Improving Security and Reliability at a Nuclear Station

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Grand Gulf Unit 1 Relay Project

• PROBLEM STATEMENT
  – Obsolete protection Equipment (no spares)
  – Secure Protection
  – 27 electro-mechanical
    • 40 single point vulnerabilities associated with generator protection.
    • 3 single point vulnerabilities associated with main transformer.
Proposed Solution

IEC-61850-MMS
Solution:

- Replace 22 electromechanical relays with 6 relays to include all protective functions
- Add engineering work station (cyber security benefit)
- Add operator HMI with real time display of CT and PT values.
- 1-out-of-2 taken twice scheme for secure, dependable protection
- Online serviceability
Solution:

• Add operator HMI
  – First out function.
  – Pre-trip data collection.
  – Post trip data collection
  – PRC005-2 capabilities
  – PRC004 monitoring
  – Mod25-2 Values
Solution:

- Modern protection Relays
- Two out of Four voting Scheme
- Eliminate SPV’s
- HMI for visual awareness
- Replaceable Online
Cyber Security

- All unused access ports to the devices are blocked.
- Isolated network with dedicated time.
- No wireless connection.
- Key control for engineering work station.
- Password Level control access for relay and HMI.
- Alarms for relay in programming mode annunciated in main control room.
- Meets all Entergy procedure and the NEI 08-09 guidelines requirements for Cyber Security.
Grand Gulf Unit 1 Rewards

- Assist Entergy transmission for better grid voltage/frequency control by removing V/HZ limitation of +/- 297.5 MVars.
- Elimination of NERC standard PRC 005-02 Preventive Maint. tasks associated with PTs and CTs input to generator & main transformer protective relays by adding real time monitoring and deviation alarms for PTs and CTs input.
- 40 Components reclassified as non- single point vulnerabilities.
- Addition of sequence of event data in real-time.
- Addition of first out display for relay trips
- Installed engineering work station
- Networked relays for time synchronization to GPS.
- One button Export capabilities for Sequence of event data to csv files.
- Real time Power Indications high side of main transformers (previously unavailable MOD 25-2)
Questions??