IOWA'S ELECTRIC INSPECTION PROGRAM

NARUC Energy Regulatory Partnership Program The Public Services Regulatory Commission of Armenia and The Iowa Utilities Board



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WHY?

To protect the people from:

- Electrical hazard
- Loss of service



HOW?

By adopting rules that:

- Set engineering standards
- Require utilities to have Inspection and Maintenance Plans
- By inspecting electrical facilities for:
 - Code compliance
 - Maintenance needs
 - Safety hazards

By reviewing electric contact accident and electric outage reports, and investigating customer complaints.



IUB INSPECTIONS OF IOWA ELECTRIC COMPANIES

- Iowa has 204 electric utility companies.
- Larger utilities are divided into management districts.
- Each utility or district is inspected approximately annually.
- About 400 IUB inspections performed per year.



INSPECTION STAFF

Inspection program personnel:

- Two inspectors full time:
 - Examine plans and records in utility offices
 - Examine condition of electrical lines and other facilities
 - Investigate complaints of hazards or service problems
 - May investigate contact accidents and outages
- One electrical engineer part time:
 - Reviews inspector reports for completeness/accuracy
 - Sends out reports, monitors responses
 - Maintains program records
- Inspectors and engineer jointly review company responses to determine if they are acceptable.



INSPECTOR TOOLS

Inspectors carry this equipment:

- Laptop computer (for reports and maps)
- Code books
- Measuring stick (manual or sonar)
- Camera
- Binoculars
- Cell phones



STANDARDS

- National Electrical Safety Code (NESC) -American National Standards Institute (ANSI) standard C-2.
- Additional Board requirements.



PRIMARY NESC REQUIREMENTS

- Conductor Clearance
 - Above ground
 - From buildings
 - From other wires
- Grounding
- Support Structures
- Enclosures



ADDITIONAL BOARD REQUIREMENTS

Examples:

- Support cable (guy) markers must be highly visible color.
- Grain bin clearance:
 - Information campaign
 - Can deny service if clearance inadequate
- Warning signs on above ground equipment.
- Safety of workers in fenced substations (when workers inside gates must be closed but not locked so rescuers can enter).



INSPECTION AND MAINTENANCE PLANS

Every utility must have one. Contents must include:

- General service territory and district offices:
 - Location of facilities
 - List of district offices and their territories
- Programs for:
 - Inspection of lines, poles and substations
 - Tree trimming and vegetation management
 - Pole inspections
- Records of:
 - Inspections performed
 - Inspection findings
 - Remedial actions taken



UTILITY COMPANY INSPECTION PROGRAM

- A utility I&M Plan must set line inspection intervals (10 years maximum).
- 34,500 volt and above lines must be patrolled annually.
- Plan must identify things that will be checked during inspections.
- Instructions given to company inspectors must be included.



Companies are expected to repair problems that their periodic inspections find





American companies do most work from bucket trucks – manual pole climbing is rare



Occasionally repair or maintenance is done by helicopter





WHAT IF PROBLEMS ARE NOT FIXED?

- After inspection, the utility is informed by letter of staff findings:
 - Given 30 days to respond with plans for corrective action
- If response is unsatisfactory, inspection staff explains to utility:
 - Why the problem does not meet code
 - Why action is needed
- If utility fails to correct, the Board can open an official enforcement proceeding leading to:
 - Civil penalty (fines)
 - Performance order action required



WHAT GETS FIELD INSPECTED?

Field inspections examine a <u>sample</u> of:

- Lines, poles and substations recently inspected by the company under its I&M Plan schedule (are they missing needed repairs?)
- Recent new construction (built to code?)
- Problems found in the previous inspection (are they fixed?)



H-Frame and single pole structures

A nice looking line in rural lowa







GUY MARKERS

Acceptable guy marker bright, clear of debris, easy to see. Unacceptable guy marker - faded, overgrown, hard to see.





More unacceptable guy markers - not a highly visible color



Checking guy marker height with measuring stick. One marker is losing color.





Checking height of substation fence. Also note grounding of fence wires.



Checking clearance above road.





lowa farm equipment is huge line clearance over rural roads is important!



How high will these sprayer arms be when folded up in transport position?



ULTRASONIC OVERHEAD CLEARANCE MEASUREMENT





SupaRule cable height meter



Grain augers are commonly used on Iowa farms to load grain into or out of storage bins. Augers can be 60 ft (20 m) long.





Moving augers near grain bins can be very dangerous if electric lines are nearby





NESC CLEARANCE FOR ELECTRIC LINES FROM GRAIN BINS





Pole damaged by lightening Untrimmed bolt is hazard to workers





Is pole too close to fire hydrant?



Pole grounding rod is exposed and damaged





Damaged crossarm



Broken guy wire, crossarm in bad shape





Eagle nest – hazard to bird from contact, hazard to line from direct shorting or insulator fouling





TREE TRIMMING

- I&M Plan must have a schedule for tree trimming and other vegetation management (5 years is typical).
- Plan must include instructions for how trimming will be done.
- Trimming methods must protect health of trees and prevent undesirable re-growth patterns.



Tree branch burning - contacted power line





Trimmed trees reduce chance of damage and outages from downed branches during storms





Poorly placed trees may need to be removed, or need extreme trimming







Poor vegetation management - vine on pole



Really bad vegetation management





Tree trimming methods must protect the health of the tree



This drawing from ANSI A300, "Pruning" shows one example of how to cut off branches with the least harm to the tree.



POLE INSPECTIONS

- I&M Plan must provide for these pole inspections.
- This is more than a visual examination.
- Looks for decayed or insect damaged wood poles.
- Generally separate from other line inspections
- Frequency varies with line age, soil conditions, etc.
- Inspection methods include:
 - Hammer test
 - Boring/drilling into pole
 - Exposure below groundline
 - Sonar
 - May include chemical treatment



Pole with plugged inspection borehole

Pole inspection record tags nailed to pole





Tag says pole was last inspected in 2008 by Osmose Company and treated with Mitc-Fume preservative





When an electric contact accident occurs

An inspection may be made to determine if code compliance was a factor











Wild animal contact with electrical facilities is a common cause of service outage and equipment damage.

Bad for the animal too.

At problem sites protective measures may be needed.



Some things you can't control



But with no control you can get this.





(These are not in Iowa!)

QUESTIONS?



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