

PRECorp's Maintenance Plan



March 27, 2013

Customer Meeting



Objectives

- Maintain PRECorp's electric transmission, substation, distribution, and metering system on a comprehensive schedule and scale that allows for work prioritization and changing requirements while complying with:
 - [Rural Utility Service \(RUS\) requirements/recommendations](#)
 - [National Electric Safety Code \(NESC\) requirements](#)
 - [Western Electricity Coordinating Council \(WECC\) Regional Reliability Standard](#)
 - [Institute of Electrical and Electronics Engineers \(IEEE\) standards](#)
 - [American National Standards Institute \(ANSI\)](#)
 - Manufacturers' recommendations
 - Prudent utility practices
- Enhance reliability and proactively reduce preventable outages for PRECorp's members as measured annually by duration (SAIDI,) frequency (SAIFI,) and momentary (CAIDI) outage minutes as well as system-wide root cause analysis findings to drive maintenance and tightening programs related to PRECorp's worst performing circuits.
- Extend plant life of PRECorp's capital assets and help keep member rates cost competitive.
- Provide a documented electric transmission, substation and distribution system maintenance policy that clearly defines PRECorp's employee expectations, defines specific maintenance work functions, and ensures adequate training to personnel in the inspection, testing, and maintenance of PRECorp's electric system plant, equipment, and other facilities.

Objectives

- Maintain PRECorp's electric transmission, substation, distribution, and metering system on a comprehensive schedule and scale that addresses work prioritization and changing requirements while complying with:

Comply with regulatory requirements

- [Federal Energy Regulatory Commission \(FERC\) requirements](#)
 - [North American Electric Reliability Corporation \(NAERC\) Recommendations](#)
 - [Western Electricity Coordinating Council \(WECC\) Regional Reliability Standard](#)
 - [Institute of Electrical and Electronics Engineers \(IEEE\) standards](#)
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Enhance reliability

- [Reduce preventable outages for PRECorp's members as measured by sustained \(SAIDI\), frequency \(SAIFI\), and momentary \(CAIDI\) outage minutes](#)
- [Use root cause analysis findings to drive maintenance and tightening programs on PRECorp's worst performing circuits.](#)
- Extend plant life of PRECorp's capital assets and help keep member rates cost competitive.
- Provide a documented electric transmission, substation and distribution system maintenance policy that clearly defines PRECorp's employee expectations, defines specific maintenance work functions, and ensures adequate training to personnel in the inspection, testing, and maintenance of PRECorp's electric system plant, equipment, and other facilities.

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Enhance reliability

Extend system plant life

Reduce the number of significant and stable outages for PRECorp's members as measured by the number of single phase interruptions (SAIFI,) and momentary (CAIDI) outage minutes per customer per year to drive maintenance and tightening programs

- Develop and implement a comprehensive maintenance program that includes safety, training, and resources and help keep member rates cost competitive.

- Develop and implement a documented electric transmission, substation and distribution system maintenance policy that clearly defines PRECorp's employee expectations, defines specific maintenance work functions, and ensures adequate training to personnel in the inspection, testing, and maintenance of PRECorp's electric system plant, equipment, and other facilities.

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Enhance reliability

Extend system plant life

Reduce the number of significant outages for PRECorp's members as measured by [System Average Interruption Duration Index \(SAIDI\)](#), [System Average Interruption Frequency Index \(SAIFI\)](#), and momentary (CAIDI) outage minutes per customer to drive maintenance and tightening programs

Document the process

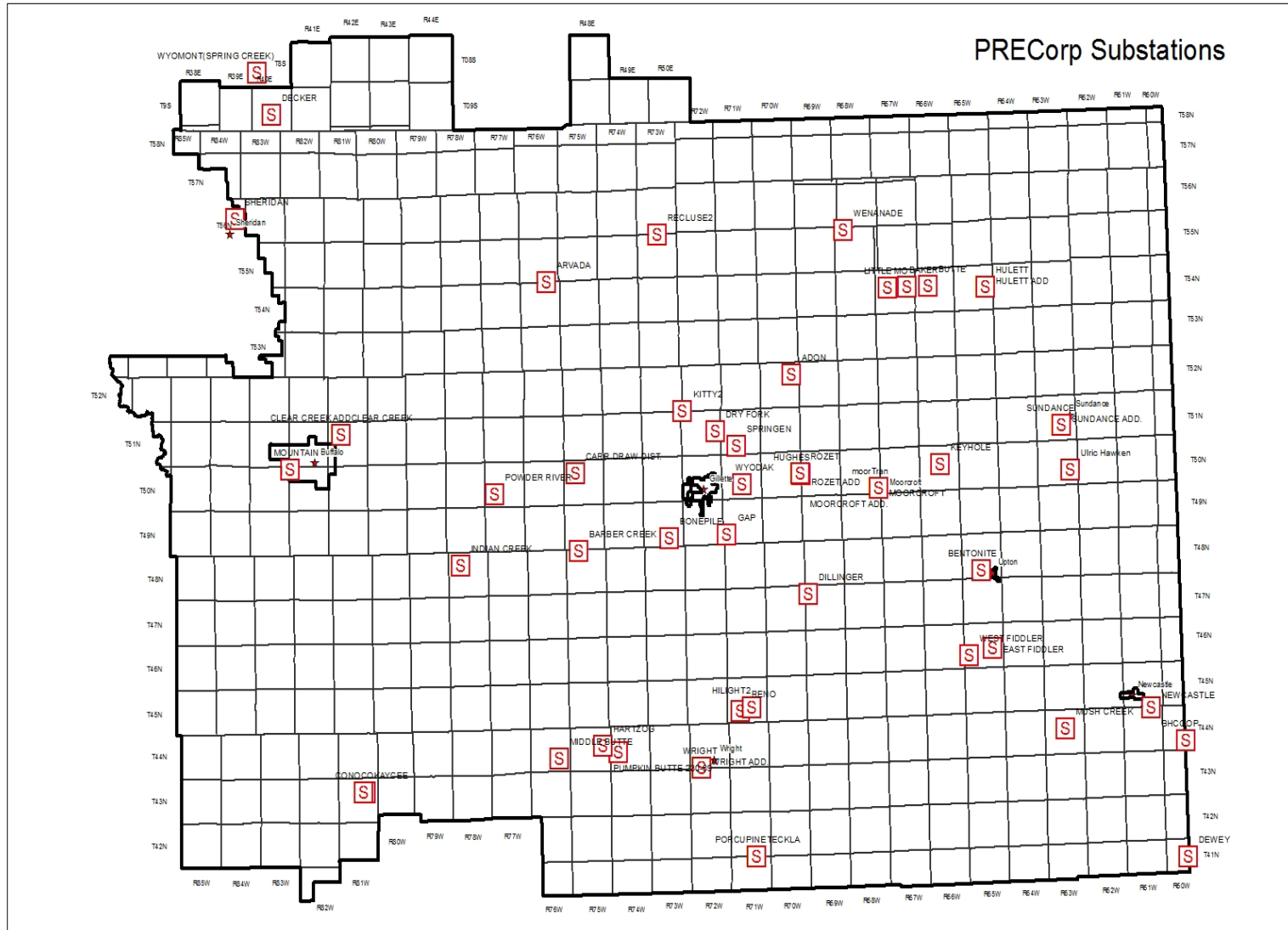
- Develop and maintain documented electric transmission, substation, distribution, and metering system maintenance policy that clearly defines PRECorp's maintenance work functions, and ensures adequate training and resources for the maintenance of PRECorp's electric system plant assets.

Magnitude

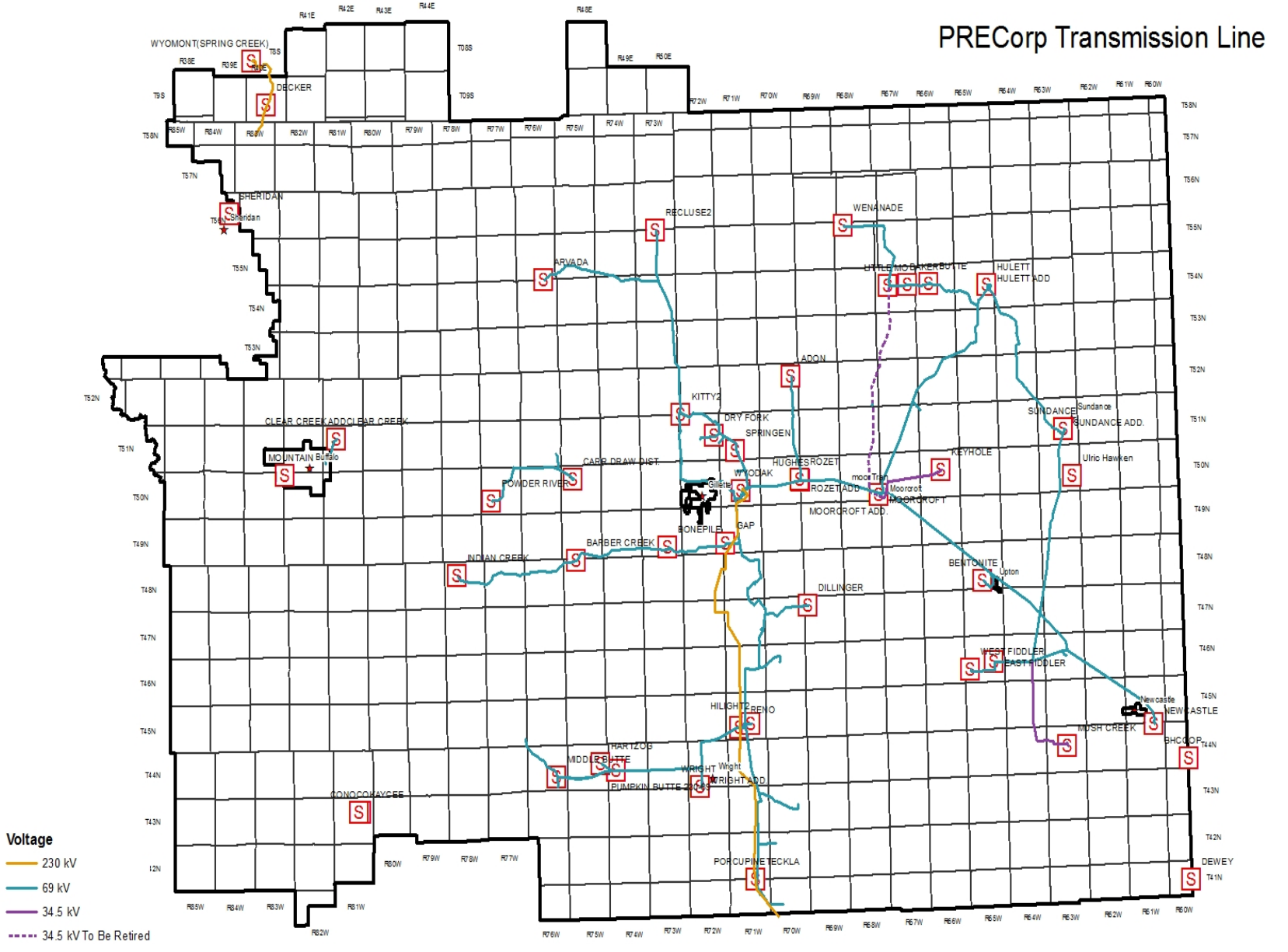
- Distribution miles: 10,044
 - OH single phase: 3,990
 - OH three phase: 5,637
 - Underground single phase: 275
 - Underground three phase: 142
- Distribution poles: 180,792
- Transmission miles: 684.1
 - 34.5 kV: 55.0 (29 miles of 34.5 kV line in process of retiring)
 - 69 kV: 565.7
 - 230 kV: 63.4
- Transmission stations: 10
- Distribution substations: 43
- Transmission poles: 11,200
- Total meters: 32,565 (these are the number mapped, not active meters)
- Transmission delivery points: 23
- Transmission wheeling points: 2
- Regulators: 225 (estimated based on substation regulators)
 - Substation regulators: 159
 - Line regulators: 66
- OCR's: 519
- Total Capacitors: 85

Schedule

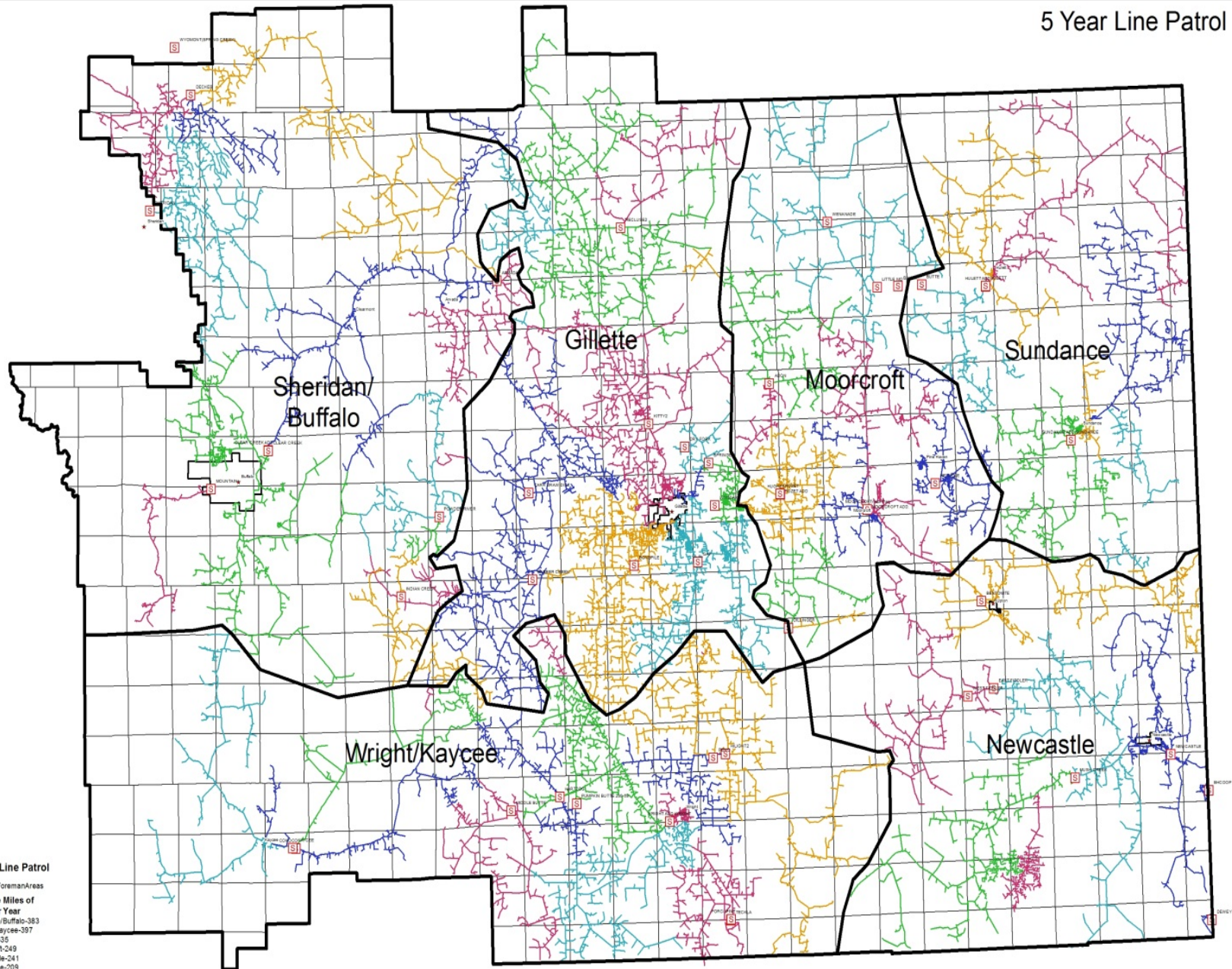
PRECorp's total electric system maintenance planning and delivery is predominately divided into fifths (1/5) annually where at the end of a five-year cycle, the entire system has been systematically maintained.



PRECorp Transmission Line



5 Year Line Patrol



Pole Testing

- 12 year cycle
- Do not test poles 14 years old – newer
- 2013 program
 - Transmission 668
 - Distribution 12,325
- May through September
- Systematically throughout service territory
- Historical 1.75% reject rate





Substation

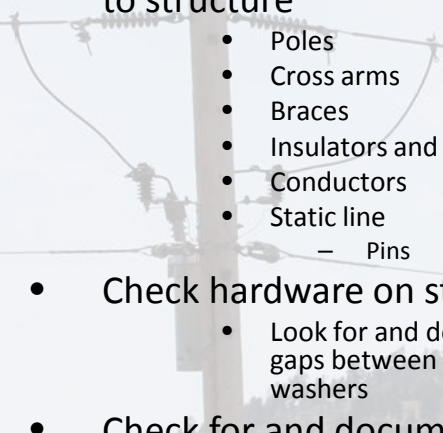
- 2013 Detailed Inventory
- Monthly inspections
- Annual infrared tests
- Annual weed control
- Detailed testing and inspections
 - 1/5 cycle
 - Power transformer and apparatus
 - Mobile sub installation/transmission switching
 - Infrastructure
 - Bus work
 - Switches
 - Getaways
 - Ancillary equipment tests
 - Controls
 - Battery banks



Transmission

- Annual aerial line inspection
 - 684 miles
 - September through November
- 1/5 Cycle
 - Detailed line inspection
 - 118 miles
 - 1894 facility points
- High water inspection
 - 100' from river, creek, lake, impoundment
- Vegetation management
 - ROW clearing

Aerial Inspection

- 
- Check overall condition of structures
 - Look for and document any damage to structure
 - Poles
 - Cross arms
 - Braces
 - Insulators and ties
 - Conductors
 - Static line
 - Pins
 - Check hardware on structure
 - Look for and document obvious gaps between bolts, nuts and washers
 - Check for and document broken/tracking/burnt insulators and bells
 - Review and document condition of conductor
 - Sag (road crossings)
 - Burn marks
 - Broken strands
 - Strands exposed and separated out of splices
 - Strands exposed and separated out of armor-rod
 - Check for and document broken guy wires
 - Inspect for broken avian protection devices
 - Visually inspect and document switch condition
 - Document any obstructions or foreign objects on structures (e.g., bird nest, signs, etc.)
 - Specifically check and document any trees in right-of-way
 - Check and document any breeches in clearances in right-of-way (e.g., buildings, rock piles, cranes, chain hoists, etc.)
 - Document all non-normal system switch line-up conditions

Distribution

- 1/5 Cycle
 - Detailed line inspection
 - OH/UG
 - 2014 miles
 - 38,266 facility points
 - Line patrol inspection
 - 2014 miles
- High water inspection
 - 100' from river, creek, lake, impoundment
- Vegetation management
 - ROW clearing
- By Outpost
 - 333 line miles/outpost average
 - 6,400 facility points/outpost average
 - 25 facility point inspections/outpost every work day

Detail Overhead Distribution Line Inspection Form
- Fix all corrective maintenance items safely at the time of inspection -

Version 7

Substation _____

Circuit _____

Inspector _____

Date _____

POLES	
Latitude _____	Longitude _____
Height _____	Class _____
Picture of Structure _____	Type _____
Brand on Pole _____	Yes ___ No ___
Picture of Brand _____	
Hammer from Ground to 6' _____	Yes ___ No ___
Pole Ground Wire Damaged _____	Yes ___ No ___ Fixed ___
Ground Rot _____	Yes ___ No ___
Shell Rot _____	Yes ___ No ___
Splitting _____	Yes ___ No ___ Fixed ___
Woodpecker Holes _____	Yes ___ No ___ Fixed ___
Ground Level-needs filled _____	Yes ___ No ___ Fixed ___
Leaning 15 degrees + _____	Yes ___ No ___ Fixed ___
Would I climb this pole _____	Yes ___ No ___
Condition: _____	Excellent ___ Average ___ Poor ___ Danger ___

GUYS/Anchor	
Tighten _____	Yes ___ No ___ Fixed ___
Replace _____	Yes ___ No ___ Fixed ___
Guy Guard/Scratcher _____	Yes ___ No ___ Fixed ___
Guy Bond Clamp _____	Yes ___ No ___ Fixed ___
Replace Anchor _____	Yes ___ No ___ Fixed ___
Damaged Strain Link _____	Yes ___ No ___ Fixed ___

CROSS ARMS/CROSS BRACES	
Cross Arm Length _____	8' ___ 10' ___
Level _____	Yes ___ No ___ Fixed ___
Split _____	Yes ___ No ___ Fixed ___
Burn Marks _____	Yes ___ No ___ Fixed ___
Through Bolt Tight _____	Yes ___ No ___ Fixed ___
Brace Length _____	28' ___ 36" ___ 42" ___
Damaged _____	Yes ___ No ___ Fixed ___
Brace Bolt Tight _____	Yes ___ No ___ Fixed ___

INSULATORS	
Damaged/Broken _____	Yes ___ No ___ Fixed ___
Tracking- Flashover _____	Yes ___ No ___ Fixed ___
Broken Ties _____	Yes ___ No ___ Fixed ___
Loose Ties _____	Yes ___ No ___ Fixed ___
4 1/4 " Aluminum Bells _____	Yes ___ No ___ Fixed ___
Epoxilators _____	Old Style ___ New Style ___
Damaged/Broken _____	Yes ___ No ___ Fixed ___

IDLE TAP LINE	
# of Poles _____	
# of Transformers _____	
Size (KVA): 5 ___ 10 ___ 15 ___ 25 ___ 37.5 ___ 50 ___ 75 ___	
# of Meter Loops _____	Useable ___
# of Cutouts _____	Useable ___

NOTES _____

Signature _____

CONDUCTOR	
Road Crossing Clearance Height _____	
Ambiant Temperature (F) _____	
Resag _____	Yes ___ No ___ Fixed ___
Damaged _____	Yes ___ No ___ Fixed ___
Bird Caging at Splice _____	Yes ___ No ___ Fixed ___

ROW	
Trimming Needed _____	Yes ___ No ___ Fixed ___
Clearing Needed _____	Yes ___ No ___
Danger Trees _____	Yes ___ No ___

SWITCHES	
Switch Number _____	
GOAB _____	Yes ___ No ___
Hook Stick _____	Yes ___ No ___
Contact Secure _____	Yes ___ No ___ Fixed ___
Switch _____	Open ___ Closed ___

TRANSFORMERS	
SN _____	
Picture of Nameplate _____	
Oil Leak _____	Yes ___ No ___ Fixed ___
Burn Marks/Tracking _____	Yes ___ No ___ Fixed ___
Gap Arrestor _____	Yes ___ No ___ Fixed ___
Black Transformers _____	Yes ___ No ___ Fixed ___

MISCELLANEOUS	
Arrestor _____	Yes ___ No ___
Blown Arrestor _____	Yes ___ No ___ Fixed ___
OCR _____	Yes ___ No ___
OCR Reading _____	A ___ B ___ C ___
PRECorp ID _____	A ___ B ___ C ___
Regulator _____	Yes ___ No ___
Regulator Count _____	A ___ B ___ C ___
Regulator Nameplate Picture _____	
Regulator Control Nameplate Picture _____	
Radio Noise _____	Yes ___ No ___ Fixed ___
Meter Loops _____	Yes ___ No ___ Fixed ___
Foreign Objects _____	Yes ___ No ___ Fixed ___
Damaged Bird Guards _____	Yes ___ No ___ Fixed ___
Hotline Clamps _____	Yes ___ No ___ Fixed ___
Loose Hardware _____	Yes ___ No ___ Fixed ___
Facility Bucket Accessable _____	Yes ___ No ___
100' or less from creek/river _____	Yes ___ No ___
Cutout Type _____	
Idle Service _____	Yes ___ No ___
Capacitors _____	On ___ Off ___

Detail Overhead Line Inspection





Line Inventory Image





- Find it
- Fix it
- Document it





Meters

All in-service billing/revenue meters in the PRECorp service territory, will be divided into homogeneous test groups based on date of purchase. A random sample from each homogeneous lot will be selected, tested and statistically analyzed. The random test sample program as described will begin in the tenth (10) year of meter service and continue annually thereafter. Meters will be considered accurate for billing purposes if they register within +/- 2.00% under test conditions. PRECorp's normal practice is to have meters register within +/- 0.2%.

Additionally the program will meet the following qualifications:

- 100% testing of all meters by the manufacturer prior to shipment to PRECorp;
- Quality assurance testing by PRECorp upon receipt of meters (testing information will be loaded into PRECorp's billing system for historical reference);
- 100% testing of all meters returned from service;
- Monitoring of all in-service meters for performance through daily reads;
- Monitoring of customer usage abnormalities on a daily and weekly basis;
- Random sample testing of meters starting in the 10th year.

Meters ... continued

- Demand
 - Tested and verified at least once every three years. 1,300 meter tests/verifications annually
- 69 & 25 kV primary delivery
 - Tested and verified once every six months
 - 44 meter tests/verifications annually.
- Residential Heat Rate
 - Tested, verified, and inspected annually
 - 100 meter tests/verifications annually
- Accounts averaging over 50,000 kWh per month
 - Tested and verified annually
 - 1,750 tests/verifications annually
- TOTAL 3500 annually
 - Including random sample from each homogeneous lot



Data Management

- Robust GIS and mapping system
- Field work is valued and utilized
- Company wide sharing of data
- Use of technology to be more efficient
- Real time system updates
- Data mining and report generation

Identify-Inventory

Clear

Line Inventory - OH Dist

GPS_Lat: 44.65917
GPS_Long: -104.6051

Line Inventory - OH Dist

GPS_Lat: 44.66116
GPS_Long: -104.60596

Line Inventory - OH Dist

GPS_Lat: 44.6604
GPS_Long: -104.60522

Line Inventory - OH Dist

GPS_Lat: 44.66269
GPS_Long: -104.60747

Line Inventory - OH Dist

GPS_Lat: 44.65992
GPS_Long: -104.60605

Line Inventory - OH Dist

GPS_Lat: 44.65915
GPS_Long: -104.60345

Line Inventory - OH Dist

GPS_Lat: 44.65845
GPS_Long: -104.60493

Line Inventory - OH Dist

GPS_Lat: 44.65895

misc_regulatorCount_B: Null
Misc_RegulatorCount_C: Null
Misc_RadioNoise: No
Misc_MeterLoops: No
Misc_ForeignObjects: No
Misc_DamagedBirdGuards: No
Misc_HotlineClamps: Yes
Misc_LooseHardware: No
Misc_BucketAccess: Null
Misc_HighWater: No
Misc_CutoutType: Null
Misc_IdleService: No
Misc_Capacitors: Null
Misc_JointUse: Null
Photo-Structure
Photo-Brand

Zoom to

Black Tail County Road
13

Black Tail County Road
20

24

008
012
011
005
004

003

007

Questions

