

# Take 5 for Safety

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NATIONAL LABORATORY

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# Causal Factors for Motor Failures

- The cable attached to the air switch was extremely old; it was a copper lug on aluminum cable which can become loose over years due to thermal cycling
- There were no protective devices which showed a loss of phase or a phase imbalance at the substation
- Seven of the motors which failed had thermal overload protection on only two phases
- On two of the motors which failed, the thermal overloads were set inappropriately high
- One of the motors was in a blower in a power supply protected by a PLC that was programmed to turn the equipment off during a voltage imbalance; the logic in the program was incorrect

# Follow-up Actions

- Investigate adding protective relaying to substation to protect against this type failure
- Regular thermal scans of the power distribution equipment, where possible, should be done
- Existing motor protection should be checked to ensure all three phases are properly protected and that overload relays are properly set
- When replacing thermal overload relays the use of magnetic type solid state trip units should be considered
- When installing large motors, the use of under voltage protection devices should always be considered a best practice

# Look for Hazards in Every Direction



**Dear, lean out a little farther—I'm going to make a left**