

SUBSTATION YARDS								
Component Classification Categories								
Criticality	I	X						Nuclear Switchyards
	II		X					DC, SS, TDC, TSS locations that serve O'Hare & Midway Airports,
	III			X				Locations exclusive of Criticality I and II, DC locations, ≤34kV ESS locations and Transmission Terminals
	IV				X			DC locations
	V					X		≤34kV ESS locations
	VI						X	Transmission Terminals
Duty Cycle	Heavy Load	N/A	N/A	N/A	N/A	N/A	N/A	
	Normal Load	N/A	N/A	N/A	N/A	N/A	N/A	
Service Condition	In Service	N/A	N/A	N/A	N/A	N/A	N/A	
	Spare	N/A	N/A	N/A	N/A	N/A	N/A	
Condition Monitoring Tasks								
		Task Frequencies					Failure Codes	Comments
Visual Inspection	5W	5W	10W	3M	6M	10W	1b, 3a-e	
Oil/Water Separator Check	1Y	1Y	1Y	1Y	1Y	AR	1a	Where applicable
Time Directed Tasks								
		Task Frequencies					Failure Codes	Comments
Culvert Cleaning	1Y	1Y	1Y	1Y	1Y	AR	1b	Where applicable
Station Summerization	1Y	1Y	1Y	1Y	1Y	AR	2a	Where applicable
Station Winterization	1Y	1Y	1Y	1Y	1Y	AR	2a	Where applicable
Septic Tank Maintenance	AR	AR	AR	AR	AR	AR	1c	At sites not connected to sewer system
Failure Finding Tasks								
		Task Frequencies					Failure Codes	Comments
None	N/A	N/A	N/A	N/A	N/A	N/A		
Condition Directed Tasks								
		Task Frequencies					Failure Codes	Comments
None	N/A	N/A	N/A	N/A	N/A	N/A		

SUBSTATION YARD MAINTENANCE TASK DEFINITIONS

TASK	DEFINITION
Culvert Cleaning	Clean out of culverts where roadways cross over or run between drainage ditches.
Oil/Water Separator Check	Measurement of sludge, water and oil content in the oil / water separator system. Results determine need for removal of sludge and/or oil .
Septic Tank Maintenance	Pumping and disposal of septic tank content.
Station Summerization	Recommended tasks necessary to prepare a substation for summer operation.
Station Winterization	Recommended tasks necessary to prepare a substation for winter operation.
Visual Inspection	<p>Scope includes, but is not limited to:</p> <ul style="list-style-type: none"> -- Check for evidence of wildlife intrusion and condition of wildlife deterrents (if installed) -- Check fence integrity (holes, wash out, grading, proper grounding) -- Identify any materials close to yard perimeter (inside and out) that could be utilized for climbing -- Check for signs of unauthorized entry (break-in) -- Check for proper posting of signs on substation perimeter fence and on entry gates; check for proper locks on entry gates. -- Check for environmental contamination (spills) and proper housekeeping. Check Petro-plugs, where applicable. -- Identify debris or materials on property that could become airborne and cause equipment damage or outage -- Identify need for vegetation control -- Visual and functional check of exterior lighting -- Check for exposed ground mats, grading needs, trench cover condition -- For Transmission Terminals only (not applicable at Nuclear Switchyards) Scope includes aforementioned steps and the following: <ul style="list-style-type: none"> a) check cable pot heads for leaks or issues, b) check arrestors for damage, c) check cable bonding leads and boxes for damage or deterioration, d) check all visible ground connections for signs of looseness, contamination, flashover, or corrosion, e) Check wildlife protection is intact f) Check foundation & structures: signs of corrosion or weld failure, chipping / peeling paint, verify structural integrity, look for cracks or loose hardware

SUBSTATION YARDS FAILURE MODES

FAILURE MODES	FAILURE CAUSES	MAINTENANCE TASKS
1. Fails to Provide Containment	1a. Oil Discharge to Waterway or Sewer	Oil/Water Separator Check
1. Fails to Provide Containment	1a. Oil Discharge to Waterway or Sewer	Visual Inspection
1. Fails to Provide Containment	1b. Flooding	Culvert Cleaning
1. Fails to Provide Containment	1b. Flooding	Visual Inspection
1. Fails to Provide Containment	1c. Sewage Discharge	Septic Tank Maintenance
2. General Equipment Failure	2a. Failure to Prepare for Seasonal Change	Station Summerization
2. General Equipment Failure	2a. Failure to Prepare for Seasonal Change	Station Winterization
3. Fails to Provide Secure Environment	3a. Unauthorized Entry	Visual Inspection
3. Fails to Provide Secure Environment	3b. Fence Integrity Compromised (Holes or Wash Out)	Visual Inspection
3. Fails to Provide Secure Environment	3c. Air Borne Debris/Material	Visual Inspection
3. Fails to Provide Secure Environment	3d. Missing Animal Protection	Visual Inspection
3. Fails to Provide Secure Environment	3e. Missing/Inadequate Signage	Visual Inspection

SUBSTATION YARDS MAINTENANCE BASIS

Substation Yards Template Summary

The Preventive Maintenance program is documented via maintenance templates. 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, 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 maintenance templates are the result of good industry practices, industry experience, and manufacturer recommendations.

References:

Internal reports and operating experience
EPRI 10011779 Guidelines for the Life Extension of Substations
IEEE Standard 450 2002

Boundary Definition

The boundary of a substation yard for the purpose of this document is defined to include the equipment and facilities inside the fenced-in or walled area of the substation site.

Excluded from this treatment are: cables and conduits emanating from the substation, aerial connections to the transmission and/or distribution system, access roads and surrounding landscaping, footings, structures and electrical equipment, grounding systems.

Transmission Terminals: Are sites (69kV & up and not applicable at Nuclear Switchyards) where transmission lines transition from an overhead construction to underground construction. Transmission Terminals may be within a fenced in area or may consist of special terminal structures only. A Transmission Terminal site may contain more than one transmission circuit.

Failure Experiences

Failures are subject to ACE/RCI investigation. Findings/recommended corrective actions are incorporated into the template as required.

Vendor Recommendations

N/A

Disposition of Vendor Recommendations

SUBSTATION YARDS MAINTENANCE BASIS

N/A

Basis For Template Tasks

Culvert Cleaning: Locations where roadways cross over or between drainage ditches require culvert cleaning to promote drainage.

Oil/Water Separator Check: Check of the oil / water separator system determines water, oil and sludge levels in the containment. Sludge levels in excess of specified depths require cleanout of the containment. Those systems designed to discharge excessive water should be checked for signs of oil in the discharge.

Septic Tank Maintenance: Periodic pumping and cleaning of septic tanks is required where sanitary facilities are not connected to municipal sewer systems.

Station Summerization: Required to prepare the substation for warm weather operation.

Station Winterization: Required to prepare the substation for cold weather operation.

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.

SUBSTATION YARDS TEMPLATE DEVELOPMENT HISTORY

Revision 0		Date 07/17/2015
Writer	Hugo Castaneda (ComEd)	
Reviewer(s)	Ken Wendt	
Approver(s)	Michael Moy (UFAM ComEd)	
Reason Written	Revised criticality definitions and modified document to serve as the ComEd maintenance standard.	

Revision 1		Date 07/17/2018
Writer	Hugo Castaneda (Material Condition)	
Reviewer(s)	Dale Player (Mgr Material Condition), Elizabeth Spolarich (T&S Equip Stds and Fire Protection), Angelo DeAngelis (Material Condition), Rocky Koehler (Transmission Engineering)	
Approver(s)	Michael Moy (UFAM ComEd)	
Reason Written	3yr review cycle. Incorporated Transmission Terminals criticality with a 10W visual inspection cycle with associated task definition and maintenance basis updated.	