

ABSTRACT REPORT OF ACCIDENT

TYPE OF LOCATION: Construction Site

DATE AND TIME OF ACCIDENT: 14 December 2010, 1700 to 15 December 2010, 0600

CATEGORY: Class A (Estimated), Property Damage, Facility Under Construction

DESCRIPTION OF ACCIDENT: Flooding incident in Replace USCENCOM HQ. Chill water line was being flushed throughout the night. Equipment in attic had a temporary bypass so that flushing did not run through the equipment coils. PVC bypass line came apart causing flooding of attic. Water infiltrated down to lower floors and affected the east side electrical rooms all the way down to the 1st floor (4th, 3rd, 2nd and 1st floors). The flushing included addition of fresh water through a hose connection and bleed off of some water also by hose to drain line. Water available for flooding was subsequently unlimited due to connection to fresh water line. Less flooding occurred as you go down each floor.

NATURE AND NUMBER OF INJURIES AND PROPERTY DAMAGE: Flooding in attic and leakage of water into mechanical and electrical room four floors below source of leak. Initial estimate of damages is in excess of \$1,000,000.00.

CAUSES, DIRECT AND INDIRECT, OF THE ACCIDENT: It is the opinion of the board that the following direct and indirect factors led to the occurrence of this accident.

Direct Cause:

1. The direct cause of the incident was PVC joint failure in a temporary by-pass line. There was no apparent bonding observed between pipe and flanged fitting. The pipe was not fully inserted into the flange and at an angle causing the pipe to not fully seat into the flange.

Indirect Causes (in order of importance):

1. An indirect cause was no restraint (i.e. shoring or blocking) of the 2 elbows on the by-pass line.
2. An indirect cause was the lack of personnel during night to monitor/regulate discharge pressure of circulation pumps.
3. An indirect cause was the potential adverse effects that the cold temperatures experience during the flushing operation.

REMARKS:

1. Chill water supply and return lines were hydrostatically tested at a pressure of 100 psi during the week of 6-10 December.
2. After hydrostatic test was completed, six (6) by-pass lines were installed and the piping system was filled with water. Three by-pass lines we observed to be PVC and one was observed to be copper/steel.
3. Prime Contractor QC personnel suggested to Mechanical Subcontract Superintendent that additional restraints/shore might be needed at the PVC by-passes. This suggestion was not implemented by the Mechanical Superintendent.
4. Prime Contractor QC personnel and Mechanical Subcontractor Superintendent walked the system to check for leaks before starting the pump to circulate water.
5. At approximately 1000 on Monday, 13 December 2010, the flushing process began with one pump circulating water through the system.
6. The system was walked several times though out the day Monday and the pump was left running throughout the night.
7. On Tuesday, 14 December 2010, the second circulating pump was started and used to circulate the water. The two pumps are installed in a parallel configuration and only one pump was operating at a time in a manual mode controlled by a Variable Frequency Drive.
8. Mechanical Subcontractor stated that several times during the day on Tuesday, the system pressure required manual adjusting. At the close of business the VFD was adjusted down to 35 Hz and left running at that condition for the night.
9. At 1645, on Tuesday, 14 December 2010, Prime Contractor Representative made end of day tour of the facility and no visible or audible evidence of leaks were observed.
10. At 0645, Wednesday, 15 December 2010, Electrical Subcontractor entered the building and discovered water in electrical rooms. Pumps were immediately shut down and a PVC fitting was found to have failed.
11. The floor drains in the area of the failed joint were covered to keep construction debris out and prevented the draining of water. Even if the floors drains were uncovered, the deluge from the open pipe under pressure would have exceeded the capability of the floor drain and still would have resulted in water damage to lower levels.

RECOMMENDATIONS: It is the opinion of the board that implementation of the following corrective actions will reduce the probability of future occurrences of similar accidents.

1. QC/QA should inspect construction of temporary piping to the same standard as permanent.
2. By-pass lines should be installed prior to hydrostatic testing of the system.
3. Building systems being filled, cleaned, tested, etc. should not be left in operation unattended unless proper and adequate safety systems are in place.

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