

Substation Equipment Maintenance Manual

345 kV Anderson Switching Station

Safety Procedures

WARNING: All maintenance work on energized equipment must be performed by qualified personnel following established safety procedures. Always verify equipment de-energization and proper lockout/tagout procedures before beginning work. Personal Protective Equipment (PPE) Requirements:

- Arc-rated clothing (minimum 40 cal/cm²)
- Class 0 electrical gloves with leather protectors
- Hard hat with face shield
- Safety glasses with side shields
- Steel-toed boots rated for electrical work

Preventive Maintenance Schedule

Equipment	Maintenance Task	Frequency	Duration
Circuit Breakers	SF6 gas pressure check	Monthly	2 hours
Circuit Breakers	Contact resistance test	Annual	4 hours
Power Transformers	Oil sampling and analysis	Semi-annual	3 hours
Power Transformers	Thermography inspection	Quarterly	1 hour
Disconnect Switches	Contact cleaning and lubrication	Annual	6 hours
Current Transformers	Insulation resistance test	Bi-annual	2 hours
Voltage Transformers	Ratio and polarity test	Bi-annual	2 hours
Lightning Arresters	Leakage current test	Annual	1 hour
Control Systems	Battery capacity test	Annual	4 hours
Protection Relays	Calibration and testing	Annual	8 hours

Troubleshooting Guide

Symptom	Possible Cause	Corrective Action
Circuit breaker fails to close	Low SF6 pressure	Check gas pressure and refill
High transformer temperature	Overloading or cooling system failure	Check loading and cooling pumps
Protection relay false trip	CT saturation or settings error	Verify CT ratios and relay settings
Control system malfunction	Battery failure or loose connections	Test battery and check connections
Abnormal noise from transformer	Loose core or winding movement	Schedule detailed inspection
High oil level in breaker	Temperature expansion or leak	Check for leaks and oil quality

Emergency Response Procedures

In case of equipment failure or emergency conditions: 1. Immediately notify system operator and control center 2. Secure the area and prevent unauthorized access 3. If fire is present, use CO2 or dry chemical extinguishers only 4. For oil spills, contain spillage and notify environmental team 5. Document all incidents and equipment conditions 6. Do not attempt repairs on energized equipment without proper authorization Emergency Contact Numbers: • System Control Center: (555) 123-4567 • Fire Department: 911 • Environmental Response: (555) 123-4568 • Maintenance Supervisor: (555) 123-4569