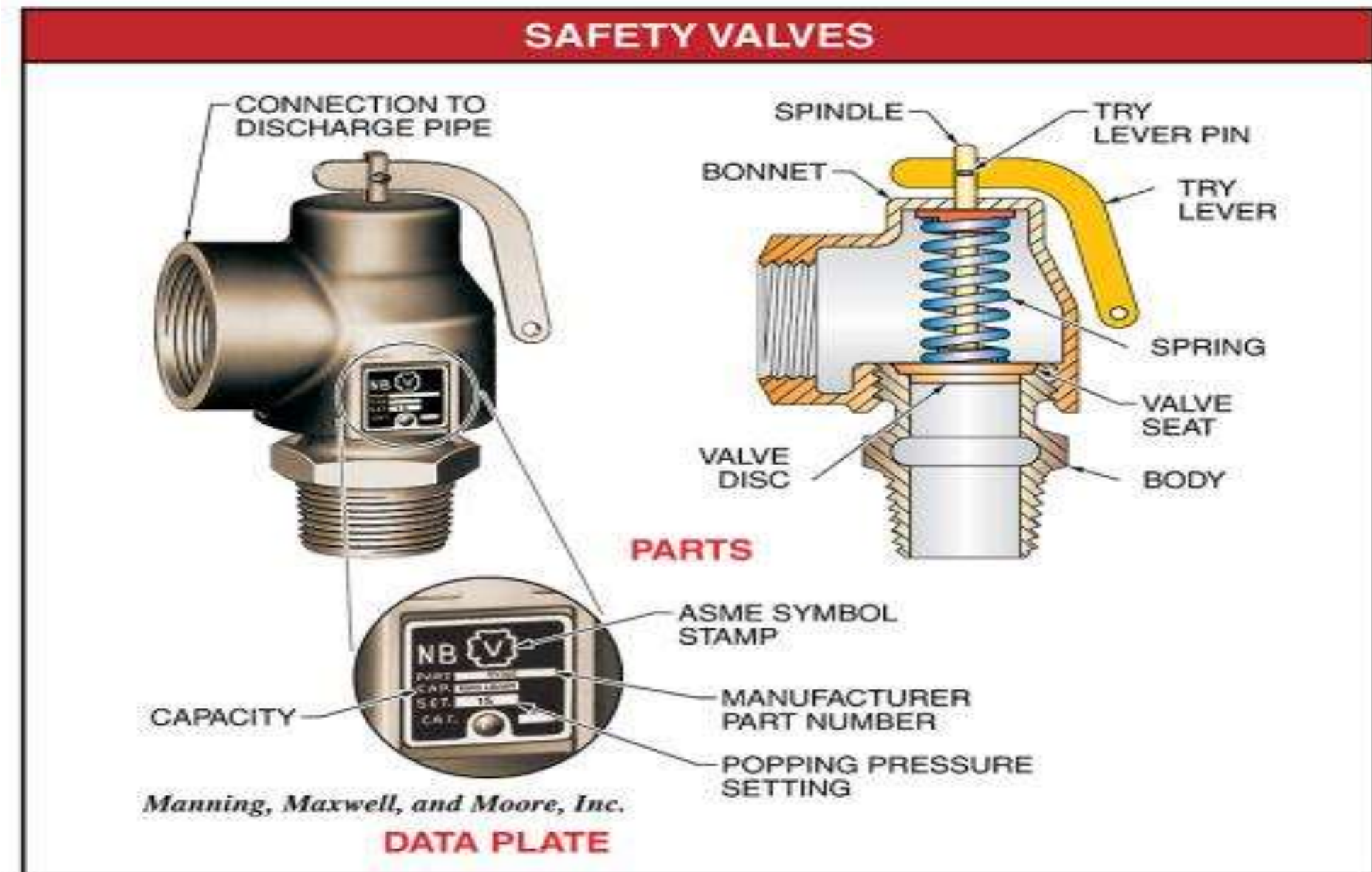
The water column is blown down first and then the gauge glass to remove any sediment. Water should enter the gauge glass quickly when the gauge glass blowdown valve is closed.





Safety Valve

The spring-loaded pop-off safety valve pops open when steam pressure exceeds the MAWP.





Safety Valve Test

Safety valves are routinely tested to ensure proper operation and must be serviced by an authorized manufacturer representative.





Burner Control System

The safety devices are all wired through a burner controller. This will shutdown the fuel supply to the burner.



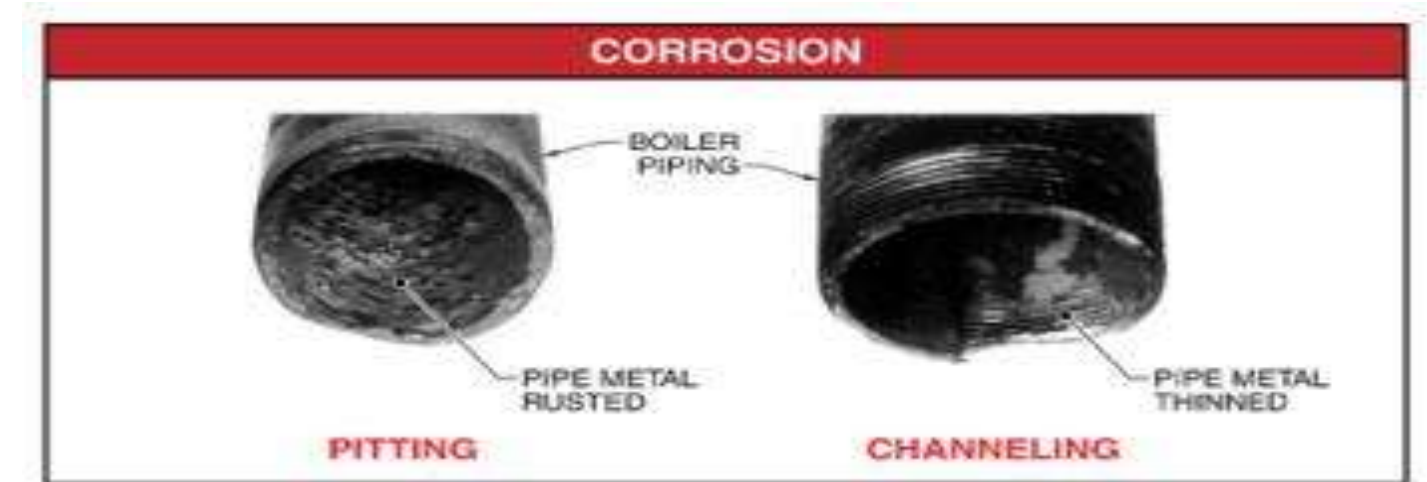
Flame Scanner Test

When testing the flame scanner, the flame scanner sensor is covered to simulate a flame failure.



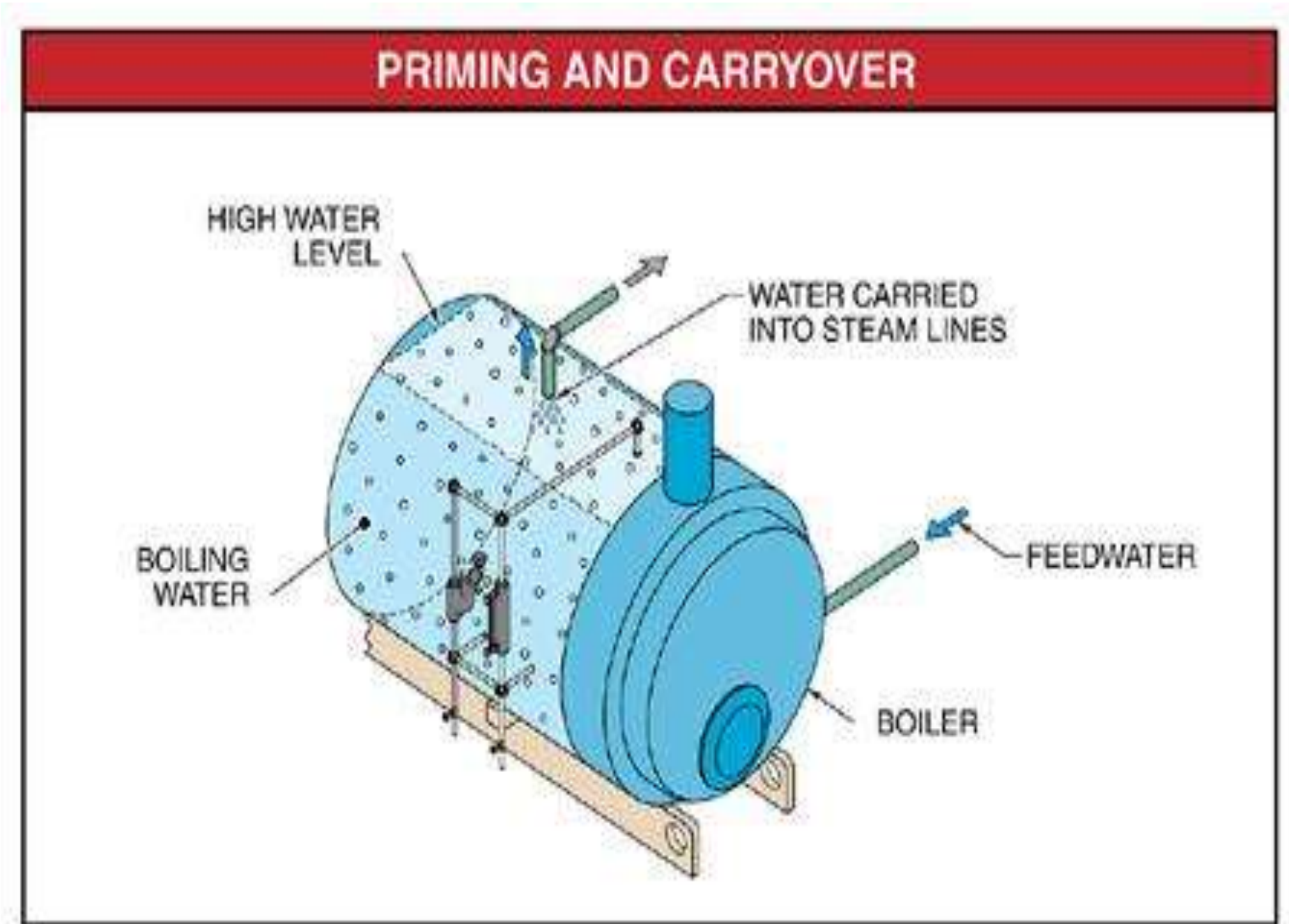
Water Treatment

Water must be treated for safety. Minerals can cause a build up of deposits and cause overheating of boiler parts.





Carryover occurs when a high boiler water level causes water particles to be carried into steam lines.





Bottom Blowdown

During a bottom blowdown, the boiler should be under light load and the water level should be at the NOWL.



Steam Valves

Steam valves are opened slowly and gloves are worn to prevent burns.



Handhole Covers

Manhole and handhole covers are removed to provide access to boiler parts during a boiler inspection.





Boiler Inspection

All internal surfaces are exposed and cleaned prior to the boiler inspection.



Clearer-Brooks



Pumps and Other Equipment

Pumps should be checked periodically to ensure proper bearing temperatures and checked for any unusual vibration. Do not wear loose clothing around moving parts.





Steam Traps

Steam traps are checked for proper operation when determining the cause of a steambound feedwater pump.





Protective Clothing

A face shield along with safety glasses provides eye protection when working with feedwater chemicals.





Fire Safety Plan

A fire safety plan includes the locations of fire alarms, fire extinguishers, the main electrical breaker, fire main, and exits for each area of the facility.





Chemical Safety

Containers that contain hazardous materials must be labeled, tagged, or marked.

HAZARDOUS MATERIAL CONTAINER LABELING . . .

RIGHT-TO-KNOW (RTK) INFORMATION ON CONTAINER LABEL

RTK LABEL

NFPA HAZARD SIGNAL SYSTEM

HEALTH HAZARD (BLUE)	FIRE HAZARD (RED)
4 DEADLY	FLASH POINTS
3 EXTREME DANGER	4 BELOW 73°F
2 HAZARDOUS	3 BELOW 100°F
1 SLIGHTLY HAZARDOUS	2 BELOW 200°F
0 NORMAL MATERIAL	1 ABOVE 200°F
	0 WILL NOT BURN
SPECIFIC HAZARD (WHITE)	REACTIVITY (YELLOW)
OX OXIDIZER	4 MAY DETONATE
ACD ACID	3 SHOCK AND HEAT MAY DETONATE
ALK ALKALI	2 VIOLENT CHEMICAL CHANGE
COR CORROSIVE	1 UNSTABLE IF HEATED
W USE NO WATER	0 STABLE
H HAZARDOUS MATERIAL	

. . . HAZARDOUS MATERIAL CONTAINER LABELING

CHEMICAL NAME: ACETONE

PROTECTIVE EQUIPMENT INDEX

DEGREE OF ACUTE OR CHRONIC HEALTH HAZARD	DEGREE OF FIRE AND EXPLOSION HAZARD	DEGREE OF STABILITY AND COMPATIBILITY	PROTECTIVE EQUIPMENT AND PRECAUTIONS REQUIRED
A	B	C	H
B	C	D	I
C	D	E	J
D	E	F	K
E	F	G	X
F	G		
G			

HMIG SYSTEM

Lab Safety Supply, Inc.



Lockout/Tagout

Lockouts and tagouts are applied to equipment to prevent injury from energized circuits and equipment operation during maintenance and repair.

LOCKOUT/TAGOUT

LOCKOUT/TAGOUT PROCEDURES

Before Working on Equipment

- Notify all personnel affected by lockout/tagout.
- Stop equipment and remove all power sources. Release any stored electrical energy and/or pressurized air or fluid.
- Secure moving parts as required.
- Apply lockout/tagout.
- Measure for voltage using voltmeter. Test all controls to ensure power is OFF.
- Verify all controls are in OFF position.

After Working on Equipment

- Remove locks, release secured moving parts, and prepare equipment for operation.
- Make sure all affected personnel are clear of equipment.
- Replace all safety guards and controls.
- Remove lockout/tagout.
- Energize and test equipment.

ANSI PIPE COLORS

Color	Designation
Red	Fire protection materials
Yellow	Hazardous gas or liquid
Green	Non-hazardous liquid
Blue	Non-hazardous gas

LOCKOUT DEVICES

DISCONNECT
MULTIPLE LOCKOUT HASP
TAGOUT USED ALONE ONLY WHEN LOCKOUT IS IMPRACTICAL
DANGER TAG
LOCKS



Accident Reports

An accident report details facts about an accident in the facility and is required for insurance claims.

Employee Status
 Full Time
 Part Time
 Other _____

ACCIDENT REPORT

Accident Classification
 First Aid Only
 Medical Treatment

PLEASE COMPLETE ALL INFORMATION

1. Name of Employee: Chris Jackson Social Security # 000-00-0000
2. Address: 7624 Gander Court Home Phone # 555-5724
3. Age 41 Sex M Occupation/Title Master Carpenter
4. Was Employee engaged in regular course of his duties at time of accident? Yes No
5. If No explain _____
6. Experience in this work activity _____ years _____ months _____ weeks
7. Total job experience for County _____ years _____ months _____ weeks
8. Department/Division Facilities Date Reported to Supervisor 10/3
9. Date of Accident 10/3 Time 11:25 am am pm Last Day Worked 10/3
10. Location of Accident Heating Plant Boiler Room
11. How many (avg) hrs per week is employee employed 5 If seasonal employment give total weekly hours _____ Regular Days Off Mon, Tue
12. Shift Hours 7 am to 12 am Working Overtime _____
13. Enter Employee Rate of Pay (See Chart) \$ 16.75 per hr check appropriate box Day Week Month
14. Do you agree with the employee's description of the Accident or information? If not, explain why Yes



Thank You