



DILO 2nd Annual SF₆ Gas Management Seminar
Tampa FL, November 2017



DILO's 2017 SF₆ Gas Management Seminar

Best Practices Dealing with Decomposition in Gas Insulated Equipment

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Support to Alabama Power Company



Best Practices Dealing with Decomposition in Gas Insulated Equipment



Neil Hutchins, Equipment Services Supervisor Southern Company Services Substation Maintenance Support

- Over 19 Years of experience in Transmission/Substation Maintenance
- Supervisor of the Southern Company Services Equipment Group
- Provide Support to Alabama Power Company on SF6 equipment,
 - Purchase SF6 Breakers, Circuit Switchers and GIS, 15 kV to 500 kV
 - Manage Alabama Power Company spare SF6 Equipment fleet
 - Provide support to Alabama Power Company's Substation Maintenance groups, Substation support group, Substation Construction, Safety and Training organizations
- Chair of the Southern Company Major Equipment Committee
- Member of Southern Company Breaker and Substation Maintenance Committees
- IEEE Senior Member
- Member of IEEE/PES Switchgear Committee
- Member of IEEE Alternative Gases to SF6 Task Force
- Member EPRI Substation Task Force



Alabama Power Company / Southern Company SF6 Best Practices



- **Plan**
 - What (Event/operation)
 - Who (Personnel required)
 - When
 - Communication (Information, Location, impacts, etc)
 - Impact to employees, system, public, customers, etc.

- **Training**
 - Procedure and Guidelines
 - Equipment
 - SF 6 Gas (Awareness and Handling)
 - Hazards
 - Respirator
 - Compliance

- **Practice**



Alabama Power Company / Southern Company SF6 Best Practices



- **Personal Protective Equipment**
 - Tyvek Disposable coveralls with protective shoe covers
 - Complete Rain Suit (Switching)
 - Nitrile gloves
 - Duct Tape
 - Full-face respirator with AG/OV/P100 cartridge
 - SCBA with auxiliary, if personnel entering area/space
- **Personnel and Equipment Decon**
 - Defined Area for Personnel Decon
 - Distilled Water
 - Baking Soda
 - Pump up sprayer(s) with Baking soda and distilled water mix
 - HEPA Vacuum with non metallic attachments
 - SF6 Cylinder(s) empty (Under Vacuum)
 - SF6 Recovery and Testing Equipment
 - Denatured alcohol
 - Atmosphere/air monitor

Alabama Power Company / Southern Company

SF6 Best Practices

Crew members in PPE





Alabama Power Company / Southern Company SF6 Best Practices



- Clean-up Supplies
 - Distilled Water
 - Baking Soda
 - Pump up sprayer with Baking soda, distilled water mix and food coloring
 - Trash Bags (3 mil thickness)
 - Rags
 - Paper Towels
 - Denatured Alcohol
 - HEPA Vacuum with non metallic attachments
- Wind Sock (Monitor direction of the wind)
- Weather Forecast and impacts
- Barricade tape
- Clear assignment of duties
- Disposal Plan
- First Aid Kit
- AED
- Medical Plan (Paramedics, Hospital and location, etc)
- Identify Onsite and Offsite support



Alabama Power Company / Southern Company SF6 Best Practices



- Alarms
 - Low SF6 Gas Alarm
 - Low SF6 Gas Alarm followed by Low SF6 Trip
 - Low SF6 Gas Alarm followed by Low SF6 Block trip
- Relay event records analysis
 - What caused the breaker to operate. (Fault current, breaker failure, low gas, etc.)
- SF6 Gas Quality analysis
 - SO2 in PPM(V)
 - Purity of SF6 Gas (%)
 - PPM(V) of Moisture
- Breaker Information
 - Manufacture
 - Type
 - Anatomy of Equipment
 - Mechanism Energy Type

Alabama Power Company / Southern Company SF6 Best Practices

View of Phase 2 Tank with Stationary Interrupter
Assembly removed



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Bushing connection moving side on interrupter for Phase 2





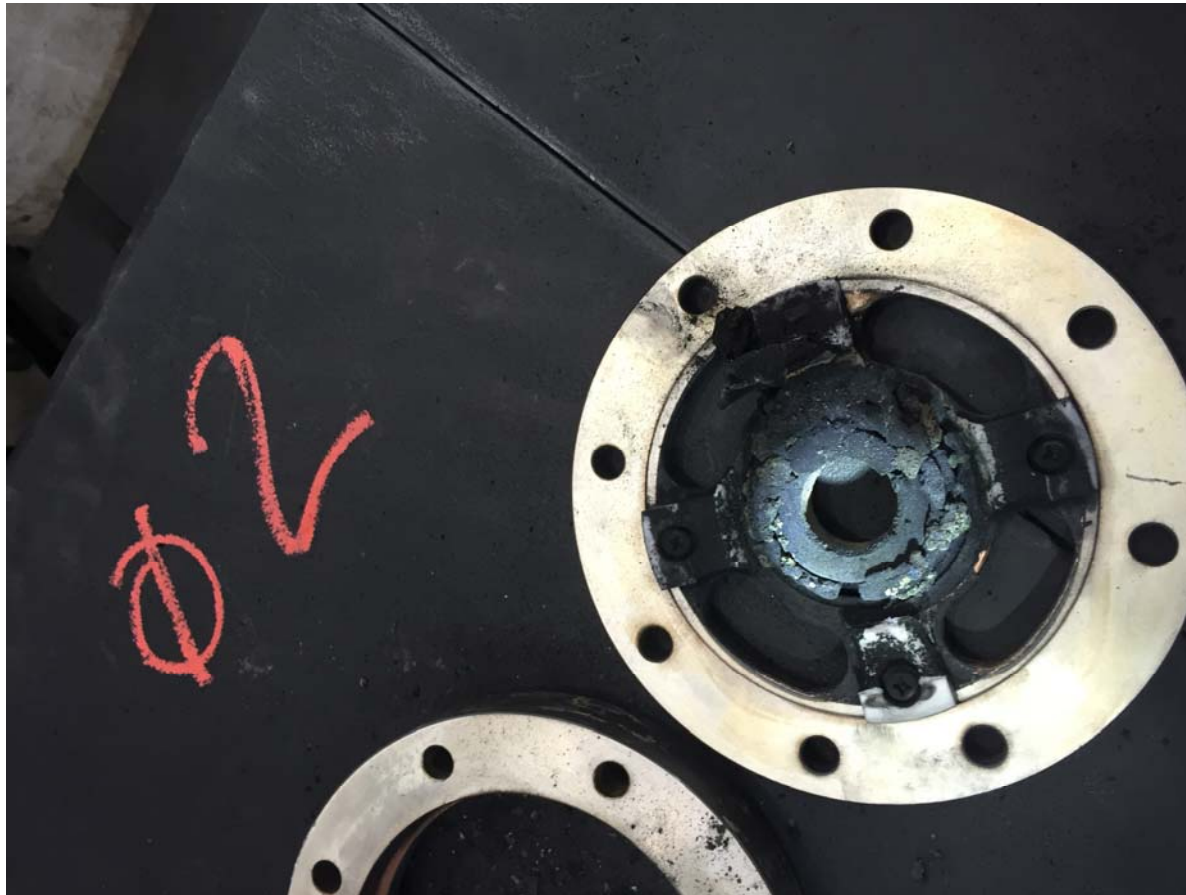
Alabama Power Company / Southern Company SF6 Best Practices



Stationary Arcing and Main Contact Assembly for Phase 2



Moving Arcing Contacts for Phase 2



Alabama Power Company / Southern Company SF₆ Best Practices





Alabama Power Company / Southern Company SF6 Best Practices



- **The After Event Plan**
 - **Documenting id an SF6 release occurred**
 - **Compliance – Documentation**
 - **Removal of the Equipment**
 - **Move Equipment to other site for scrapping process**
 - **Scrap equipment on site**
 - **Disassembling**
 - **Bushings**
 - **Cabinets**
 - **Mechanism**
 - **Hydraulic/spring mechanisms need specialize equipment to be safety and properly disassembled**
 - **Remove all energy sources (Pnenmatic, Spring/spring,Nitrogen)**



• **QUESTIONS ?????**

• **Thank You**