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Naval Facilities Engineering Command
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Naval Facilities Engineering Command Northwest

Safety Lessons Learned Accident Abstract

Accident Type: Natural Gas Boiler Catastrophic Failure - explosion

Injury: No injuries

Damage: Destruction of Boiler and exhaust flue; ancillary property damage

Type of Work: High fire boiler

DESCRIPTION OF THE ACCIDENT:
On 11 September 2012, boiler installation subcontractor was nearing overall completion of the installation of two Bryan Model EB -200-boilers, outfitted with Riello RLS-250 burners, at the Naval Hospital Bremerton. The subcontractor was initiating boiler performance testing on boiler #2 and was providing training to BOSC personnel and demonstrating boiler performance to the boiler burner manufacturer –Riello. Boiler technicians were unable to attain the required combustion rate and the subcontractor noted the boiler's inability to fire off at high fire specification requirements. At 1520 Boiler #2 explodes during the high fire evolution, which forced the combustion chamber doors to blow off into the mechanical room. The exhaust flue was destroyed by the shock and anchor bolts separated from boiler's foundation. Adjacent equipment in the mechanical room suffered collateral damage and luck yielded no serious injuries - seven contractor personnel present at time of the explosion.

DIRECT CAUSE:

- Burner manufacturer/vendor stated the addition of a Gas Pilot Ignition Assembly (GPIA) for the North American market to a burner proven in the European market caused the flame to separate from the burner combustion head during high fire operations, enabling the accumulation of unburned fuel.

INDIRECT CAUSE:

Having identified that the boiler system was not performing properly the installation technicians manipulated the control system well beyond what would be considered normal adjustments when tuning a new boiler.

ROOT CAUSE:

- Manufacturer's publication of faulty performance specifications for RLS-250 model burner after integration of a GPIA for the North American market.

LESSONS LEARNED:

- The prime contractor did not effectively control personnel presence, failing to recognize performance testing as a high risk activity.
- The troubleshooting steps identified and employed should have raised a red flag and/or triggered questions for a higher level decision maker or a more qualified boiler technical specialist / mechanical engineer.
- Detailed planning is required prior to initial boiler run-up testing and demonstration to ensure proper operational risk management is conducted – determine indicators requiring testing securement and ensuring only essential personnel are present during testing.

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