



National Conference on Building Commissioning



Amazing Findings "Pop Goes the Heat Pump"


April 2006 – San Francisco, CA

Bryan W. Welsh, P.E.



Welsh Commissioning Group, Inc.

Mullenix Ridge Elementary



- ✦ One of three identical prototypical schools
- ✦ All electric buildings on special school-only electrical rate
- ✦ Water source heat pump system
- ✦ "Commissioned" by school district staff

Commissioning Steps

- ✦ Design Review
- ✦ Site Observations
- ✦ Witness of Start-Ups
- ✦ Installation Verification
- ✦ Functional Test
- ✦ Troubleshooting
- ✦ O&M Review and Training
- ✦ Minimal Documentation of Process

Observations

- ✦ During construction – weld-o-let coupons and slag were observed being dropped in the hydronic piping
- ✦ During fill of hydronic loop – water main broke and siphoned in huge amounts of sand
- ✦ Post occupancy – heat pumps in one wing were popping off on high refrigerant pressure limit

Investigation

- ✦ High Differential Temperature across hydronic pipes of units in question
- ✦ Balancing records said all was OK
- ✦ High Differential Pressure across the wing in question and low DP at each unit
- ✦ Obstruction location was predicted within a range of pipe lengths
- ✦ Contractor assured that all piping was ragged out prior to being put into service
- ✦ Contractor reluctant to disassemble pipe (grove lock) to investigate

The Amazing Finding

- ✦ After weeks of convincing, the system was drained and the piping disassembled.
- ✦ Much to everyone's surprise (and the contractor's dismay) an unexpected item was found lodged in the elbow right where predicted.....