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October 1, 2015

VIA UNITED PARCEL SERVICERosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street, 2nd Floor
Harrisburg, PA 17120**RECEIVED**

OCT 1 2015

PA PUBLIC UTILITY COMMISSION
SECRETARY'S BUREAU

**Re: Biennial Inspection, Maintenance, Repair and Replacement Plan –
Pennsylvania Electric Company for the period January 1, 2017 –
December 31, 2018
Docket No. M-2009-2094773**

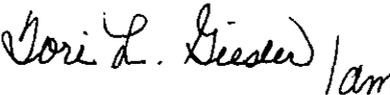
Dear Secretary Chiavetta:

In accordance with 52 Pa. Code § 57.198, enclosed for filing on behalf of Pennsylvania Electric Company (“Penelec”) is an original and one copy of the Biennial Inspection, Maintenance, Repair and Replacement Plan (the “Plan”) for the period January 1, 2017 through December 31, 2018. Please date stamp the extra copy and return it in the postage-prepaid envelope provided.

This Plan is designed consistent with the guidelines established by the National Electric Safety Code, the Codes and Practices of the Institute of Electrical and Electronic Engineers, Federal Energy Regulatory Commission Regulations, and the American National Standards Institute, Inc. The Plan also has been designed to reduce the risk of outages on Penelec’s system and form the basis of its inspection and maintenance goals and objectives as outlined in Penelec’s annual and quarterly reliability reports filed with the Pennsylvania Public Utility Commission (“Commission”).

Penelec respectfully requests that the Commission accept its Biennial Inspection, Maintenance, Repair and Replacement Plan. If you have any questions, please contact me or Tiffanne Cowan at (330) 761-4474.

Sincerely,



Tori L. Giesler

dlm
Enclosure

c: D. Searfoorce

**Biennial Inspection, Maintenance, Repair and Replacement
Plan of Pennsylvania Electric Company ("Penelec")**

For the period of January 1, 2017 – December 31, 2018

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OCT 1 2015

PA PUBLIC UTILITY COMMISSION
SECRETARY'S BUREAU

**Submitted by:
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President, Pennsylvania Operations
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Greensburg, PA 15601
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Revisions to Approved Plan

The Commission accepted Pennsylvania Electric Company's ("Penelec") current Biennial Inspection, Maintenance, Repair and Replacement Plan ("I&M Plan") for 2015 and 2016 on December 30, 2013. The table below illustrates, in summary fashion, the proposed additions to the 2017 and 2018 plan that differ were not in the 2015-2016 I&M Plan.

Penelec <i>Proposed Program (effective January 1, 2017)</i>
Distribution Overhead Line Inspections – page 7
The Company has included switches and sectionalizers to the list of items to be inspected in the <u>Distribution Inspection & Maintenance Practice – Overhead Circuits and Equipment</u> .

Section 57.198(N)(1). Vegetation Management. *The statewide minimum inspection and treatment cycle for vegetation management is between 4-8 years for distribution facilities. An EDC shall submit a condition-based plan for vegetation management for its distribution system facilities explaining its treatment cycle.*

Program Description

Pennsylvania Electric Company (“Penelec”) performs vegetation management to promote the continued safe and reliable operation of the distribution system. Vegetation management may be performed utilizing one of three methods: Standard Specification, Inspect/Maintain or Enhanced techniques. The Standard Specification for vegetation management is designed to support line reliability, maintain access, make repairs, or restore service and to support safe and reliable service. The Standard vegetation specification provides vegetation to be pruned to achieve five years of clearance, removal of selected incompatible trees within the clearing zone corridor, removal of certain defective limbs that are overhanging primary conductors, controlling selected incompatible brush mechanically and/or using herbicide, and removal of off-corridor priority trees that are dead, dying, diseased, and leaning or significantly encroaching the corridor.

Portions of a circuit that experience high customer interruption minutes due to vegetation-caused outages may be targeted to receive the Standard Specification as well as enhanced vegetation removal techniques, which includes removal of certain healthy limbs, based on tree species and condition, which overhang primary conductors.

For portions of a circuit that have not experienced significant reliability issues due to vegetation-caused outages, a proactive Inspect/Maintain process will target selective vegetation removal for continued reliable system operation. This may include the extension of a cycle which will not exceed eight years. This process involves inspection of the vegetation to evaluate the extent of potential for vegetation to interfere with energized conductors. Factors to consider in the evaluation are the voltage and height of the conductor, the type of tree, its growth rate and branching habit. Trees that will impact safety or reliability will be maintained to the Standard Specification.

Methods used to manage and control vegetation include manual control methods using hand-operated tools, mechanical control using equipment mounted saws, mowers or other devices, and various herbicide application techniques such as, selective basal herbicide applications, stem foliage applications and cut stubble applications.

For further detailed information regarding Penelec’s vegetation management program, reference the [Vegetation Management Distribution Specifications](#).

Inspection Plan¹

	Area	Inspections and Treatments Planned	
		Total Circuit Miles	
		2017	2018
Penelec 19,091 total circuit miles	Altoona <i>1,974 total circuit miles</i>	371	348
	Clearfield <i>1,680 total circuit miles</i>	383	314
	DuBois <i>1,589 total circuit miles</i>	211	382
	Erie <i>2,373 total circuit miles</i>	532	512
	Johnstown <i>2,414 total circuit miles</i>	409	311
	Lewistown <i>1,807 total circuit miles</i>	352	322
	Oil City <i>2,013 total circuit miles</i>	403	407
	Towanda <i>4,006 total circuit miles</i>	797	813
	Warren <i>1,235 total circuit miles</i>	245	260

Section 57.198(C). Time frames. *The plan must comply with the inspection and maintenance standards in subsection (N). A justification for the inspection and maintenance time frames selected shall be provided, even if the time frame falls within the intervals prescribed in subsection (N). However, an EDC may propose a plan that, for a given standard, uses intervals outside the Commission standard, provided that the deviation can be justified by the EDC's unique circumstances or a cost/benefit analysis to support an alternative approach that will support the level of reliability required by law.*

Justification

Distribution vegetation management activities are performed in accordance with the following:

- Generally accepted industry practices
- ANSI Z133.1 and A-300 Standards and according to the requirements given by OSHA and the National Electrical Safety Code (NESC)

The standard specification seeks to control all vegetation in the space defined as the "distribution clearing zone". The distribution clearing zone is a corridor measured at a horizontal distance of fifteen feet on either side of the pole line or the established large tree edge, whichever is greater in width. The corridor is measured vertically to fifteen feet

¹ Subject to change.

above the highest conductor attached to the pole or structure. In addition to the standard specification, Penelec may apply a practice described as "enhanced maintenance" to select line sections. Enhanced maintenance is intended to improve tree related reliability. This practice involves removing overhanging limbs beyond the prescribed fifteen feet as well as aggressive hazard tree mitigation.

As part of Penelec's approach to improved tree related reliability, the Company continues to analyze the circuit electrical protection schemes and gives added attention to those line sections that serve high numbers of customers. While following the existing protection schemes, three distinct line sections have been identified and defined. Zone 1 is defined as the three-phase circuitry from the circuit breaker to the first protective device which serves the entire circuit customer load. Zone 2 is defined as the three-phase circuitry beyond the first protective device which typically serves a large percentage of the circuit customer load. Zone 3 is defined as all single phase and two-phase circuitry which serves smaller percentages of the circuit customer load.

Section 57.198(m). Record Keeping. *Maintain records of inspection and maintenance activities sufficient to demonstrate compliance with its distribution facilities inspection, maintenance, repair and replacement programs.*

In order to demonstrate compliance with its distribution facilities inspection, maintenance, repair and replacement programs, Penelec will maintain inspection and maintenance records either electronically or in hard copy as required by state law.

Section 57.198(N)(2). Pole Inspections. *Distribution poles shall be inspected at least as often as every 10 – 12 years except for the new southern yellow pine creosoted utility poles which shall be initially inspected within 25 years, then within 12 years annually after the initial inspection. Pole inspections must include:*

- i. *Drill tests at and below ground level*
- ii. *A shell test*
- iii. *Visual inspection for holes or evidence of insect infestation*
- iv. *Visual inspection for evidence of unauthorized backfilling or excavation near the pole*
- v. *Visual inspection for signs of lightning strikes*
- vi. *A load calculation*

Program Description

Penelec shall visually inspect distribution wood poles on a twelve year cycle. The purpose for inspecting distribution wood poles is to identify and repair unsafe conditions or conditions that may adversely affect service reliability or system performance, and to comply with the state regulatory agencies and the National Electrical Safety Code.

This preventative maintenance inspection for wood poles will include a visual inspection as well as hammer-sounding as needed. The inspection consists of the recording of abnormal conditions from the groundline to the top of the pole including but not limited to the following:

- Damage – broken or leaning
- Equipment – crossarms, insulators, conductors, oil leaking
- Testing for decayed internal wood

In addition to the visual inspection, poles showing incipient decay or poles that are thirty-five years old or older will be bored to further assess the condition of the pole. This inspection consists of the recording of tests performed and abnormal conditions detected including but not limited to the following:

- Boring – testing for internal decay
- Verification of shell thickness

For further detailed information regarding Penelec's inspection of wood poles, reference the Distribution Inspection & Maintenance Practice – Wood Pole Groundline.

Inspection Plan²

	Area	Pole Inspections Planned (Number of Poles)	
		2017	2018
Penelec 499,087 total poles	Altoona 58,975 total poles	4,915	4,915
	Clearfield 31,240 total poles	2,603	2,603
	Dubois 54,037 total poles	4,503	4,503
	Erie 73,600 total poles	6,133	6,133
	Johnstown 59,866 total poles	4,989	4,989
	Lewistown 35,844 total poles	2,987	2,987
	Oil City 57,366 total poles	4,781	4,781
	Towanda 90,161 total poles	7,513	7,513
	Warren 37,998 total poles	3,167	3,167

Section 57.198(N)(3). Inspection Failure. If a pole fails the groundline inspection and shows dangerous conditions that are an immediate risk to public or employee safety or conditions affecting the integrity of the circuit, then the pole shall be replaced within 30 days of the date of inspection.

Corrective Maintenance

Wood poles and supporting structures with recorded defects that Penelec could reasonably expect to endanger life or property shall be repaired or replaced within thirty days. All remaining deficiencies will be evaluated and prioritized on a case-by-case basis.

Section 57.198(C). Time frames. The plan must comply with the inspection and maintenance standards set forth in subsection (N). A justification for the inspection and maintenance time frames selected shall be provided, even if the time frame falls within the intervals prescribed in subsection (N). However, an EDC may propose a plan that, for a given standard, uses intervals outside the Commission standard, provided that the deviation can be justified by the EDC's unique circumstances or a cost/benefit analysis to support an alternative approach that will support the level of reliability required by law.

² Subject to change based on the addition or removal of equipment.

Justification

The practice of performing wood pole inspections on a twelve year cycle is based on accepted electric utility practices. National Electrical Safety Code (NESC) Rule 12.121.A states "lines and equipment shall be inspected at such intervals as experience has shown to be necessary." A periodicity of twelve years between inspections allows enough time for proper planning and remediation prior to any emergent problems having a negative impact on personal safety, equipment integrity or service reliability.

Regarding load calculations, Penelec's design personnel base line designs on FirstEnergy's Distribution Line Construction Standards and Distribution Engineering Practices. The Company's Construction Standards are based and updated each time an updated NESC Heavy Loading standard is issued. The majority of FirstEnergy's service territory lies within this zone and these standards provide basic guidance for most designs encountered by distribution line design personnel. All new facilities are in line with NESC Heavy Loading standard NESC C2-2012, Section 250. The Engineering Practices provide detailed guidance for both guying and pole loading to be used when designers encounter more complex design needs, again based on NESC Heavy Loading. Per the NESC, both of these resources include safety factors such that the deterioration of poles in service shall not reduce the strength capability of the pole below the required strength. Further, as the Company receives requests from other entities to attach their facilities to Penelec poles, an assessment of the pole's ability to accommodate the new strength requirement is performed.

Section 57.198(m). Record Keeping. *Maintain records of inspection and maintenance activities sufficient to demonstrate compliance with its distribution facilities inspection, maintenance, repair and replacement programs.*

In order to demonstrate compliance with its distribution facilities inspection, maintenance, repair and replacement programs, Penelec will maintain inspection and maintenance records either electronically or in hard copy as required by state law.

Section 57.198(N)(4). Distribution overhead line inspections. *Distribution lines shall be inspected by ground patrol a minimum of once every 1 – 2 years. A visual inspection must include checking for:*

- i. Broken insulators*
- ii. Conditions that may adversely affect operation of the overhead distribution line*
- iii. Other conditions that may adversely affect operation of the overhead distribution line*

Program Description

Penelec shall visually inspect overhead lines and equipment on a five-year cycle. The purpose for inspecting overhead lines and equipment is to identify and repair unsafe conditions or conditions that may adversely affect service reliability, and to comply with the requirements of state regulatory agencies and the National Electrical Safety Code. This program shall be limited to overhead facilities.

Approximately one-fifth of all circuits will be inspected annually to levelize labor commitments and expenses. This preventative maintenance will consist of a visual inspection and recording of abnormal conditions including but not limited to the following types of overhead circuit equipment:

- Conductors (wire and cable) – excessive slack, condition, damage, clearances
- Supporting structures (wood poles) – deteriorated condition, sustained damage (lightning, vehicle, woodpecker holes)
- Pole hardware – condition, damage
- Guying – condition, damage
- Pole-mounted distribution equipment – condition, damage
- Switches
- Sectionalizers

For further detailed information regarding Penelec's inspection of Distribution Overhead Lines, reference the Distribution Inspection & Maintenance Practice – Overhead Circuits and Equipment.

Inspection Plan³

	Area	Overhead Line Inspections Planned (Number of Circuits)	
		2017	2018
Penelec 1,251 total circuits	Altoona 172 total circuits	33	35
	Clearfield 65 total circuits	15	12
	Dubois 95 total circuits	18	23
	Erie 203 total circuits	39	40
	Johnstown 134 total circuit	27	26
	Lewistown 84 total circuits	18	17
	Oil City 142 total circuits	30	27
	Towanda 260 total circuits	53	54
	Warren 96 total circuits	17	19

Section 57.198(N)(5). Inspection Failure. *If critical maintenance problems are found that affect the integrity of the circuits, they shall be repaired or replaced no later than 30 days from discovery.*

Corrective Maintenance

Supporting structures with recorded defects that Penelec could reasonably expect to endanger life or property shall be repaired or replaced within thirty days. All remaining deficiencies will be evaluated and prioritized on a case-by-case basis.

Section 57.198(C). Time frames. *The plan must comply with the inspection and maintenance standards in subsection (N). A justification for the inspection and maintenance time frames selected shall be provided, even if the time frame falls within the intervals prescribed in subsection (N). However, an EDC may propose a plan that, for a given standard, uses intervals outside the Commission standard, provided that the deviation can be justified by the EDC's unique circumstances or a cost/benefit analysis to support an alternative approach that will support the level of reliability required by law.*

³ Subject to change based on the addition or removal of equipment.

Justification

The practice of performing overhead line inspections on a five-year cycle is based on accepted electric utility practices and the experience of Penelec. National Electrical Safety Code (NESC) Rule 12.121.A states "*lines and equipment shall be inspected at such intervals as experience has shown to be necessary.*" A periodicity of five years between inspections has historically been utilized and has proven to be successful in addressing emergent problems in a timely manner, allowing for proper planning and remediation prior to the emergent problem having a negative impact on personal safety, equipment integrity or service reliability.

In addition to an inspection every five years, there are many other opportunities for Penelec personnel to view the overhead line facilities and identify any potential issues. Penelec's overhead line inspection program coincides with other equipment inspections, such as the annual recloser inspections. In order to address specific reliability concerns and to assess some worst performing circuit performance, additional circuit assessments are performed in addition to Penelec's five-year inspection program. Any emergent priority overhead line problems identified during these other inspections are similarly addressed in a timely manner.

Section 57.198(m). Record Keeping. *Maintain records of inspection and maintenance activities sufficient to demonstrate compliance with its distribution facilities inspection, maintenance, repair and replacement programs.*

In order to demonstrate compliance with its distribution facilities inspection, maintenance, repair and replacement programs, Penelec will maintain inspection and maintenance records either electronically or in hard copy as required by state law.

Section 57.198(N)(6). Distribution transformer inspections. Overhead distribution transformers shall be visually inspected as part of the distribution line inspection every 1 – 2 years. Above-ground pad-mounted transformers shall be inspected at least as often as every 5 years and below-ground transformers shall be inspected at least as often as every 8 years. An inspection must include checking for:

- i. Rust, dents or other evidence of contact
- ii. Leaking oil
- iii. Installation of fences or shrubbery that could adversely affect access to and operation of the transformer
- iv. Unauthorized excavation or changes in grade near the transformer

Program Description

Penelec visually inspects overhead distribution transformers as part of the overhead line inspection. Above-ground pad-mounted transformers are inspected on a five-year cycle and below-ground transformers are inspected on an eight-year cycle. The purpose for inspecting distribution transformers is to identify and repair unsafe conditions or conditions that may adversely affect service reliability, and to comply with the requirements of state regulatory agencies and the National Electrical Safety Code.

Overhead distribution transformers – visual inspection and recording of abnormal conditions including but not limited to the following:

- Equipment condition – oil leakage, arresters, rust, dents or evidence of contact

Above-ground pad-mounted equipment (transformers and switchgear) – inspection and recording of abnormal conditions including but not limited to the following:

- Equipment condition – oil leakage, cabinet damage, holes, washout
- Security – locking mechanisms
- Accessibility – as required for operation and maintenance purposes
- Warning labels – electrical hazard warning label and landscaping instructions notice

Below-ground transformers – visual inspection and recording of abnormal conditions including but not limited to the following:

- Accessibility – verify cover is secured
- Equipment condition – visually inspect baffle

For further detailed information regarding Penelec's inspection of distribution transformers, reference the Distribution Inspection & Maintenance Practice – Underground Equipment.

Inspection Plan⁴

	Area	Type	Transformer Inspections Planned (Total Transformers)	
			2017	2018
Penelec 195,142 total transformers	Altoona 28,426 total transformers	Overhead Transformers <i>23,358 total transformers</i>	4,193	4,506
		Above-Ground Pad-mounted <i>4,760 total transformers</i>	676	929
		Below-Ground Transformers <i>308 total transformers</i>	38	38
	Clearfield 16,551 total transformers	Overhead Transformers <i>15,089 total transformers</i>	3,210	2,639
		Above-Ground Pad-mounted <i>1,308 total transformers</i>	227	220
		Below-Ground Transformers <i>154 total transformers</i>	19	19
	Dubois 16,785 total transformers	Overhead Transformers <i>14,481 total transformers</i>	3,176	3,091
		Above-Ground Pad-mounted <i>2,102 total transformers</i>	399	583
		Below-Ground Transformers <i>202 total transformers</i>	25	25
	Erie 27,576 total transformers	Overhead Transformers <i>22,422 total transformers</i>	4,450	4,310
		Above-Ground Pad-mounted <i>5,033 total transformers</i>	1,002	1,167
		Below-Ground Transformers <i>121 total transformers</i>	15	15
	Johnstown 23,106 total transformers	Overhead Transformers <i>19,665 total transformers</i>	3,768	3,676
		Above-Ground Pad-mounted <i>3,248 total transformers</i>	481	523
		Below-Ground Transformers <i>193 total transformers</i>	24	24
	Lewistown 16,136 total transformers	Overhead Transformers <i>13,388 total transformers</i>	3,347	2,689
		Above-Ground Pad-mounted <i>2,575 total transformers</i>	549	481
		Below-Ground Transformers <i>173 total transformers</i>	22	22

⁴ Subject to change based on the addition or removal of equipment.

Area	Type	Transformer Inspections Planned (Total Transformers)	
		2017	2018
Oil City 20,508 total transformers	Overhead Transformers 18,002 total transformers	4,705	3,859
	Above-Ground Pad-mounted 2,331 total transformers	537	539
	Below-Ground Transformers 175 total transformers	22	22
Towanda 33,081 total transformers	Overhead Transformers 30,037 total transformers	5,621	6,488
	Above-Ground Pad-mounted 2,803 total transformers	649	504
	Below-Ground Transformers 241 total transformers	31	31
Warren 12,973 total transformers	Overhead Transformers 11,846 total transformers	1,924	1,927
	Above-Ground Pad-mounted 1,100 total transformers	212	306
	Below-Ground Transformers 27 total transformers	3	3

Section 57.198(C). Time frames. *The plan must comply with the inspection and maintenance standards in subsection (N). A justification for the inspection and maintenance time frames selected shall be provided, even if the time frame falls within the intervals prescribed in subsection (N). However, an EDC may propose a plan that, for a given standard, uses intervals outside the Commission standard, provided that the deviation can be justified by the EDC's unique circumstances or a cost/benefit analysis to support an alternative approach that will support the level of reliability required by law.*

Justification

The practice of performing distribution overhead and above-ground pad-mounted transformers on a five-year cycle and below-ground transformers on an eight-year cycle is based on accepted electric utility practices and the experience of Penelec. National Electrical Safety Code (NESC) Rule 12.121.A states "lines and equipment shall be inspected at such intervals as experience has shown to be necessary."

The above periodicities between inspections has proven to be successful in addressing emergent problems in a timely manner, allowing for proper planning and remediation prior to the emergent problem having a negative impact on personal safety, equipment integrity or service reliability.

Section 57.198(m). Record Keeping. *Maintain records of inspection and maintenance activities sufficient to demonstrate compliance with its distribution facilities inspection, maintenance, repair and replacement programs.*

In order to demonstrate compliance with its distribution facilities inspection, maintenance, repair and replacement programs, Penelec will maintain inspection and maintenance records either electronically or in hard copy as required by state law.

Section 57.198(N)(7). Recloser inspections. *Three-phase reclosers shall be inspected on a cycle of 8 years or less. Single-phase reclosers shall be inspected as part of the EDC's individual distribution line inspection plan.*

Program Description

Penelec visually inspects distribution line reclosers annually. The purpose for inspecting distribution line reclosers is to identify and repair unsafe conditions or conditions that may adversely affect service reliability or system performance, and to comply with the requirements of state regulatory agencies and the National Electrical Safety Code.

The annual preventative maintenance consists of counter readings and field inspection. The counter readings are obtained to assess system performance based on the number of operations. The field inspection includes but is not limited to the following:

- Type of recloser and current rating
- Counter reading
- Condition – rust, dents, physical damage, leaks, lightning damage
- Equipment – surge arresters, tank-ground connections, by-pass switches, control battery, pole
- Grounds – damage, condition

For further detailed information regarding Penelec's inspection of reclosers, reference the Distribution Inspection & Maintenance Practice – Line Reclosers.

Inspection Plan⁵

	Area	Type	Recloser Inspections Planned	
			Total Number of Reclosers	
			2017	2018
Penelec 2,570 total reclosers	Altoona 357 total reclosers	Single Phase 272 total reclosers	272	272
		Three Phase 85 total reclosers	85	85
	Clearfield 278 total reclosers	Single Phase 235 total reclosers	235	235
		Three Phase 43 total reclosers	43	43
	Dubois 145 total reclosers	Single Phase 86 total reclosers	86	86
		Three Phase 59 total reclosers	59	59
	Erie 430 total reclosers	Single Phase 350 total reclosers	350	350
		Three Phase 80 total reclosers	80	80
	Johnstown 128 total reclosers	Single Phase 39 total reclosers	39	39
		Three Phase 89 total reclosers	89	89
	Lewistown 176 total reclosers	Single Phase 143 total reclosers	143	143
		Three Phase 33 total reclosers	33	33
	Oil City 397 total reclosers	Single Phase 327 total reclosers	327	327
		Three Phase 70 total reclosers	70	70
	Towanda 425 total reclosers	Single Phase 344 total reclosers	344	344
		Three Phase 81 total reclosers	81	81
	Warren 234 total reclosers	Single Phase 200 total reclosers	200	200
		Three Phase 34 total reclosers	34	34

⁵ Subject to change based on the addition or removal of equipment.

Section 57.198(C). Time frames. *The plan must comply with the inspection and maintenance standards in subsection (N). A justification for the inspection and maintenance time frames selected shall be provided, even if the time frame falls within the intervals prescribed in subsection (N). However, an EDC may propose a plan that, for a given standard, uses intervals outside the Commission standard, provided that the deviation can be justified by the EDC's unique circumstances or a cost/benefit analysis to support an alternative approach that will support the level of reliability required by law.*

Justification

The practice of performing annual recloser inspections is based on accepted electric utility practices and the experience of Penelec. National Electrical Safety Code (NESC) Rule 12.121.A states "lines and equipment shall be inspected at such intervals as experience has shown to be necessary." A periodicity of one year between inspections has proven to be successful in addressing emergent problems in a timely manner, allowing for proper planning and remediation prior to the emergent problem having a negative impact on personal safety, equipment integrity or service reliability.

Section 57.198(m). Record Keeping. *Maintain records of inspection and maintenance activities sufficient to demonstrate compliance with its distribution facilities inspection, maintenance, repair and replacement programs.*

In order to demonstrate compliance with its distribution facilities inspection, maintenance, repair and replacement programs, Penelec will maintain inspection and maintenance records either electronically or in hard copy as required by state law.

Section 57.198(N)(8). Substation inspections. Substation equipment, structures and hardware shall be inspected on a cycle of 5 weeks or less.

Program Description

Penelec inspects its distribution substations twelve times annually. The purpose of these monthly inspections of the distribution substations is to ensure that any developing substation problems are identified and addressed in a timely manner in support of system reliability and electrical safety.

There are three types of the preventative maintenance inspections that are performed at Penelec substations during a twelve-month period. The chart below illustrates the type of inspection performed each month⁶:

Inspection Type	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Safety and Security of Facilities/Visual Equipment Inspection/Reporting and Recording of Deficiencies and Relay Operations (Class C)	X	X	X	X	X	X	X	X	X	X	X	X
Safety/Security, Visual Equipment Inspection and Record Readings (Class B)			X			X			X			X
Seasonal Maintenance (Class A)			X						X			

The following is a summary of each type of inspection that is conducted at Penelec substations:

1. *Safety and Security of Facilities and Visual Equipment Inspection of Electrical Equipment and Reporting/Recording Identified Deficiencies and Relay Operations (Class C).* Monthly visual inspection of substation equipment, structures and hardware that also includes the recording of abnormal conditions or deficiencies. This inspection may include but is not limited to the following:
 - General condition – read and record ambient temperature
 - Perimeter fence inspection (gate locks, fence and gate grounds, warning signs)
 - Yard and facility inspection (equipment grounds, vegetation condition, general yard condition, equipment condition, oil levels and leaks, structure/hardware condition, hotspots, conductors/switches/connections)
 - Building inspection (security, integrity, indication lights)
 - Visual inspection of major equipment (power transformers, circuit breakers, instrument transformers, etc.)
 - Relays, electronic controls, and panel meters for alarms and targets
 - Batteries and chargers

2. *Safety and Security, Visual Equipment Inspection and Record Readings (Class B).* In addition to the safety and security and visual equipment inspection that is performed monthly, every three months an additional visual inspection that includes the recording of readings is performed. This inspection may include but

⁶ For illustrative purposes only.

is not limited to all items listed under the Class C inspection as well as the following types of substation equipment:

- Recording of amps and load readings
- Recording of counter and gauge readings
- Inspection/test of carrier communication equipment
- Inspection of microwave/radio sites and engine generators – generator alarms and battery

3. *Seasonal Maintenance - Summer and Winter Readiness (Class A)*. In addition to the monthly and three-month inspections, every six months a more comprehensive inspection of the substation and substation equipment is performed. This inspection may include but is not limited to all items listed under the Class C and B inspections as well as the following types of substation equipment:

- Servicing fire protection equipment
- Servicing eye wash stations
- Yard lighting
- Servicing filters and HVAC systems
- Servicing of equipment cabinet heaters
- Servicing engine generators

Further detailed information regarding Penelec's inspection of substations may be found Section 20P – Substation Patrol Inspection of the Substation Maintenance Practice and Methods.

Inspection Plan⁷

	Area	Substation Inspections Planned	
		Number of Substations	
		2017	2018
Penelec 399 total substations	Altoona 59 substations	708	708
	Clearfield 52 substations	624	624
	Erie 41 substations	492	492
	Huntington 19 substations	228	228
	Indiana 12 substations	144	144
	Lewistown 27 substations	324	324
	Mansfield 21 substations	252	252
	Montrose 28 substations	336	336
	Oil City 35 substations	420	420
	Richland 48 substations	576	576
	Towanda 31 substations	372	372
Warren 26 substations	312	312	

Section 57.198(C). Time frames. *The plan must comply with the inspection and maintenance standards in subsection (N). A justification for the inspection and maintenance time frames selected shall be provided, even if the time frame falls within the intervals prescribed in subsection (N). However, an EDC may propose a plan that, for a given standard, uses intervals outside the Commission standard, provided that the deviation can be justified by the EDC's unique circumstances or a cost/benefit analysis to support an alternative approach that will support the level of reliability required by law.*

Justification

Providing a trained, physical presence within the substation on a regular, periodic basis has proven very successful in detecting the degradation of facilities not always captured by existing local and remote surveillance and monitoring tools. A periodicity of one month

⁷ Subject to change based on the addition or removal of equipment.

between inspections has proven to be successful in addressing emergent problems in a timely manner, allowing for proper planning and remediation prior to the emergent problem having a negative impact on person safety, equipment integrity or service reliability.

As a result of advancement in today's technologies, substation equipment inspections have been refined to leverage these advancements in order to ensure the highest levels of safety and reliability of substations and substation equipment in a more efficient manner. With today's technology, equipment inspections along with patrol inspection results can now be captured by field personnel on site and integrated and tracked electronically in the maintenance database. Enhanced software programs allow condition-based maintenance to target specific equipment and trigger maintenance based on equipment condition. The counter readings that are obtained during the three-month inspection (Class B) are then utilized to trigger this condition-based maintenance. Predictive and condition-based programs not only extend the operating life of the equipment, they also optimize the necessary maintenance interval, improve service reliability, and reduce down time that is typically experienced when equipment is taken off line which reduces exposure of the grid, all with consistency and efficiency.

As part of this program, monthly patrol inspections of distribution substations will continue to be performed in order to focus on safety and security as well as in identifying equipment deficiencies that could have a negative impact on reliability. Load and counter readings will be recorded every three months in order to allow local engineering to conduct planning and load study activities. A seasonal inspection occurs during the spring and fall.

Section 57.198(m). Record Keeping. *Maintain records of inspection and maintenance activities sufficient to demonstrate compliance with its distribution facilities inspection, maintenance, repair and replacement programs.*

In order to demonstrate compliance with its distribution facilities inspection, maintenance, repair and replacement programs, Penelec will maintain inspection and maintenance records either electronically or in hard copy as required by state law.