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

Pole Top Regulators						
Component Classification Categories						
Criticality	I	X				O'Hare circuits
	II		X			Non Distribution Automation Circuit Mainstem Regulators
	III			X		Non Distribution Automation Fused Tap Regulators
Duty Cycle	Heavy Load	N/A	N/A	N/A		
	Normal Load	N/A	N/A	N/A		
Service Condition	In Service	N/A	N/A	N/A		
	Spare	N/A	N/A	N/A		

Condition Monitoring Tasks	**Task Frequencies**			**Failure Codes**	**Comments**
Visual Inspection	**2Y**	**2Y**	**2Y**	**1a, 3a-e, 4a-d, 5a**	
Failure Finding Tasks	**Task Frequencies**			**Failure Codes**	**Comments**
Thermography	**6M**	**2Y**	**N/A**	**4b, 5a**	
Functional Test	**2Y**	**2Y**	**2Y**	**2a, 6a-b**	
Time Directed Tasks	**Task Frequencies**			**Failure Codes**	**Comments**
None	**N/A**	**N/A**	**N/A**		
Condition Directed Tasks	**Task Frequencies**			**Failure Codes**	**Comments**
None	**N/A**	**N/A**	**N/A**		

FAILURE MODES	FAILURE CAUSES	MAINTENANCE TASKS
1. Fails to Provide Adequate Cooling	1b. Loss of Oil	Visual Inspection
2. Fails to Regulate Voltage/Current	2a. Control Circuit Failure	Functional Test
3. Fails to Maintain Boundary Integrity	3a. Gasket Failure	Visual Inspection
3. Fails to Maintain Boundary Integrity	3b. Weld Failure	Visual Inspection
3. Fails to Maintain Boundary Integrity	3c. Tank Corrosion	Visual Inspection
3. Fails to Maintain Boundary Integrity	3d. Valve Leakage	Visual Inspection
3. Fails to Maintain Boundary Integrity	3e. Tank Over Pressurization	Visual Inspection
4. Fails to Provide Adequate Insulation Level	4a. Loss of Oil	Visual Inspection
4. Fails to Provide Adequate Insulation Level	4b. Bushing Failure	Visual Inspection
4. Fails to Provide Adequate Insulation Level	4b. Bushing Failure	Thermography
4. Fails to Provide Adequate Insulation Level	4c. Vegetation/Animal Intrusion	Visual Inspection
4. Fails to Provide Adequate Insulation Level	4d. External Contamination	Visual Inspection
5. Fails to Provide Adequate Conduction Path	5a. Loose Connections	Visual Inspection
5. Fails to Provide Adequate Conduction Path	5a. Loose Connections	Thermography
6. Fails to Provide Adequate Indication	6a. Cam Failure	Functional Test
6. Fails to Provide Adequate Indication	6b. Mechanical Failure	Functional Test

TASK	DEFINITION
Functional Test	Obtain voltage readings and identify component failures.
Thermography	Infrared inspection of electrical equipment and power path components to identify any hot spots that may exist.
Visual Inspection	Inspections scope should include the following (added details available via documents posted to the Management Model under the control element Conduct of Maintenance): -- Check bushings, oil level, lightning arrestors, ground connections, position indicator, cutout box, misc hardware & support brackets -- Check for signs of oil leaks, rust, pealing paint, vegetation/animal intrusion -- Record operations counter reading

Pole Top Regulator Template Summary

The Preventive Maintenance program is documented via Performance Centered Maintenance (PCM) templates. Templates have been developed that address all transmission, substation, and distribution equipment that is owned, and / or, maintained by EED. Each template documents the program tasks, frequencies, failure modes, and maintenance basis for the associated equipment. Tasks and associated frequencies are designed to address known failure modes of the equipment covered by the template. In general, the tasks included in the PCM templates are the result of good industry practices, industry experience, and manufacturer recommendations.

References:

Internal reports and operating experience
GEH-4281C, G.E. Type VR-1 regulators instructions manual
G.E. Type VR-1 regulators service advisory 7/19/95
S225-10-5, McGraw-Edison VR-32 regulators service manual

Boundary Definition

Boundary is defined to include the pole top regulator unit and associated hardware.

Failure Experiences

Failures that result in significant impact are subject to ACE/RCI investigation.
Findings/recommended corrective actions are incorporated into the template as required.

Vendor Recommendations

OEM manuals were referenced and interviews conducted during the development of this template.

Disposition of Vendor Recommendations
Recommendations were incorporated into the template as deemed necessary.

Basis For Template Tasks

Functional Test: This test will obtain voltage readings and identify component failures.

Thermography: A primary tool for detection of hot spots and connection issues.

Visual Inspection: This inspection approximates real-time condition monitoring that can detect developing problems and degradation, and provides condition data used to initiate corrective actions.

	Revision 0	Date 12/29/2006
Writer	Larry Griess (Strategic Programs)	
Reviewer(s)		
Approver(s)	Kathy McHugh (FAM Maintenance Planning)	
Reason Written	To document the maintenance program tasks, frequencies, failure modes, and maintenance basis	

	Revision 1	Date 11/30/2010
Writer	Chris Stefanski	
Reviewer(s)	Ken Wendt (Mgr. Material Condition)	
Approver(s)	Bill Fluhler , Bill Gannon, Nitin Patel, Jim Crane, Bill Sullivan	
Reason Written	Added note to ensure template changes are communicated to affected work groups.	

	Revision 2	Date 01/27/2014
Writer	Suneetha Parupalli, Sr Engineer, Material Condition	
Reviewer(s)	Ken Wendt (Mgr. Material Condition)	
Approver(s)	Mike Moy (UFAM)	
Reason Written	3 year review, reformat document, No content change	

	Revision 0 (AM-CE-P034-R3010 previous version)	Date 11/20/2015
Writer	Suneetha Parupalli, Sr Engineer, Material Condition	
Reviewer(s)	Ken Wendt (Mgr. Material Condition)	
Approver(s)	Mike Moy (UFAM)	
Reason Written	Align with current practice of same maintenance frequency for fixed and switched banks.	

	Revision 1	Date 07/11/2016
Writer	Suneetha Parupalli, Sr Engineer, Material Condition	
Reviewer(s)	Dale Player (Mgr. Material Condition), Peter Yan (Sr. Engineer, Reliability Programs)	
Approver(s)	Mike Moy (UFAM)	
Reason Written	Change wording in criticality section to Non Distribution Automation Circuit Mainstem and Fused Regulators to align with EU documentation.	