efficiency bulletin

December 15, 2020

Color Code: Red
Due: January 2021

Efficiency Bulletin: 16–17, Rev. 1

Optimizing FLEX Equipment Preventive Maintenance Strategies and Sharing of Operational Experience

This Efficiency Bulletin originally issued in 2016 is being updated to reflect the experience gained relative to FLEX equipment preventive maintenance (PM) strategies and sharing of FLEX operational experience. Continued reporting of experience and performance data for FLEX equipment in the nuclear industry is necessary. Initially, the industry adopted a conservative process combining failure modes and effects analysis with vendor information and operating experience from external emergency response organizations to create the initial PM strategies. The industry continues to build its collective testing experience to validate the current scope and frequency of maintenance strategies which can be adjusted based on actual experience from storing, testing, and using the FLEX equipment. Sharing of operational experience is critical to this strategy.

Addressees: Chief Nuclear Officers, NEI APCs and INPO APCs

Issue: **PMP-999, Optimizing FLEX Equipment PM Strategies, and Effective Sharing of FLEX Operating Experience**

Summary of Efficiency Opportunity

- Desired end-state—Optimizing PM tasks for FLEX equipment will ensure that appropriate resources are applied to the FLEX equipment based on a value-added reliability focus. Operational experience regarding FLEX equipment will be shared with industry leadership and will be entered into the EPRI FLEX Equipment Database in a timely manner. The most significant operating experience will also be reported to the INPO/IRIS database. The outcome will provide the operating history necessary to effectively sustain our FLEX programs, adjust the maintenance strategy for the FLEX equipment to assure appropriate reliability by applying the right maintenance on the right

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equipment at the right time and will also support the expanded use of FLEX.

- Value proposition (vision of excellence)—By collecting information on the operating history and sharing critical operational experience with FLEX equipment in an industry database, it will be possible to sustain our FLEX programs and continually adjust the maintenance strategies for the components. This will result in the appropriate use of resources necessary to maintain the requisite reliability to assure that regulatory-mandated performance is met.

- Why it is important? — The initial maintenance strategies for the FLEX equipment were developed from the collective experience of subject matter experts for the components. There was no previous operating history for this equipment in this application. Sharing operating experience is an essential practice that enables the continuous improvement of nuclear plant operating practices. It also supports maintenance strategies and development of reliability data. This will assure that the necessary reliability is obtained at the most reasonable level of resource allocation.

Relevant Standards

- Nuclear Maintenance Applications Center: Preventive Maintenance Basis for FLEX Equipment—Project Overview Report. EPRI, Palo Alto, CA. 2013. 3002000623.
- U.S. NRC Staff Directive JLD-ISG-2012-01, Order to Modify Licenses with regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, March 12, 2012.
- NEI-12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide Rev. 0, 2, 4.
- U.S. NRC Regulations for Mitigation of Beyond Design Basis Events in 10 CFR 50.155 and NEI guidance to consistently meet the rule provided in Mitigation of Beyond Design Basis Events Program Description Template, NEI 20-10.

Guidance

- Attachment 1 provides the expectations for sharing of operational experience pertaining to FLEX equipment and screening levels for communication of operational experience industry wide.
- Attachment 2 provides a streamlined format for sharing operational experience information with the EPRI FLEX Equipment Maintenance Event Collaboration site and the INPO Industry Reporting and Information System.
- INPO 19-002, Industry Reporting and Information System (IRIS), Reporting Requirements

Required Industry Actions

- Implement actions for reporting operational experience to the EPRI FLEX Equipment Maintenance Event Collaboration site and the INPO Industry Reporting and Information System (Attachment 1).

Key to Color Codes:

Red: NSIAC initiative – full participation required for viability
Blue: Action expected at all sites, but is not needed for broad industry viability
Green: Utility discretion to implement, consistent with its business environment

Change Management Considerations

Industry Activities

- NEI will host an industry webinar to provide background for initiative, industry peer discussion, and an open forum to clarify expectations and ask questions. EPRI and INPO will participate in the industry webinar.
- EPRI has provided and continues to provide (upon request) training for entry of relevant industry reporting of operating history of FLEX equipment. Industry personnel will populate this database as relevant information becomes available.
- Information from the EPRI database will be used by industry personnel with the assistance of EPRI to adjust the task, task content and task intervals for the FLEX equipment maintenance and testing strategies to assure the requirements of the staff directive and industry commitments are met.
- Attend EPRI organized events outlining use and application of their available FLEX products, including the PM Basis Database and FLEX OE Database at flex.epri.com.
- INPO will provide training to INPO evaluators/analysts and will share learnings through industry working group meetings and the Emergency Response Advisory Committee.

Company Actions

- Access EPRI Collaboration site for FLEX program documents, member procedures, inspection lessons learned, PM templates, basis documents, white papers, and position papers https://membercenter.epri.com/collaboration/4000000475
- Use EPRI FLEX Equipment Maintenance Event Collaboration site to report Operational Experience: "Test Failure" and "Other" events https://flex.epri.com
- Use INPO/IRIS database to report significant operational experience.
- Actively participate in the Beyond Design Basis Industry Experience Working Group and routine calls.
- Review the industry history associated with FLEX equipment reliability and adjust the maintenance strategy as necessary.

Guiderails

- Revisions to component PM tasks must be documented in the station's PM technical bases or other engineering records. The NRC has emphasized this mater in Information Notice 2020-02: FLEX Diesel Generator Operational Challenges. This notice addresses operational challenges involving FLEX equipment at nuclear power plants. Similarly, INPO Level 3 IER 20-5, Ineffective Use of Operating Experience Challenges FLEX Mitigation Strategies, also addressed the importance of these issues.

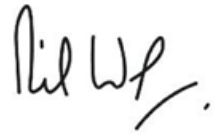
Report Your Site's Results

Please report your company's implementation of this improvement opportunity, including the date of completion. Send this information, along with your company point of contact, to: EfficiencyBulletin@NEI.org.

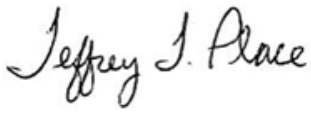
Industry Contacts

- Industry champion for this issue: Aldo Capristo, 361-972-7697, acapristo@STPEGS.COM
- EPRI contact: Monica Hurley, 704-595-2795, mhurley@epri.com
- INPO contact: Larry Lucas, 770-644-8636 lucaslj@inpo.org
- NEI contact: Andrew Mauer, 202-739-8018, anm@nei.org
- On the web: www.nei.org/bulletin1617

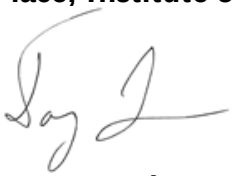
Industry Approval:



Neil Wilmshurst, Electric Power Research Institute

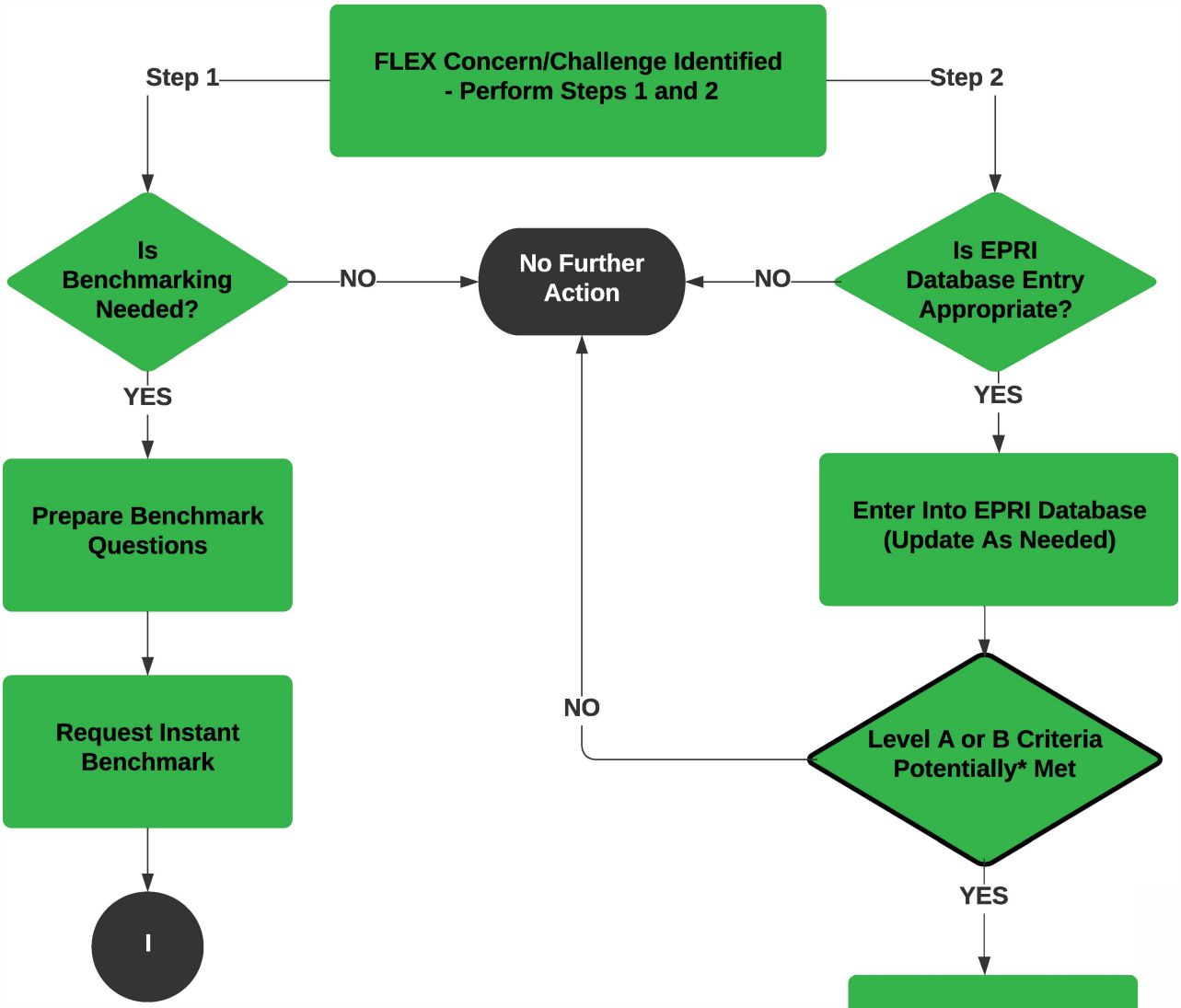


Jeff Place, Institute of Nuclear Power Operations



Doug True, Nuclear Energy Institute

EB 16-17 Attachment 1: Process for Sharing FLEX Operational Experience



Level A – Noteworthy or Industry Exposure Risk Criteria:

1. Result in increased NRC attention
2. Potential extent of condition to other nuclear sites or SAFER
3. Actual or potential NRC violation
4. Adverse trend with equipment type

Level B – High Significance Level Screening Criteria:

Plant Site

1. Total loss of the ability to implement a FLEX strategy
2. POTENTIAL non-conformance with a licensing requirement or commitment involving FLEX equipment use for other than FLEX
3. Could result in setting an adverse precedent

SAFER

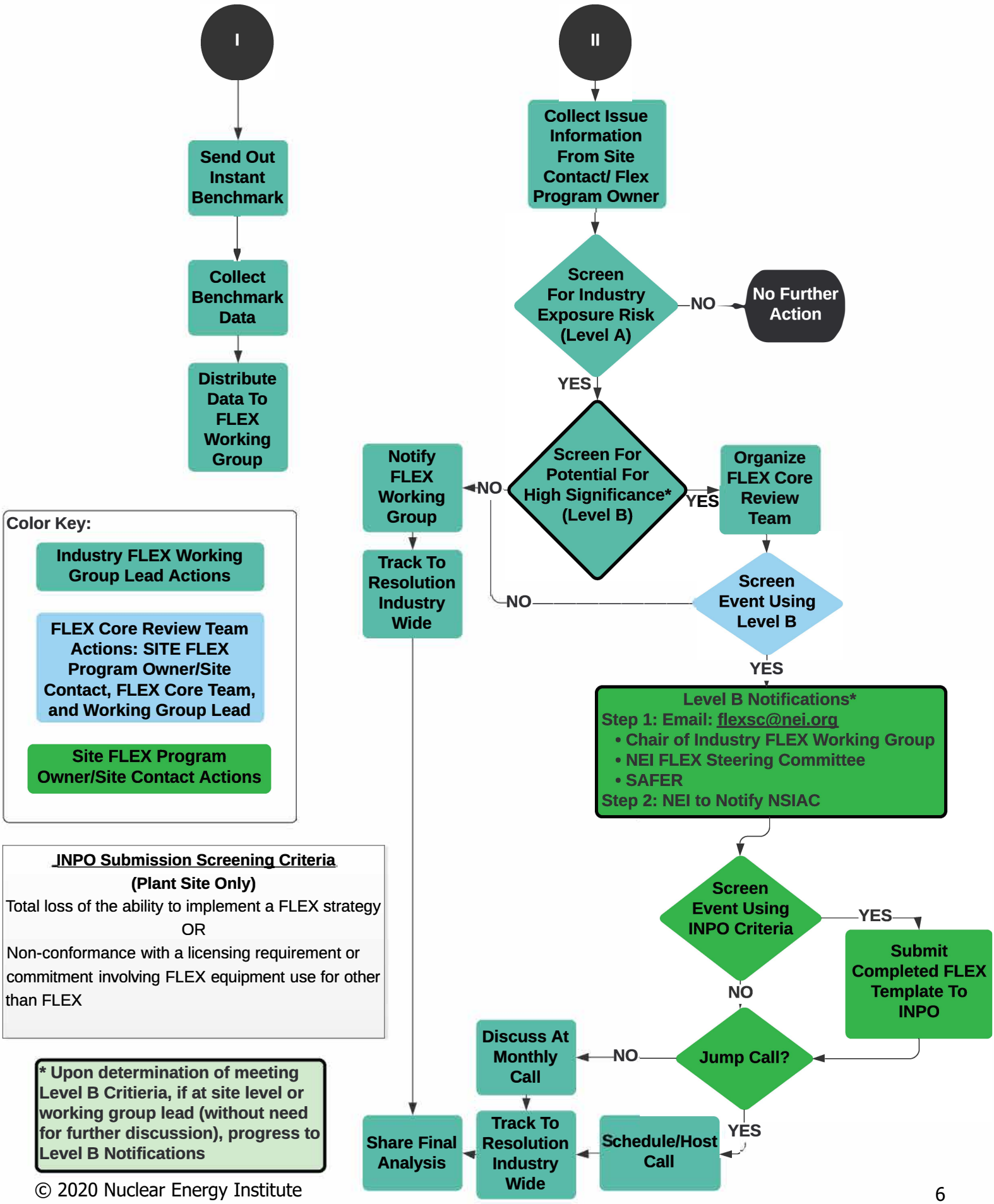
1. Equipment below N without compensatory measures in place
2. SAFER is unable to deliver equipment in the timeframe required by a plant SRP
   Example Issues:
   - Natural or man-made phenomena
   - Transportation logistics
   - Insufficient or unqualified support staff

Color Key:

Site FLEX Program Owner/Site Contact Actions

*** If station determines Level B Criteria Are Met progress to Level B Notifications diamond (second page of Attachment 1) and follow next steps: Notify Industry Groups, Screen for INPO Submission, and Track To Resolution.**

EB 16-17 Attachment 1: Process for Sharing FLEX Operational Experience



Use this template as an aide in translating the results of your on-site corrective action program investigations into industry standard terminology to promote the sharing of operating experience and monitoring. The intent is not to prompt investigations beyond the site CAP requirements. Check applicable boxes. If not applicable, leave blank.

Create/Edit FLEX Report

Site		**Discovery Date/Time**			
Event	☐ Test Passed	☐ Failed to Start	**Equipment Type**	☐ FLEX Direct	
	☐ Test Failed	☐ Failed to Run		☐ FLEX Support	
	☐ Baseline PM Task Interval	☐ Other		☐ Other	
Event Title/Subject					
EPRI Record Number					

Component Type

☐ Air Compressors	☐ Generators Large (>600 volts)	☐ Portable MCCs/Switchgear
☐ Battery	☐ Generators Medium (>120 Volts)	☐ Pumps - Centrifugal
☐ Battery Power Instruments	☐ Generators Small (≤120 volts)	☐ Pumps – Positive Displacement
☐ Communications Equipment	☐ Hoses – Collapsible	☐ Pumps - Submersible
☐ Debris Removal	☐ Hoses – Hydraulic	☐ SFPLI – Wide Range
☐ Diesel Engines Large (≥50 HP)	☐ Hoses – Non-Collapsible	☐ Trailers
☐ Diesel Engines Small (<50 HP	☐ Inverters	☐ Transformers
☐ Electric Cables and Connectors	☐ Lifting Equipment	☐ Transport or Towing Vehicles
☐ Fire Trucks	☐ Lighting Equipment (Lanterns)	☐ Ventilation Blowers
☐ Fuel Transfer Pumps	☐ Light Towers	☐ Other

Reason for Entry – Level A, Noteworthy or Industry Exposure Risk Criteria [Plant Site or SAFER]

☐ Result in increased NRC attention	☐ Potential extent of condition to other nuclear sites or SAFER
☐ Adverse Trend with equipment type	☐ Actual or potential NRC violation

Reason for Entry – Level B, High Significance Level Screening Criteria [Plant Site or SAFER]

☐ Total loss of the ability to implement a FLEX strategy	☐ Potential non-conformance with a licensing requirement or commitment involving FLEX equipment use for other than FLEX	☐ Could result in adverse precedent
☐ SAFER <N with no comp measure in place	☐ SAFER unable to deliver equipment in the time required by plant SRP.	

INPO Submission Criteria [Plant Site]

☐ Total loss of the ability to implement a FLEX strategy	☐ Non-conformance with a licensing requirement or commitment involving FLEX equipment use for other than FLEX

Basic Inputs

Reporter Assessment of Report Completion	☐ Tentative, investigation on-going
	☐ Final, all data updated and complete
Recommended for Review By: [check groups below]	**Technical Contact [required]:**

☐ Design Engineers	☐ Component Engineers	☐ Configuration Management Engineers
☐ Operations Staff	☐ Electrical Maintenance Staff	☐ Emergency Preparedness Staff
☐ Program Engineering	☐ Equipment Reliability Staff	☐ Industrial Safety Staff
☐ System Engineers	☐ I & C Maintenance Staff	☐ Mechanical Maintenance Staff
☐ Work Management/Planning Staff	☐ Licensing Staff	☐ Procurement Engineers
☐ Security Staff	☐ Training Staff	☐ Supply Chain Services Staff

Description

Consequences

Cause
Corrective Action
Lessons Learned

Attachments/Pictures		
File Name	Attachment Title	Revision Date

Note: User Provided Id and Attachment Type (e.g., Condition Report, Equipment Failure Checklist, picture, etc).

Related Events							
Provide any known information of events this may be a repeat of or related to							
Location		Date		EPRI Record		Link (i.e. cause/equipment/etc.)	
Location		Date		EPRI Record		Link (i.e. cause/equipment/etc.)	
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