Operation Data Collection

Entities Analysis Process Initiated

Interrupting Device Operation

Caused by Protection System

YES

Gather Data

System Information
- System Operators Log
- EMS SCADA SER/Log
- System Operators Account
- Field Forces findings/report
- Interconnecting Entity Operation Log/Report
- System Topology
  - Outages
  - Switching Configuration
  - Generation Mix
  - Loading
  - Normal/Abnormal changes

Protection System/Recorder Information
- Relay Event/DFR
- Relay SER/DFR
- Phasor Measurement Recorder
- PQ Recorder
- Targets
- Breaker Counts
- Relay Settings As Found
- Telecom status/alarms
- Instruction Manuals

Relevant Information
- Protection System Schematics
- Ongoing Station Work
- RAS Status
- Environmental Conditions
- Time of Day
- Failed Equipment
- Common Occurrence

X

Analysis of Information

Review Protection System Scheme and Settings – Understand Expected

Develop a SOE of actual to compare to expected

Analyze relay response to event phasors, oscillography, fault type and location compare to expected

X

Operation Correct?

YES

Documents findings update Operation Database

NO

Misoperation Cause Analysis
Capture Misoperation results:
- Assessment
- Hypothesis

Review:
- Protection System Schematics
- Fault Record
  - Element thresholds to record
  - Communication Signaling
  - Plot element to measured
  - Verify Breaker time
  - Perform Fault Study Model to Record

Further Actions:
- Compare Fault Record to previous Field test
- Protection System Components
- Telecom path and levels
- Apparatus
- Playback event in bench test
- Put in monitoring equipment

Root Cause Identified