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Update of the INPO Transformer/Switchyard Review Visit Program

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ENCLOSURE 10

Purpose

To provide an overview of INPO's transformer, switchyard and grid (TSG) review visit program and results.

Program Background

INPO activities related to the transformer, switchyard, and grid initiative:

- Analysis of Operating Experience
- Develop and Issue Significant Operating Experience Reports (SOERs)
- Transformer/Switchyard Review Visits
- Plant Evaluations

SOER Development Overview

Significant Operating Experience Reports Related to the TSG Initiative:

- SOER 99-1 "Loss of Grid"
- SOER 02-3 "Large Power Transformer Reliability"
- SOER 99-1A "Loss of Grid – Addendum"

SOER Implementation

- INPO members are obligated to implement SOER recommendations
- Evaluation of typical SOER recommendations is within scope of evaluation teams
- SOER 99-1 scope was revised based on lessons learned from industry events
- TSG review visits were implemented due to increased scope of SOER

Review Visit Overview

- Separate from plant evaluations; however it is evaluative
- One week, in-depth, team review on-site
- Peers include industry experts
- Use INPO Performance Objectives and Criteria and industry developed technical guidelines
- INPO guidance for performing review visits developed with industry input – posted on INPO member Website
- Follow-up during next INPO evaluation

TSG Review Visit Focus Areas

- Communication/coordination with grid operators
- Adequacy/operability of offsite power
- Predictive (PdM) and preventive maintenance (PM) for large power transformers and switchyard equipment

Review Visit Results To Date

14 visits have been completed

- Focus is on improvements to achieve excellence in performance

Overall findings from the visits can be grouped as:

- 86% were recommended improvements
- 14% were beneficial practices

Recommendation Highlights

Communication/coordination with grid operators examples:

- Improvements needed in interface procedures
- Improvements needed with procedures for the exchange, review, and analysis of engineering data
- Improvements needed with communicating the status of the real time contingency analysis program

Recommendation Highlights

Adequacy/operability of offsite power examples:

- Design calculations did not demonstrate preferred offsite power source would be maintained.
- Plant design change process did not review transmission system modifications to offsite power systems.
- Grid operator analysis tools and plant design calculations used different post trip contingency loading conditions.

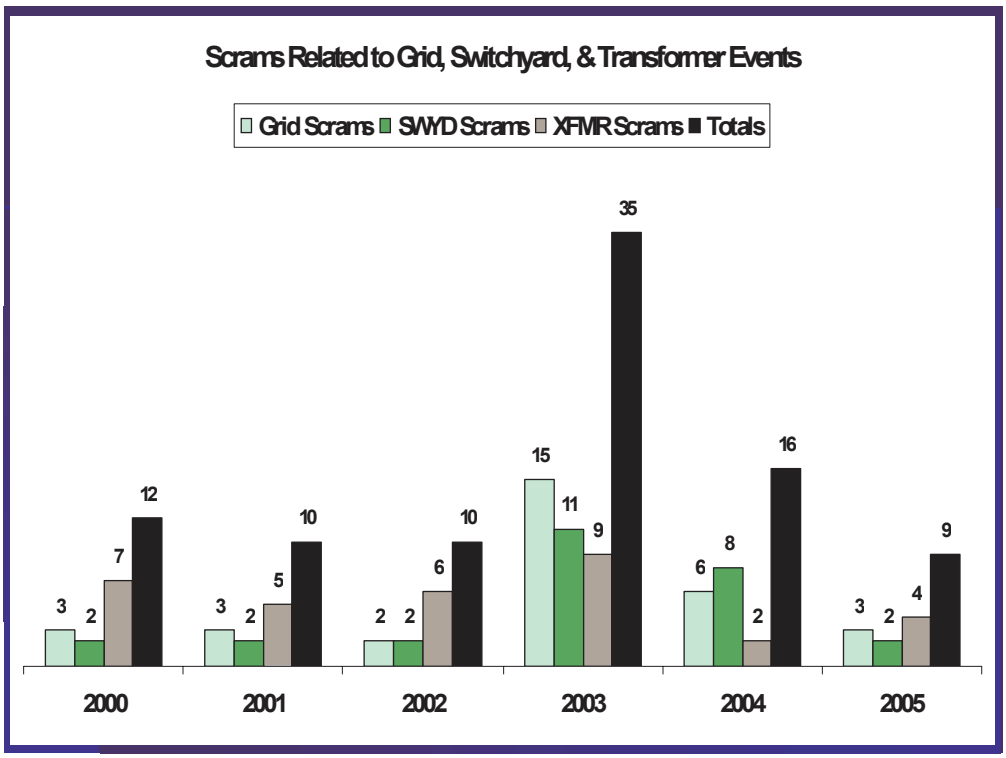
Recommendation Highlights

Predictive (PdM) and preventive maintenance (PM) for large power transformers and switchyard equipment examples:

- Improvements needed with adequacy of spare transformers and replacement plans.
- Improvements needed in emergent and planned maintenance risk assessments.
  - include transmission system component maintenance deferrals
  - include component operational limitations
  - detail of package work scope

Beneficial Practice Highlights

- Switchyard oversight committees
- Detailed guidelines for communication and work planning include single points of contact
- The probability risk assessment model includes substation details


Scrams Related to Grid, Switchyard, & Transformer Events
Grid Scrams
SWYD Scrams
XFMR Scrams
Totals
3
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7
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