LUMA

Reducing Risk Exposure to Contingencies

REDUCING RISK EXPOSURE TO CONTINGENCIES

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Procedure Title: **Reducing Risk Exposure to Contingencies**

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1.0 Executive Summary

This procedure provides direction on how to proactively monitor and react to all contingencies. This procedure will also instruct operators on identifying system issues to prevent them from becoming a contingency.

2.0 Objective/Scope/Roles

2.1 Objective

This procedure will reinforce the requirement for System Operations to maintain situational awareness using telemetry data and field observations to assess and react optimally to avert contingencies from occurring. This approach is necessary to maintain the system security and operation and act in accordance with other procedures should the circumstances dictate.

2.2 Scope

This procedure is executed continuously by System Operations. It details how to continuously perform Contingency analysis of the system while maintaining situational awareness for warnings, alarms, along with other data changes and reacting to each in the appropriate manner. The procedure permits the Transmission Operations Center team to obtain Bulk Power System deficiency information from the field and to include such data in their decision making to operate the Bulk Power System while maintaining safety and stability while reacting optimally to a Bulk Power System contingency.

2.3 Roles and Responsibilities

2.3.1 Manager Control Center Operations (MCCO)

The MCCO oversees all Transmission and Interconnected Facility operations and outage implementation. Manages the communication of all ratings information with the Transmission Operating Center personnel involved in operating the BPS. Oversees the entire Control Center Operations and, when BPS conditions require, the MCCO **shall** direct the response to maintain and/or return to safe and stable operations.

2.3.2 Supervisor Transmission and Generation (STG)

The STG is directly responsible for and supervises all Transmission and Interconnected Facility operations including reviewing and approving and implementing outages, supervising all operations personnel, directs the STO, TO, SSE, SE, and oversees actions and responses to BPS emergencies or other anomalies that may occur.

2.3.3 Senior Shift Engineer (SSE)

The SSE has direct responsibility for the overall operation of the Transmission Operations Center (TOC). Oversees and ensures that all activities within the TOC are properly controlled and coordinated including the functions of the Transmission Operator (TO), the Senior Transmission Operator STO and the Shift Engineer (SE). The SSE also consults on all planned outages to Interconnected Facilities.

2.3.4 Shift Engineer (SE)

The SE has direct responsibility for the operation and integration of the generation connected to the overall electrical system. The SE oversees load dispatching of the generation as well as managing scheduled outages to Interconnected Facilities. The SE is also responsible for the generation responses to emergencies or other system anomalies that may occur.

2.3.5 Senior Transmission Operator: 115 kV & 230 kV (STO)

The STO has direct responsibility for the operation of the 115 kV and 230 kV portions of the electrical system. The STO oversees the loading and switching operations on the 115 kV and 230 kV system and responds to emergencies or other system anomalies that may occur and affect the safe and stable operation of the 115 kV and/or the 230 kV system. The STO consults on all Interconnect Facilities and Transmission planned outages.

2.3.6 Transmission Operator 38 kV (TO)

The TO has direct responsibility for the operation of the 38 kV portion of the electrical system. The TO oversees the loading and switching operations on the 38 kV system and the response to emergencies or other system anomalies that may occur and affect the safe and stable operation of the 38 kV system.

3.0 Procedure

3.1 Gaining Situational Awareness

Situational Awareness is the understanding of what is happening, why it is happening and what might happen next. It involves utilizing a questioning attitude to challenge assumptions and proactively operate the system to minimize or mitigate system events.

Situational awareness of system conditions and circumstances begins at shift turnover and is required for the entire shift by all system operators employees.

3.1.1 During Shift Turnover the SSE, SE, STO, and TO shall:

3.1.1.1 Gather detailed status of the BPS via following these key Procedures: Energy Dispatch, Scheduling and Merit Order, while gaining situational awareness with each item on the Turnover Checklist.

3.1.1.2 Review the Load Forecast for the shift.

3.1.1.3 Review the Weather Forecast for the shift.

3.1.1.4 Collect data on other Anomalies.

3.2.1 Data to Monitor

During their entire shift, the SSE, SE, STO and TO **shall** observe, collect, analyze, review, and respond to changing data during entire shift such with respect to Warnings, Alarms, Breaker Operation, Transmission availability, Transmission capability, Generator availability, Generator capability, Scheduled Outages, Recall times, System Configuration, Energy Flow Monitoring, Emergent Issues and Field Observations.

3.2 Perform Normal Operations

Normal Operation refers to the ongoing BPS monitoring and responding to various system changes during a shift.

The STO **shall** continuously monitor the following with Situational Awareness:

- SCADA real-time data.
- Additional data including Line and Transformer Loadings, power factor, cps (cycles per second) data, and voltages.
- Weather conditions, including present and forecasted.
- Outputs of all operating Interconnected facilities.
- Status of all generation not currently running on the system.
- Status of all system elements (including, but not limited to, generating stations not currently on-system, transmission/sub-transmission lines, transmission substation breakers, capacitor banks) that are out of service, and ongoing estimated time(s) to restore back onto the system.
- Comparative economics for each generation source.

3.3 React Optimally to Reduce Risk

Operators **shall** react optimally to reduce the risk of Contingencies – Proactively monitor system flows and configurations to mitigate any possible contingencies.

3.3.1 STO may need to collaborate with other members in the Operations room upon a BPS change and evaluate the following:

- New data or circumstances potentially indicate for the BPS or circumstance.
- The risk of entering an N-1 or G-1 contingency situation.
- The immediate steps to mitigate any adverse conditions.
- The potential subsequent events and action to mitigate a worsening condition.

3.3.2 STO shall initiate necessary action(s) to resolve the issue.

3.3.3 STO shall inform the on-shift Senior Shift Engineer immediately of unanticipated status changes and system adverse conditions

3.3.4 The SSE shall evaluate the potential impact of unanticipated changes in system elements using the SCADA subsystem.

3.3.5 The SSE shall request the Supervisor Transmission and Generation for system studies as necessary.

3.3.6 The SSE shall notify the Supervisor Transmission and Generation and the MCCO when the system event is deemed critical to system stability.

3.3.7 Respond to System Alarms

Unexpected system element failures may cause the automatic system monitoring equipment to alarm. When this occurs all normal operations cease. The TOC personnel **shall** focus their attention on restoring the system to stable operation within the time limits described in Alarm Levels 1, 2, and 3. The situation may escalate through the alarm levels as the TOC personnel are actively responding.

For Alarm Level descriptions, refer to Procedure 18 Contingency and System Operating Limits Response.

Appendix A: Glossary

Term	Definition
Alarm	An indication on SCADA that denotes a condition that requires immediate attention by TOC personnel.
Breaker Operation	An automated equipment operation on the BPS that is unplanned. It is indicated on the SCADA system.
Bulk Power System (BPS)	Refers to all transmission and distribution system and related facilities, equipment and other assets related to the transmission and distribution system.
Contingency	A contingency is the loss or failure of a small part of the power system (e.g. a transmission line), or the loss/failure of individual equipment such as a generator or transformer. It simulates and quantifies the results of problems that could occur in the power system in the immediate future.
Contingency Analysis	Contingency Analysis of a power system is a major activity in power system planning and operation. In general, an outage of one transmission line or transformer may lead to overloads in other branches and/or sudden system voltage rise or drop.
Emergent Issue	An unplanned change that can negatively impact Normal Operations.
Energy Flow Monitoring	A set of data points on SCADA that allow the TOC personnel to determine the real time amount of loading on the Transmission System.
Field Observations	Information regarding a field condition on the BPS that is communicated to the TOC such as a broken insulator, damaged equipment, vegetation near a Transmission Line, a nearby fire or unusual event.
Generation Availability	The operational status of all Interconnected Facilities on the BPS. The status has four conditions: in service, out of service, ready for service, part of reserves.

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Generation Capability	Includes specific performance data of all Interconnected Facilities such as regulation capability, maximum available output, current output, limitations on start.
Generation Island	Islanding is a scheme in a power system designed in such a way that, in case of major grid disturbance as sensed by the protection element, a portion of system is isolated by tripping the predefined tie lines/transmission lines, thus, isolating the part of system from the remaining grid.
N-1	Single Outage Contingency (N-1). The N-1 criterion is a minimum system security measure that the System Operator models the transmission network to address redundancy avoiding potential power interruptions. If a component (any transmission element) should fail or be shut down the network security must still be guaranteed.
Recall Times	The amount of time required to restore a Transmission Line or Interconnected Facility to service that may either be currently out of service or that is scheduled to be taken out of service during the current shift.
Scheduled Outages	Applies to all Transmission and Interconnected Facilities that may either be currently out of service or that are scheduled to be taken out of service during the current shift.
Situational Awareness	Situational Awareness is the understanding of what is happening, why it is happening and what might happen next. It involves utilizing a questioning attitude to challenge assumptions and proactively operate the system to minimize or mitigate system events.
System Configuration	The combined current operational status of all Transmission Elements and Interconnected Facilities on the BPS.
Transmission Availability	The operational status of all 115kV, 230kV and 38kv Transmission Lines and associated equipment during a shift. The status has two conditions: in service and out of service.

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Term	Definition
Transmission Capability	The load carrying capacity versus the actual loading of all 115kV, 230kV and 38kv Transmission Lines and associated equipment during a shift. Also includes any limitations or special conditions.
Transmission Operating Center (TOC)	The main control room for the LUMA transmission system and interconnected facilities. The TOC has certified Independent System Operators who are responsible for operation and communication with all Interconnected Facilities and the operation of 230 KV, 115 KV and 38 KV. systems
Warning	An indication on SCADA that denotes a condition that merits attention by TOC personnel.

Appendix B: Procedure Cross-Reference Matrix

Procedure Reference Matrix, Part 1 of 2	Short Term Load Forecasting	New Facility Interconnection	Resource Adequacy Planning	Interconnected Facility Retirements	Legacy T&G Demarcation	Interconnected Facilities Capabilities	Black Start	Telemetry	Cybersecurity	Root Cause Analysis & Corrective Actions	Public Reporting	Performance Reporting	Stakeholder Management	Policy on Reserves
Short Term Load Forecasting														
New Facility Interconnection														
Resource Adequacy Planning														
Interconnected Facility Retirements														
Legacy T&G Demarcation														
Interconnected Facilities Capabilities														
Black Start														
Telemetry														
Cybersecurity														
Root Cause Analysis and Corrective Actions														
Public Reporting														
Performance Reporting														
Stakeholder Management														
Policy On Reserves														
Reducing Risk Exposure to Contingencies														
Critical Loads														
Load Shedding														
Contingency and System Operating Limits Response														
Energy Dispatch, Scheduling and Merit Order														
Transmission Operations														
Plant Level Communications														
Balancing Frequency and Voltage														
Demand-Side Resources (Non-Wire Alternatives)														
System Operator Training														
Scheduling Planned T&G Outages														
Forced Outage														
Outage Execution and Closeout														
Emergency Response Execution														
Emergency Response Drills														

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Procedure Reference Matrix, Part 2 of 2	Reducing Risk Exposure to Contingencies	Critical Loads	Load Shedding	Contingency & System Operating Limits Response	Energy Dispatch, Shedding & Merit Order	Transmission Operations	Plant Level Communications	Balancing Frequency & Voltage	Demand Side Resources (NWA)	System Operator Training	Scheduling Planned T&G Outages	Forced Outage	Outage Execution & Closeout	Emergency Response Execution	Emergency Response Drills
Short Term Load Forecasting															
New Facility Interconnection															
Resource Adequacy Planning															
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