

Naval Facilities Engineering Command

Abstract of an Accident

98-1

ACCIDENT TYPE: Multiple Third Degree Burns (Steam)
INJURY: Permanent Disability
TYPE OF WORK: Steam Distribution System Start-up
EQUIPMENT: Steam Distribution Lines

DESCRIPTION OF MISHAP

Employee was injured by a massive blast of steam released when two system valves ruptured (first a 10 inch and then a three inch valve) as he operated another bypass valve inside a steam valve pit to bring the steam system "on-line".

DIRECT CAUSE

- Mechanical Failure - The flange of a cast iron 10 inch steam valve failed when the system re-heated because an expansion joint malfunctioned (it had not returned to its correct position when cooled). This placed excessive force on the valve and expansion joint supports during system heat-up.
- The three inch valve secondarily failed as a result of bending moment forces from failure of the 10 inch valve flange.

INDIRECT CAUSES

- Lack of established procedures.
- No comprehensive work plan prepared and approved to bring the system "on-line".
- No specific safety related work practices or procedures developed to control injury in event of energy release.
- System not designed to allow operation of valves from outside all steam pits to minimize entry into steam pits during system operation.

LESSONS LEARNED

- Ensure written standard operating procedures are established and communicated to all utility plant employees on steam distribution system start-up.
- Ensure all procedures for control of energy sources (lockout/tagout/tryout) located in 29CFR Part 1910.147 are integrated into all command utility operations.
- Ensure personal protective equipment evaluations are conducted for operations involving steam.
- Engineer/design for new steam systems and engineer/redesign existing systems for remote valve operation (outside steampits) to eliminate entering valve pits during system start-up/shutdown.

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