



EPRI Project 37.110 Power Switching Safety and Reliability

2013 TF Chair: Rodney Krause, BPA
2013 TF Vice-Chair: Chris Sullivan, NPPD
EPRI Project Engineer: George Gela

Presented by Rodney Krause, Bonneville Power Administration, DOE



Objectives of EPRI Project 37.110 “Power Switching Safety and Reliability”

Project started by in 1996, report TR-106465 – “Field
Operation Power Switching Safety”

Objectives of Project 37.110 “Switching Safety and Reliability”

- Catalog utility experience and develop training modules to minimize errors in power switching
- Provide training material for new and seasoned switching personnel.
- Investigate switching order generation and execution processes.

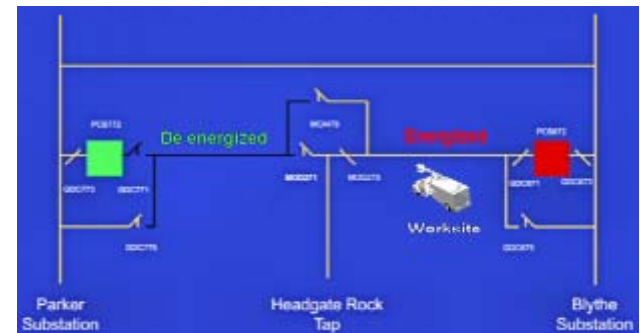
Reports of utility practices



Reference Guide



Training materials



Project Set Objectives

- Understand, with special emphasis on **switching** activities:
 - How accidents happen
 - How they can be avoided or prevented
- Research shows that accidents can be prevented by developing procedures and controls that set up “barriers” to block dangers resulting from human errors and other causes of incidents.
- No barriers are perfect
 - they contain “holes” through which errors can propagate.
- This research aims to “plug up” the holes

Key message

- Primary goal of this project is to improve power **switching procedures and processes** in order to:
 - Ensure safety,
 - Minimize errors and power disruptions,
 - Improve the reliability of power delivery.
- The project achieves this by:
 - Analyzing **all aspects of switching procedures and processes**
 - Developing an understanding how incidents, near-misses and error occur
 - Developing controls or "barriers" aimed at preventing errors and incidents
 - Developing effective training materials for new and seasoned switching personnel

Example of Research: Understanding Near Misses

- The study of near misses
 - Greatly expands the body of rare events
 - Allows problems to point out useful information
 - Provides opportunities to understand and correct problems
- However, people often do not report near misses because:
 - Inclination is to “hush up” incidents that did not cause damage or injury
 - Fear of punishment when filing a near-miss report

Substations (Program 37) Power Switching Safety & Reliability (P37.110)

Technology Innovations in Power Switching

- Modern operator-field communications
- iPad, GPS, iPhone...

Ripe for Innovation



Reduce Error Rates in Switching



Manage Access to Equipment

Many keys

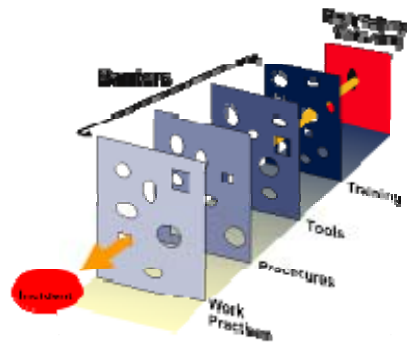


Technology Transfer

Annual Conference



Develop barriers



Smart Key



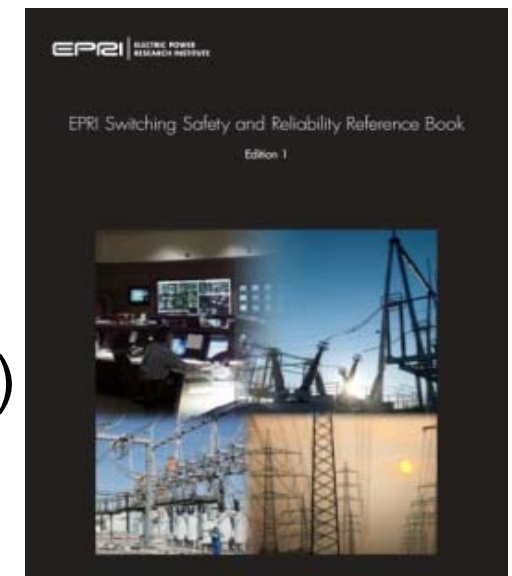
Newsletter



Reference Book

Technology transfer

- Issue: Information/data related to switching safety are scarce, scattered, not consolidated
- Approach:
 - Annual SS&R Conference
 - Annual SS&R Newsletter
 - Conference Brochure
 - Summaries of SS&R reports
 - SS&R Reference Book (the “Black Book”)
- Relevance:
 - Most recent information
 - Direct feedback “from the trenches” (control room and field personnel)



Reports published by the SS&R project

1	TR-106465	Field Operation Power Switching Safety	1996
2	1000123	Switching Practices Survey: Toward Improved Safety and Reliability	2000
3	1001956	Collecting and Using Near-Miss Information: Enhancing Switching Safety and Reliability	2001
4	1001789	Generic Job and Task Analysis: Handling Planned Outages and Hot Line Work	2002
5	1002077	Incident Investigation and Reporting	2003
6	1008685	Processing Outage Requests and Writing Switching Instructions	2004
7	1008691	Job & Task Analysis Database, Version 1.0	2004
8	1008692	Job and Task Analysis to Identify Failure Points in Switching Operations	2004
9	1011267	Switching and Tagging Performance Standards and On-the-Job Assessments	2004
10	1010614	Barriers to Switching Accidents	2005
11	1010615	Approaches to Error Avoidance	2005
12	1011659	A Definition of "Switching Error": Toward a Common Nomenclature of Switching Incidents	2005
13	1011660	Mitigation of Human Operational Errors Involving Control, Relay, and Auxiliary Equipment	2005
14	1011661	JTA Database Version 2.0 on CD Rom for Win 98/NT/2000/XP - Job & Task Analysis Database	2005
15	1013109	Study of Outage Request Switching and Clearance Forms	2006

Reports published by the SS&R project

16	1013606	New Switching Operator Training	2006
17	1013605	Training Materials on Preparation of Switching Instructions	2006
18	1013604	Management of Prints and Diagrams used in Planning Switching	2006
19	1013596	Human Operational Errors Involving Control, Relay, and Auxiliary Equipment	2006
20	1012376	Utility Documentation of Switching and Clearance Procedures	2006
21	1012374	Generic Terminology Versus Specific Jargon in Power System Switching	2006
22	1013924	Utility Documentation of Switching and Clearance Procedures	2007
23	1013915	Generic Terminology vs. Specific Jargon in Power System Switching	2007
24	1014952	Issues in Print Management	2007
25	1015990	Situation Awareness in Power System Operations	2008
26	1015952	Recommendations for Certification of Switching Personnel	2008
27	1016827	EPRI Power Switching Safety and Reliability Reference Book and Training Manual	2008
28	1016826	Communication Between Field Personnel and Control Center	2008
29	1016829	Generic Terminology Versus Specific Jargon in Power System Switching	2008

Reports published by the SS&R project

30	1016828	EPRI Power Switching Safety and Reliability Project – a Decade of Research	2008
31	1016830	Database of Incidents and Near Misses in Power Switching	2008
32	1017758	Incident-Based Training Modules for Power Switching: Edition 1	2009
33	1017759	Database of Incidents and Near Misses in Switching: 2009 Update	2009
34	1017760	Recommendations for Certification of Control Room Operators: Part 2 – Survey of Industry Practices for Certification of Control Room Operators	2009
35	1018975	Generic Terminology versus Specific Jargon in Power System Switching: In-Depth Analysis of 50 Critical Terms	2009
36	1019327	Switching Safety & Reliability Newsletter	2009
37	1020015	Recommendations for Qualification of Control Room Operators: Part 3 – Best Practices for Training and Qualification of Control Room Operator	2010
38	1020016	Incident-Based Training Modules for Power Switching: Edition 2	2010
39	1020018	Error-Likely Situations in Power Switching	2010
40	1022331	Generic Terminology versus Specific Jargon in Power System Switching: Five Terms That Cause Operators Concern	2010

Reports published by the SS&R project

41	1023050	EPRI Power Switching Safety and Reliability Project : Summaries of Published Reports and Conference Presentations 1996-2010	2011
42	1021907	Pocket Guide: Preventing Switching Errors - Identifying and Dealing with Error-Likely Situations	2011
43	1021908	Industry Practices for Field Switchmen Qualification	2011
44	1023049	Technology Innovation in Power Switching – Survey of Utilities and Vendors	2011
45	1023048	Incident-Based Training Modules for Power Switching – Edition 3	2011
46	1023325	Example of Consequences of Miscommunication (DVD)	2011
47	1024230	EPRI Power Switching Safety and Reliability Project: Summaries of Published Reports and Conference Presentations 1996-2011	2012

2013 Deliverables in 2013 Portfolio

- New research:
 - Situation awareness in the control room - expand on the 2011 “Identifying Error-Likely Situations In Power Switching” pocket book
- Technology transfer:
 - 2013 SS&R newsletter – new format
 - 2013 SS&R conference brochure
 - Summaries of SS&R reports to 2012 – update of 2012 edition (new PID number)
 - SS&R Reference Book chapters – request feedback on 2012 chapters, add new chapters (new PID number)

Additional 2013 Research

- Update error rate report – develop questionnaire (this will take at least a year; a progress report may or may not be published)
- Collect reports for database of incidents and near-misses (a report will be published if many new reports are obtained)
- Review training modules
 - Seek feedback (how good are they, how are they used)
 - Develop new modules, DVDs
- Other?

2013 Conference



- Dates: Monday-Tuesday, September 16-17, 2013
- Location: Hotel Monteleone, 214 Royal Street, New Orleans, LA (French Quarters)
- Theme: “Reporting and Tracking Near Misses: How to Prevent Predictable Surprises”
- Conference details to follow
- Presentation suggestions
- Sunday Seminar???
- Control Center Tour???
- Cvent registration to open February-March 2013



Project 37.110 Task Force 2013 activities

Task Force Chair: Rodney Krause, BPA

Task Force Vice-Chair: Chris Sullivan, NPPD

EPRI TF Manager: George Gela, 413-445-3710, ggela@epri.com

2013 Task Force Meetings

- Monday, March 25 to Friday, March 29, 2013 (details to follow)
- September 18, 2013, New Orleans, LA
- **2013 P37.110 Webcasts**
- First webcast: tbd
- Second webcast: tbd

Also: TF Officers, Past Officers, EPRI PM and selected others hold monthly conference calls to prepare the Conference and resolve issues that may come

2013 SS&R Conference (more on this later)

- Seventeenth EPRI Power Switching Safety and Reliability Conference: Monday-Tuesday, September 16-17, 2013, New Orleans, LA
- Also, Seminar on Sunday afternoon?

Mobile devices and switching orders

- Looking for funders
- Objectives
 - Research technological innovations that could potentially be applicable to power switching
 - Assess their suitability for power switching
 - Demonstrate the capabilities of an inexpensive mobile data platform



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