

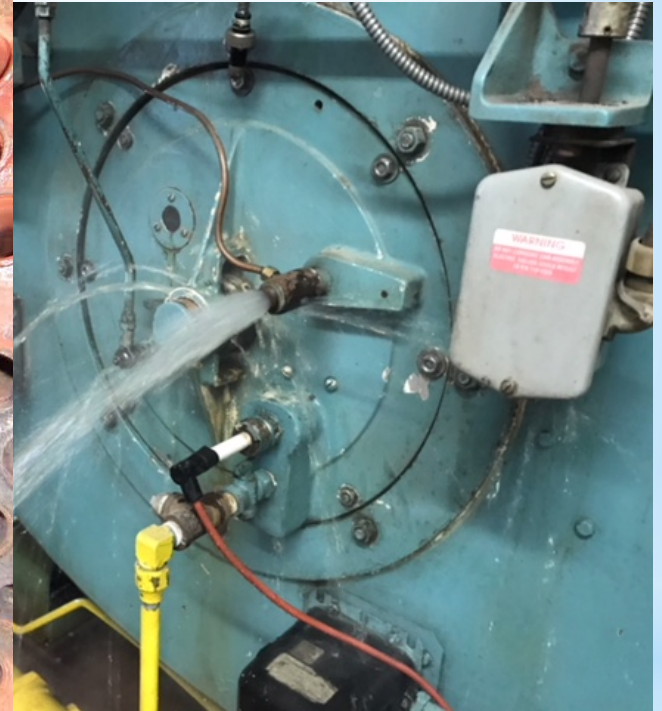
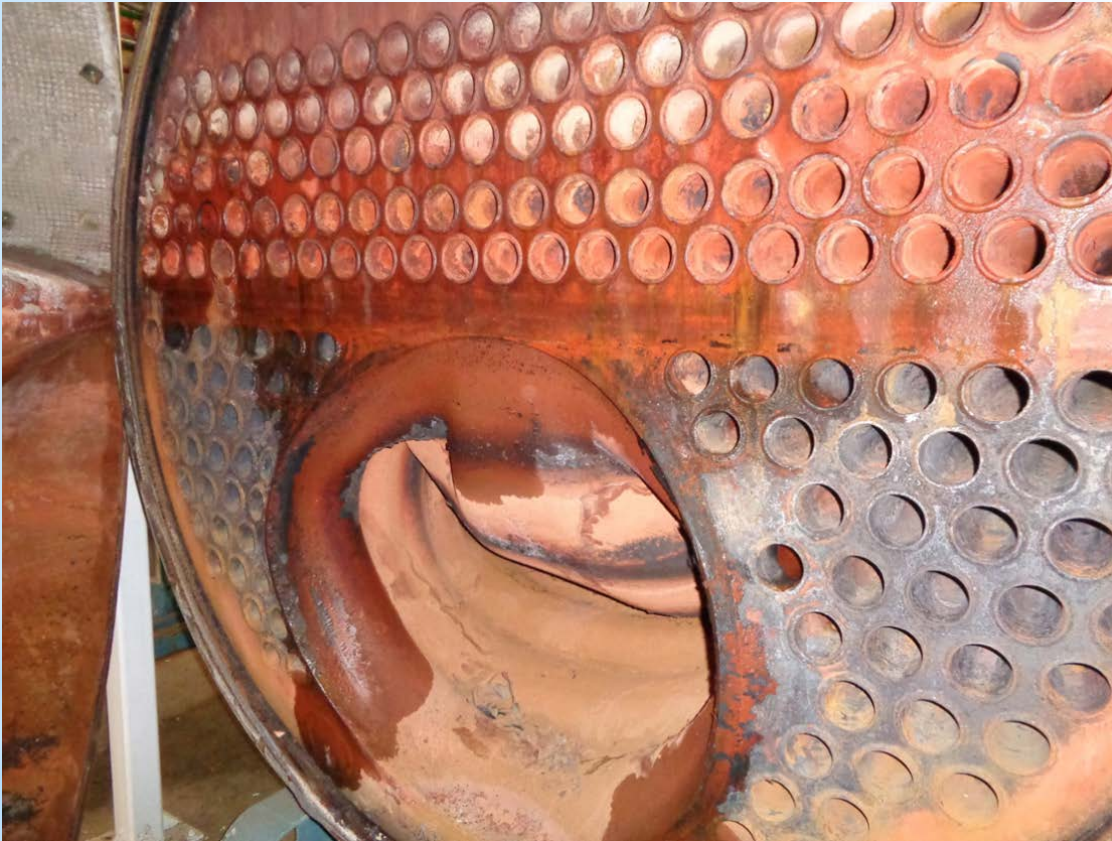
# 5 Why's of Maintenance - Boilers

Presented by: Don Williams



**R.F. MacDonald Co.**  
*your boiler & pump solutions team*  
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# Why Maintenance #1



300 HP Firetube Boiler

# Why Maintenance #1

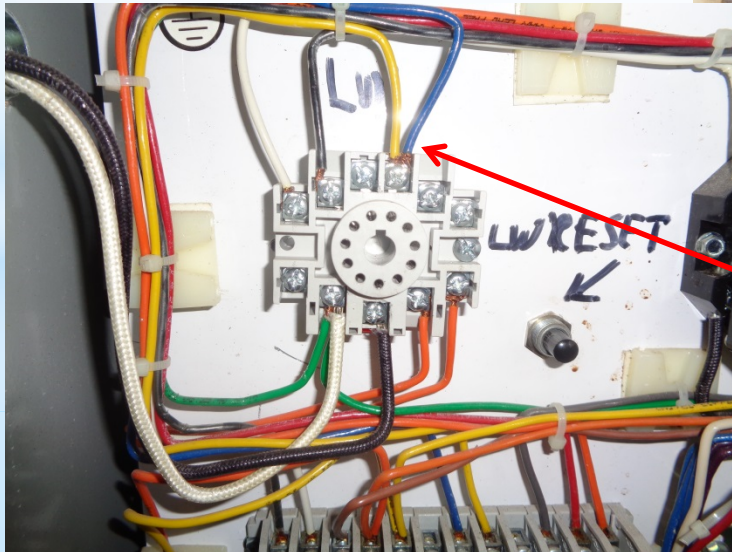
- \* Did not perform hourly boiler checks
- \* Did not test LWCO before each shift much less daily
- \* 6 months prior was notified LWCO did not work but continued to operate boiler
- \* ALWCO failed in closed position

\* ADDITIONAL LIMITS: Additional limits tested  
1st LWCO Does Not Shut Down  
Burner - Probably Wiring  
Does Sound Alarm Horn  
and Works OK





# Why Maintenance #2



200 HP Firetube Boiler

ALWCO jumppered

# Why Maintenance #2

- \* ALWCO relay was jumpered removing it from safety circuit
- \* LWCO float switch was worn out, intermittent operation
- \* Site performs their own annuals
- \* Operators did not perform LWCO test at start of each shift much less daily



# Why Maintenance #3

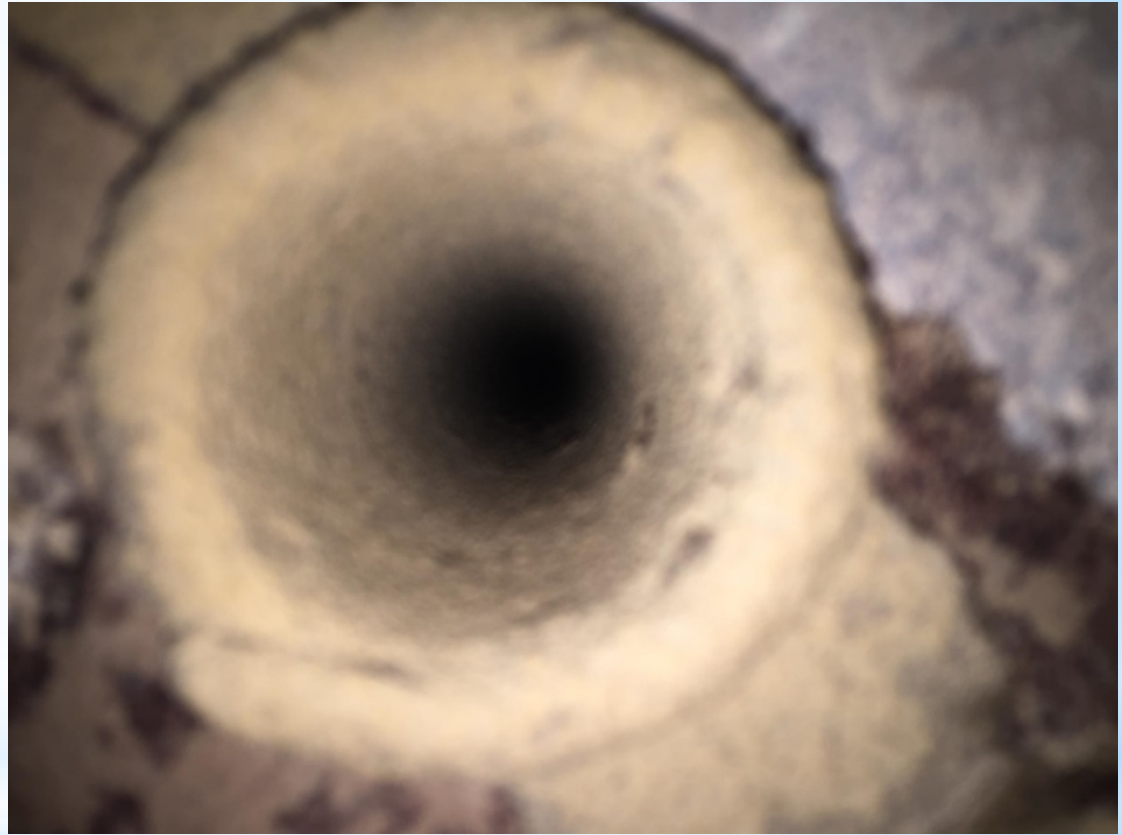


600 HP Firetube Boiler

# Why Maintenance #3

- \* Boiler water chemistry not maintained nor monitored
- \* Boiler not blown down daily
- \* Less than 8 months after annual completed

# Why Maintenance #4



30,000 PPH Watertube Boiler



# Why Maintenance #4

- \* Poor water chemistry
- \* During annual inspection inspector had notified end user to have tubes cleaned or the boiler would be red tagged
- \* Customer did not clean tubes and upon inspector follow up was red tagged and shut down
- \* Rental boiler and additional costs

# Why Maintenance #5



9.5 HP Cal Special Vertical Boiler

# Why Maintenance #5

- \* Small boiler didn't require attendant per Title 8 Section 781 of California Code
- \* Water level switches weren't being tested
- \* Time delay relay provided by vendor to minimize nuisance trips was changed by end user
- \* Installed incorrect relay bypassing water level safety circuit
- \* Boiler dry fired and melted down due to feed tank running empty due to bad float switch



# Why Maintenance?

- \* Each of these incidents would have been avoided if proper operation and maintenance had been performed
- \* California Code Title 8 Section 781 establishes guidelines for boiler attendants on High Pressure Steam Boilers and includes annual inspection requirements
- \* California Code Title 8 Section 770 requires annual inspections of boiler and controls by an inspector
- \* Inspection of safety limits should be completed by a competent and qualified person who has the knowledge and experience to determine the integrity of the devices

