FNP NFPA 805 LAR Submittal Overview

March 19-21, 2013

Circuit Analysis

Summary

- Circuit Analysis Process and Controls
- Analyst Qualifications
- Governing Analysis Criteria
- NSCA vs. PRA
- Analysis Methodology
- Circuit Analysis Database
- Associated Circuits

Process and Controls

- Circuit Analysis Process
  - Performed IAW approved procedure
  - Strict and formal analysis conventions
  - Emphasis on consistency and standardization
  - Integrated PRA and NSCA requirements
- Controls
  - Rigidly defined Function States
  - Independent verification for each analysis
  - Detailed documentation in database (FDM/ARCPlus)

Analyst Qualifications

- All analysts formally qualified to SNC & Contractor QUAL CARD for independent work
- Internalized industry lessons learned on training, qualifications, and oversight
- Procedure and database established to force consistency
- Maintained awareness of dual use – PRA and NSCA

Governing Criteria

- NEI 00-01, Rev.1
  - Initial Work to Rev.1
  - Gap analysis performed to Rev. 2 (per Generic RAI 10 and RG 1.205)
- NEI 00-01, Rev. 2
  - Later work
  - Integrated emerging PIRT issues
  - No credit taken for off-scheme exclusions
- NUREG/CR-6850
  - Included Open circuits

Note: Integrated requirements for conservative, but universal criteria between PRA and NSCA

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NSCA vs. PRA

- Implementing Concepts
  - 95% of circuit analysis criteria for PRA and NSCA are the same
    - Establish single dataset for criteria to assure dual use and better interface between NSCA and PRA
    - Provide procedure and database flexibility to accommodate the 5% difference
  - Long-term configuration control extremely difficult if redundant data sets are maintained
  - Differences primarily handled through:
    - Use of Function States
    - Interlock identification and documentation

Analysis Methodology

- All circuit analysis drive by FUNCTION STATES
- Function States
  - Component + Initial State + Desired State
  - Permits maximum flexibility to accommodate PRA and NSCA differences (primarily auto signals)
  - Minimize false failures up front
  - Efficient and less error prone
  - Consistent with NUREG/CR-6850 methods for Tasks 3 & 9

Analysis Methodology, cont…

- Work package development to facilitate process
- Single, controlled database (FDM)
- Process and techniques based on NRC/EPRI training modules
- Major Steps

  Prerequisites satisfied

  - Function state established
  - Plant specific rules and conventions
  - General classification
  - Resolve questions

Analysis Methodology, cont…

- Major Steps

  Work Package Development

  - Drawings
  - Supplemental information

  Cable Selection

  - All scheme cables dispositioned
  - Fault codes applied to all cables
  - Basis documented for excluded cables
  - Selection of required cables with “hot probe” method
  - Cables generally excluded based only on design features at this stage (NUREG/CR-6850 concept)

Analysis Methodology, cont…

- Major Steps

  Power Supply Identification

  - All Power Supplies identified
  - Required and not-required determined based on Function State requirements
  - Sensitive to alternate PS lineups and how they are credited

  Dependencies & Interlocks

  - All circuit interlocks formally dispositioned
  - Equipment dependencies established or off-scheme cables directly incorporated
  - Differentiate auto functions so NSCA and PRA can apply as credited by Basic Event

Analysis Methodology, cont…

- Major Steps

  Documentation

  - Controlled database, with individual analysis originate and check sign-offs
  - Reference drawing
  - Final calculation for circuit analysis and PRA Notebook

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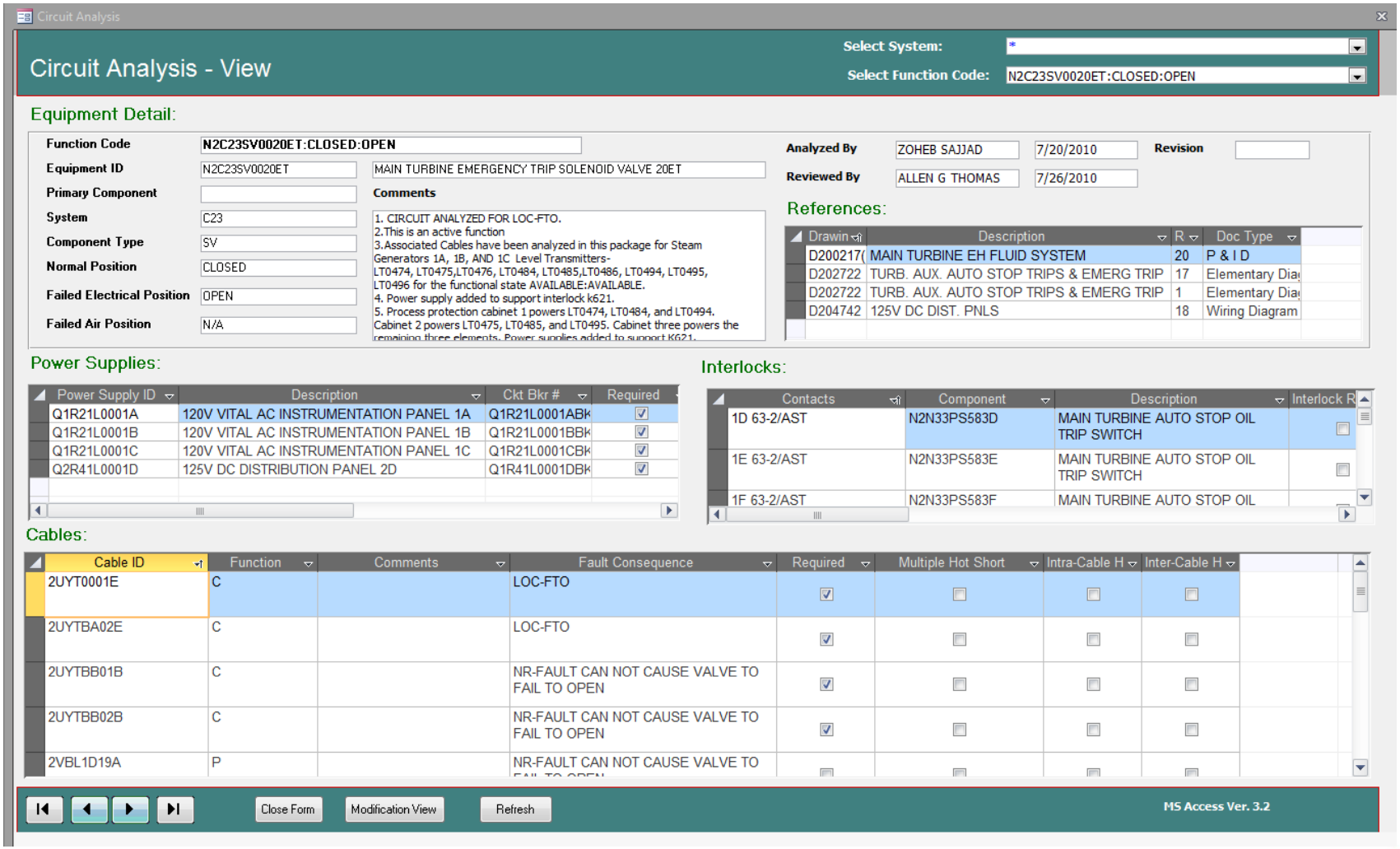
Circuit Analysis Database



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Associated Circuits

- Electrical Coordination
  - Consolidated calculation
  - Addresses NSCA & PRA
- Common Enclosure
  - Addresses secondary fire concerns
  - Addresses loss of DC control power to Switchgear
- CPT Open Circuits
  - Followed PIRT recommendations
- MHIF Analysis
  - Followed NEI 00-01, Appendix B method

Questions ?

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