

**UNDERFREQUENCY LOAD SHED (UFLS) AND UNDERVOLTAGE LOAD SHED (UVLS)
MAINTENANCE TEMPLATE**

AM-CE-P034-R0003
Rev. 3

Revisions to this document shall be communicated in accordance with program document AM-EU-P034 to ensure alignment between Maintenance Templates and field work procedures.

This document contains specific content that has been or will be used as "Evidence of Compliance" for regulatory audits. Any person(s) making revisions to this document shall contact the T&S Engineering Manager, T&S Compliance Analyst and the Exelon NERC Compliance and Security NERC Compliance Management Team (NERC CMT) to inform them of proposed revisions (Outlook address of Exelon NERC CMT O&P Compliance). A representative of the NERC CMT shall be included as a "reviewer" of any proposed revisions to this document. This document is related to NERC Standard PRC-005-6.

This template only applies to the portions of any UFLS or UVLS maintenance required by the applicable revision of the NERC PRC-005-6 Reliability Standard. Not all tasks performed during select UFLS and UVLS routines are subject to the PRC-005-6 Reliability Standard (ex/testing current pick-ups in distribution power reclosers where UVLS or UFLS settings are embedded). Maintenance Tasks and Task Frequencies shown below shall align with the applicable Protection System Maintenance Program for items covered under the PRC-005-6 Reliability Standard and it is the responsibility of the document writer to ensure the documents remain synchronized.

Underfrequency Load Shed & Undervoltage Load Shed Protection Systems Maintenance					
Component Classification Categories					
Criticality	I	X			Unmonitored Distributed Underfrequency Load Shed and Undervoltage Load Shed Protective Relay Systems
	II		X		Monitored Distributed Underfrequency Load Shed and Undervoltage Load Shed Protective Relay Systems
Duty Cycle	Heavy Load	N/A	N/A		
	Normal Load	N/A	N/A		
Service Condition	In Service	X	X		
	Spare	N/A	N/A		
Protective Relays		Task Frequencies*		Failure Codes⁽¹⁾	Comments
Verify Protective Relay settings are as specified		4.8Y ⁽²⁾	8Y ⁽³⁾		
Non-Microprocessor Relays Only: Test and, if necessary calibrate the relay(s)		4.8Y ⁽²⁾	N/A		
Microprocessor Relays Only: Verify operation of the relay inputs and outputs essential to UFLS and UVLS operation		4.8Y ⁽²⁾	8Y ⁽³⁾		
Microprocessor Relays Only: Verify acceptable measurement of power system input values		4.8Y ⁽²⁾	8Y ⁽³⁾		
Voltage and Current Sensing Devices associated with UFLS or UVLS systems		Task Frequencies*		Failure Codes⁽¹⁾	Comments
Verify current and/or voltage signal values are provided to the protective relays		9Y ⁽⁴⁾	9Y ⁽⁴⁾		
Protection system dc supply for tripping non-BES interrupting devices used only for UFLS or UVLS systems		Task Frequencies*		Failure Codes⁽¹⁾	Comments
Verify Protection System dc Supply Voltage		4.8Y ⁽²⁾	8Y ⁽³⁾		
Control Circuitry		Task Frequencies*		Failure Codes⁽¹⁾	Comments
Verify the path from the lockout and/or tripping auxiliary relay (including essential supervisory logic)		9Y ⁽⁴⁾	9Y ⁽⁴⁾		Control circuitry between the UFLS and UVLS relays and electromechanical lockout and/or tripping auxiliary devices (excluding non-BES interrupting device trip coils)
Verify the electrical operation of electromechanical lockout and/or tripping auxiliary devices		9Y ⁽⁴⁾	9Y ⁽⁴⁾		Electromechanical lockout and/or tripping auxiliary devices associated only with UFLS or UVLS systems (excludes non-BES interrupting device trip coils)
Alarming Paths and Monitoring		Task Frequencies*		Failure Codes⁽¹⁾	Comments
Verify operation and reset of Protective Relay internal alarms and power supply fail alarms from the point of origin to the dispatcher or SCADA system logging database		N/A	8Y ⁽³⁾		

*All intervals are performed with a 25% Grace Period unless otherwise noted. With grace period included, all task frequencies are within the maximum maintenance intervals as required by PRC-005-6 Reliability Standard.

- ⁽¹⁾ For items covered under the PRC-005-6 Reliability Standard, time-based maintenance is performed in accordance with the minimum maintenance activities and the maximum maintenance intervals prescribed in the tables of the PRC-005-6 Reliability Standard.
- ⁽²⁾ For items covered under the PRC-005-6 Reliability Standard, interval is 4.8Y but not to exceed the Maximum Maintenance Interval of 6 calendar years.
- ⁽³⁾ For items covered under the PRC-005-6 Reliability Standard, interval is 8Y but not to exceed the Maximum Maintenance Interval of 12 calendar years.
- ⁽⁴⁾ For items covered under the PRC-005-6 Reliability Standard, interval is 9Y but not to exceed the Maximum Maintenance Interval of 12 calendar years.
- ⁽⁵⁾ For items covered under the PRC-005-6 Reliability Standard, interval is 4.8Y but not to exceed the Maximum Maintenance Interval of 12 calendar years.

**UNDERFREQUENCY LOAD SHED (UFLS) AND UNDERVOLTAGE LOAD SHED (UVLS)
TASK DEFINITIONS**

TASK	DEFINITION
Microprocessor Relays Only: Verify acceptable measurement of power system input values	Verifies integrity of relay's AC input circuitry. Each utilized power system input is checked by either applying test signals or using actual power system signals to verify protective relay receives the power system inputs per design.
Microprocessor Relays Only: Verify operation of the relay inputs and outputs essential to UFLS and UVLS operation	Verifies integrity of relay's DC input and output circuitry. Each utilized control input and output is checked to verify it operates per design. Multiple contacts in series are checked to verify that operation of one contact does not initiate an input.
Non-Microprocessor Relays Only: Test and, if necessary calibrate the relay(s)	Verifies if the relay is out of setting tolerance since the last routine and by how much. If a relay element is out of tolerance, it could impact relay fault isolation, relay coordination, reclosing, or Breaker Failure operations.
Verify current and/or voltage signal values are provided to the protective relays	Ensures current and potential transformers supply accurate inputs into protective relaying as well as verifies integrity of circuitry associated with current transformers (CTs) and potential transformers (PTs). An inaccurate CT/PT or failed CT/PT circuitry could cause a relay misoperation (trip in error or fail to trip), impact reclosing, and/or provide inaccurate real-time metering to SCADA systems.
Verify operation and reset of Protective Relay internal alarms and power supply fail alarms from the point of origin to the dispatcher or SCADA system logging database	Verifies integrity of relay alarm contact(s) and circuitry by simulating alarm conditions and verifying alarm was received in SCADA. An undetected relay fail alarm or relay major and/or minor alarm could cause a relay misoperation as well as impact relay coordination, reclosing, or Breaker Failure operations.
Verify Protection System dc Supply Voltage	Ensures UVLS & UFLS system has appropriate dc supply voltage to operate as required.
Verify Protective Relay settings are as specified	Verifies that the UVLS & UFLS protective relay settings be as specified at the conclusion of maintenance activities, whether those settings may have "drifted" since the prior maintenance or whether changes were made as part of the testing process.
Verify the electrical operation of electromechanical lockout and/or tripping auxiliary devices	Verifies the integrity of the electromechanical lockout and/or tripping auxiliary devices. This verifies that the electromechanical lockout and/or tripping auxiliary devices will operate the interrupting devices as required.
Verify the path from the lockout and/or tripping auxiliary relay (including essential supervisory logic)	Verifies that the UVLS & UFLS system is functional up to and including the contact that operates a non-BES breaker trip coil. No periodic maintenance is required for the control circuitry between the electromechanical lockout and/or tripping auxiliary device and the non-BES interrupting device on UFLS or UVLS systems, or between UFLS or UVLS relays (with no interposing electromechanical lockout or auxiliary device) and the non-BES interrupting devices (excludes non-BES interrupting device trip coils).

**UNDERFREQUENCY LOAD SHED (UFLS) AND UNDERVOLTAGE LOAD SHED (UVLS)
MAINTENANCE BASIS**

Underfrequency Load Shed & Undervoltage Load Shed Protection Systems Maintenance

Underfrequency Load Shed & Undervoltage Load Shed maintenance programs are documented in the individual utility's Protection System Maintenance Program. Templates have been developed that address transmission, substation, and distribution equipment that is owned and maintained by Exelon Utilities. Each template documents the program tasks, frequencies, and maintenance basis for the associated equipment.

References:

NERC Standard PRC-005-6 - Protection System, Automatic Reclosing, and Sudden Pressure Relaying Maintenance
ComEd PSMP AM-CE-P181 - Protection System Maintenance Program

Boundary Definitions

The boundary of Underfrequency Load Shed & Undervoltage Load Shed for the purpose of this document is defined to include the applicable component types for UVLS and UFLS systems under PRC-005-6.

Failure Experiences

n/a

Vendor Recommendations

n/a

Disposition of Vendor Recommendations

n/a

Basis for Underfrequency Load Shed & Undervoltage Load Shed Protection Systems Maintenance Tasks

Maintenance tasks and intervals established to comply with PRC-005-6 - Protection System, Automatic Reclosing, and Sudden Pressure Relaying Maintenance standard so that these Protection Systems are kept in working order.

**UNDERFREQUENCY LOAD SHED (UFLS) AND UNDERVOLTAGE LOAD SHED (UVLS)
TEMPLATE DEVELOPMENT HISTORY**

Revision 0		Date 3/20/2015
Writer	Kevin Swiat (ComEd)	
Reviewer(s)	Dan Wasilewski (ComEd), David Carlson (EU TS&C)	
Approver(s)	Mike Moy (ComEd UFAM)	
Reason Written	To document Exelon Utilities North Star for UVLS/UFLS System Maintenance and align to PRC-005-2 - Protection System Maintenance standard.	

Revision 1		Date 12/31/2016
Writer	Kevin Swiat (ComEd)	
Reviewer(s)	Dan Wasilewski (ComEd); Ruth Miller (EU TS&C)	
Approver(s)	Michael Moy (ComEd UFAM)	
Reason Written	Updated all references of PRC-005-2 to PRC-005-6. NERC Review Complete.	

Revision 2		Date 5/25/2018
Writer	Kevin Swiat (ComEd)	
Reviewer(s)	Martin Copello (ComEd); Becky Webb (EU NERC CMT)	
Approver(s)	Michael Moy (ComEd UFAM)	
Reason Written	Added page numbers to all tabs. Corrected titles to "Maintenance Basis" and "Template Development History" tabs by placing the tab title on the second line of the header. NERC Review Complete.	

Revision 3		Date 5/15/2020
Writer	Kevin Swiat (ComEd)	
Reviewer(s)	Martin Copello (ComEd); Dan Gacek (EU NERC CMT)	
Approver(s)	Michael Moy (ComEd UFAM)	
Reason Written	Completed periodic review. No significant updates made.	