NERC Compliance & PWS

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NERC Compliance Issues

- Compliance isn’t new…
  - but the fines are!
    - up to $1 million a day

- Are you compliant?
  - can you PROVE it?

- If it isn’t written down it never happened!
  - the “Gold Standard” for compliance efforts
An Aside about Compliance

- **Submarine Safety (SUBSAFE)**
  - Created after the USS Thresher (SSN-593) was lost
    - She represented the leading edge of US Submarine technology
    - Lost 10 April 1963
      - 117 crew & 17 civilians died

- **Investigation focus areas**
  - Documentation, processes, design, etc
    - No compliance program was in place at the time!
Investigation Results

- Deficient Specifications
- Deficient Shipbuilding and Maintenance Practices
- Incomplete or Non-Existent Records
  - Work Accomplished
  - Critical Materials
  - Critical Processes
- Deficient Operational Procedures
SUBSAFE Program Success

1915 – 1963
16 submarines lost to non-combat causes

1915: USS F-4 (SS-23)
1917: USS F-4 (SS-20)
1920: USS H-1 (SS-28)
1923: USS O-5 (SS-66)
1926: USS S-51 (SS-162)
1927: USS S-4 (SS-109)
1939: USS SQUALUS (SS-192)
1941: USS O-9 (SS-70)
1942: USS S-26 (SS-131)
1943: USS R-12 (SS-89)
1944: USS S-28 (SS-133)
1949: USS COCHINO (SS-345)
1958: USS STICKLEBACK (SS-415)
1963: USS THRESHER (SSN-593)

1963 - Present
1 submarine lost to non-combat causes

1968: USS SCORPION (SSN-598)
- SCORPION was not SUBSAFE certified
- Loss would not have been prevented by the SUBSAFE Program
- Lost due to weapon malfunction

NO SUBSAFE-CERTIFIED SUBMARINE HAS EVER BEEN LOST

SUBSAFE Program inception after THRESHER was lost
Objective Quality Evidence (OQE)

- Compliance is strictly based on OQE
  - OQE is any statement of fact pertaining to the quality of a product or service based on observations, measurements, or tests which can be verified.
    - either quantitative or qualitative
    - OQE is defined from technical requirements
    - Based on the integrity & responsibility of individuals
  - OQE provides verifiable evidence that deliberate steps were taken to comply with requirements
System Performance Following Loss of Two or More Bulk Electric System Elements

- Not just common mode outages
  - In the past only double circuits were examined
- “Be supported by a current or past study…”
- “[provide] rationale for contingencies selected for evaluation…”
- Studies need to be conducted annually

OUCH!
Avista

■ Recent audit
  • “Dinged” on TPL-003
  • Past experience deemed to be “not good enough”
    • Auditors wanted to see study plans and study reports
      • In other words, DOCUMENTATION
      • They were looking for N-1-1 studies
        • This included non Avista transmission outages (i.e. BPA)

■ The solution?
  • PowerWorld contingency and sensitivity tools
    • Mitigation plan…
Get Smart—Document!

**Review all possible WECC N-2 contingencies?**

- **How?**
  - Contingency Analysis tool
    - Using 07HS2a WECC operating case
      - 15,032 buses
      - 17,434 lines
  - Auto insert N-2 (lines only…)

- **NO WAY!**
Ok, our first run at this is nuts, but…

- Write it down!
  - You did write or are writing a study plan, correct?
    - Step 1: Examine all possible N-2 ctgs
      - Reject this because 83,547,200 ctgs will take:
        - 1.23 years using DC load flow
        - 3.87 years using AC load flow
    - Step 2: Be smart, use filters and sensitivity tools
      - Look at just AVA N-2
      - Still reject at 38,266 ctgs…
      - Bound the problem
Sensitivity Tools

- Line Outage Distribution Factors
- High voltages affect lower
  - Usually anyway
- Power Transfer Distribution Factors
- Flow and Voltage Sensitivity Tools
- Geography Matters
  - Usually—electrically close is the true measure
  - Overbuilt 500 kV is BPA’s stuff…
Use Advanced LODF Tool

- Setup contingencies
  - All BPA 500 kV
- Monitor only AVA
- Run Advanced LODF
- Get Results
Down to nine BPA 500 kV

- MONITORED BRANCH 48025 40090 5  ! FLOW = -241.8753 MW  LODF = 13.0443 "BEACON N-BELL S3"
- MONITORED BRANCH 48031 40092 4  ! FLOW = -245.8484 MW  LODF = 15.3067 "BEACON S-BELL S4"
- MONITORED BRANCH 48463 41275 1  ! FLOW = -126.5984 MW  LODF = 13.2479 "WEST-WESTBPA1"
- MONITORED BRANCH 48463 41276 1  ! FLOW = -17.2859 MW  LODF = 14.1433 "WEST-WESTBPA2"
- MONITORED BRANCH 48524 48031 1  ! FLOW = -212.7717 MW  LODF = 18.7463 "BOULDER-BEACON S"
- MONITORED BRANCH 48524 48037 1  ! FLOW = 185.0494 MW  LODF = -19.1694 "BOULDER-BENEWAH"
- CONTINGENCY
  40091 40092 1  ! Flow = -324.3445 MW  "BELL BPA-BELL S4"
- END
- !
- MONITORED BRANCH 48463 41276 1  ! FLOW = -17.2859 MW  LODF = 11.3221 "WEST-WESTBPA2"
- CONTINGENCY
  40091 40287 6  ! Flow = 114.9703 MW  "BELL BPA-COULEE"
- END
- !
- MONITORED BRANCH 48025 40090 5  ! FLOW = -241.8753 MW  LODF = -10.6887 "BEACON N-BELL S3"
- MONITORED BRANCH 48031 40092 4  ! FLOW = -245.8484 MW  LODF = -12.0318 "BEACON S-BELL S4"
- MONITORED BRANCH 48524 48031 1  ! FLOW = -212.7717 MW  LODF = -16.0771 "BOULDER-BEACON S"
- MONITORED BRANCH 48524 48037 1  ! FLOW = 185.0494 MW  LODF = -15.5627 "BOULDER-BENEWAH"
- CONTINGENCY
  40091 41060 1  ! Flow = 209.3742 MW  "BELL BPA-BELTAF11"
- ctc
Use PWS to generate numbers

Explain the process

- Evaluated ALL N-2’s—rejected these
  - 83,547,200 possible contingencies (noncompliant due to time required to study!)

- Used sensitivity tools to get down to 9 foreign lines that need to be accounted for
  - Still a chunk of studies, but it is tractable enough

Write this DOWN. Write a study plan and a study report.
Write to the Standard

- Name your studies using the Standards
  - Make it EASY to audit!

- Example Report Titles
  - System Performance Under Normal Conditions
  - System Performance Following Loss of a Single BES Element
  - System Performance Following Loss of a Two or More BES Elements
  - System Performance Following Extreme BES Events
CIP-002 Critical Cyber Asset

- Critical “Cyber(?)” Assets
  - Ha! There is nothing cyber about critical assets…

- CIP-002, R1
  - Critical Asset Identification Method — The Responsible Entity shall identify and document a risk-based assessment methodology to use to identify its Critical Assets.
  - What are you using?
    - Probably voltage, size, and a panel of expert staff…
      - Not easily quantified is it?
Use PWS to ID Critical Assets

- Not to pick on our host...

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Critical Facilities for Entergy?

- Facilities
  - 6WATRFRD—Waterford
  - 8ANO 50—Arkansas Nuclear One
  - 8WH BLF—White Bluff (fossil)
  - 69MILE—Nine Mile Point (fossil)
  - 8G.GULF—Grand Gulf
  - 8DELL 5—Dell
  - 8MCKNT—McKnight
  - 8FRKLIN—Franklin
Conclusions

- Compliance means documentation
- Documentation is good!
  - Aids in training
  - Corporate memory
  - Brings rigor and review to study processes
  - Feeds the compliance “monster”
    - This monster is a most unique form of herbivore
      - Lives on paper or its digital equivalent
- PWS WILL help feed the monster…
Questions

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