

Michael Brinkman

Substation & Transmission Maintenance Manager
Pedernales Electric Coop, Inc

Dedicated substation and transmission maintenance manager with 25+ years of experience in the electric utility industry. Proven expertise in substation design, construction, maintenance, protection, and control. Passionate about ensuring a reliable and efficient electrical grid. Currently leading a team at Pedernales Electric Cooperative, leveraging my management skills to drive operational excellence and deliver exceptional service to our customers.





PEC Winter Preparedness

Mike Brinkman | Substation & Transmission Maintenance Manager
Pedernales Electric Coop, Inc

Rule 16 TAC § 25.55 Winter Requirements

By December 1 each year, a Transmission Service Provider (TSP) must complete the following winter weather preparation measures for its transmission facilities.

- Confirmation of the operability of all systems and subsystems containing all cold weather critical components
- Confirmation that the sulfur hexafluoride gas in breakers and circuit switchers is at the correct pressure and temperature to operate during winter weather emergencies
- Perform annual maintenance that tests sulfur hexafluoride breaker heaters and supporting circuitry to assure that they are functional
- Confirmation of the operability of power transformers and auto transformers in winter weather emergencies by:
 1. Inspecting heaters in the control cabinets
 2. Verification that main tank oil levels are appropriate for actual oil temperature
 3. Inspecting bushing oil levels
 4. Inspecting nitrogen pressure
 5. Verification of proper oil quality such that moisture and dissolved gases are within acceptable ranges for winter conditions

PEC Monthly Inspections

- Substation inspections performed all 12 months of the year
- 2 substation inspectors inspecting stations daily
- 12-day revolving inspection route consisting of 3-4 substations each day
- Inspections are recorded in Maintenance software
- Work Orders are created for issues found during inspections

Battery Banks

Monthly Inspection

- Bank float voltage
- DC ground check
- Cell voltage
- Cell specific gravity
- Electrolyte levels
- Cell condition
- Battery charger charging current
- Condition of battery rack – i.e., corrosion & integrity



Ventilazation Of Battery Rooms

Monthly Inspection

- Verify operation of forced air vent fans
- Verify operation of forced air vent fan timers
- Inspect fresh air vents and filters, if equipped



Transformer & Breaker Bushing Oil Levels

Monthly Inspection

- Visually confirm oil level in all bushings



Transformers & Auto Transformers

Monthly Inspections

- Bushing oil level
- Main tank oil level
- LTC oil level
- LTC desiccant
- LTC oil filtration pump – operate hours & PSI
- Liquid temp – present & max
- Winding temp – present & max
- LTC position – present/min/max
- Nitrogen pressure – main tank
- Nitrogen supply tank volume
- Cabinet heaters operatable
- Cooling fans operatable
- Radiators free of obstructions (bird nests)





Transformers Cooling Fans

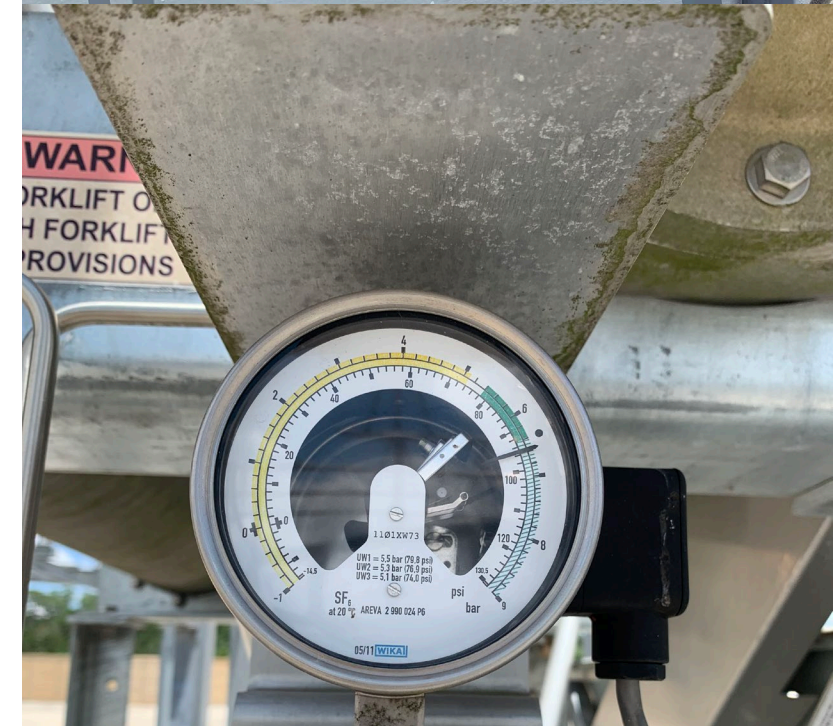
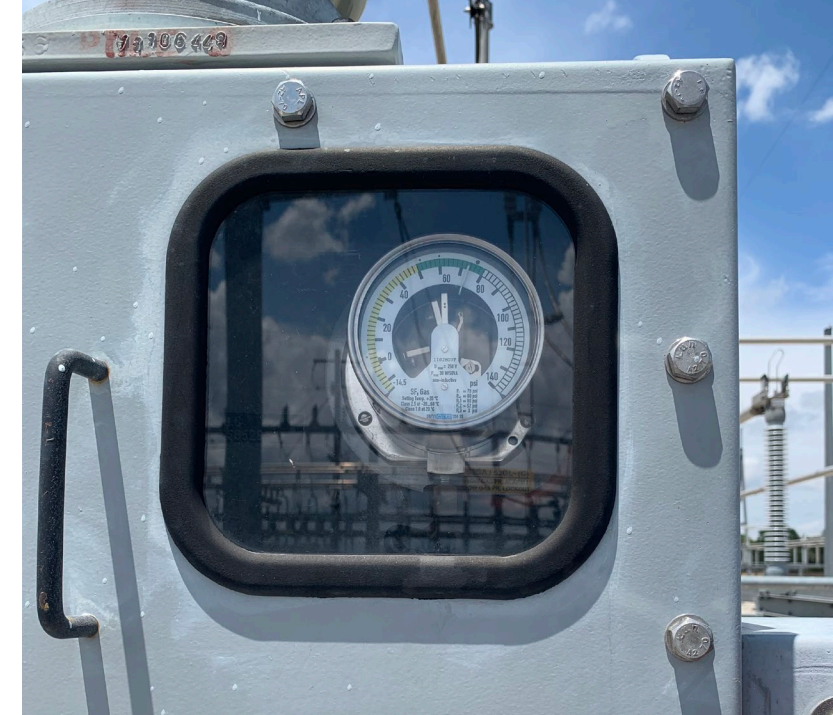
Monthly Inspections

- Check operability of fans
- Check radiators to be free of obstructions (bird nests)

Gas Circuit Switchers & Breakers

Monthly Inspections

- SF6 pressure
- Cabinet heaters
- Counter reading
- SCADA monitors SF6 low pressure thresholds 24/7 and dispatches Substation Maintenance for alarms



Relay Protection Schemes

Monthly Inspection

- Trip circuit integrity monitored via SCADA 24/7 and dispatches Substation Maintenance for alarms
- Check relay RS/EN light
- Check displays for alarms or trouble messages
- Check control handle red lights on breakers; both should be on for each trip coil. This visually confirms that the trip circuit is intact



Manual Switches

Monthly Inspection

- Inspect for broken parts
- Inspect for bird nests



Capacitor Banks

Monthly Inspections

- Capacitor bank physical integrity – bulging capacitors, broken parts, etc.
- Capacitor oil leaks
- Protection relays operational – check displays for alarms or trouble messages



Maintenance Records

All Maintenance Records Need To Be:

- Accurate
- Organized
- Detailed
- Completed and processed into maintenance database quickly so our asset database is up-to-date

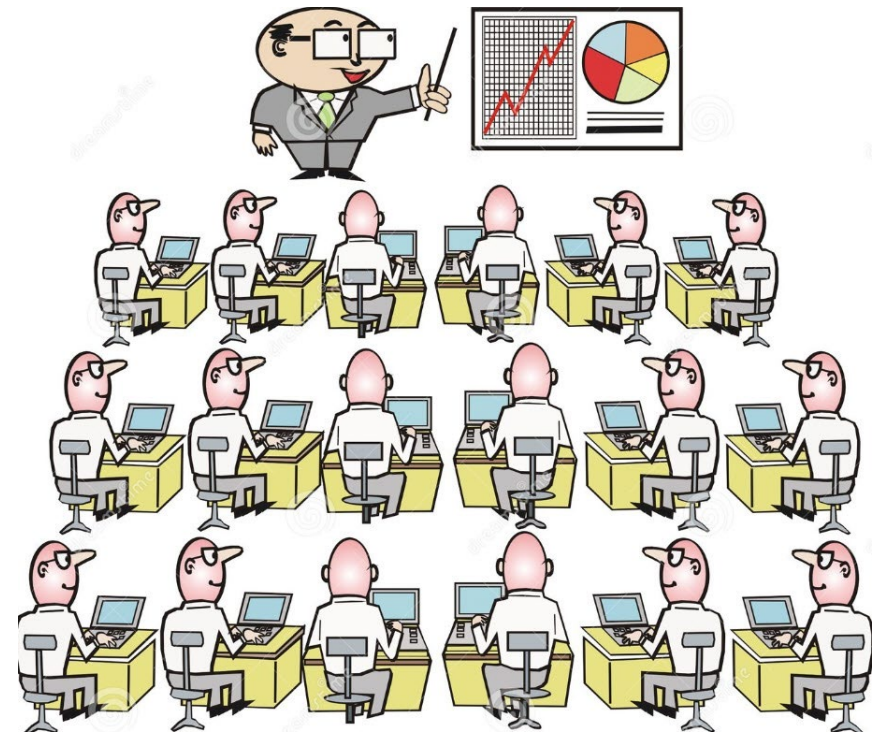
If maintenance records aren't kept, then the maintenance didn't happen!

MAINTENANCE OF RECORDS AND REPORTS



Preparedness Training & Training Record Retention

- Training of operational personnel on winter weather preparedness is mandatory
- Anyone who misses the training must make it up prior to December 1
- All trainees sign attendance sheet
- Training records must be retained



Questions?