Cathodic Protection Regulatory Requirements

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PHMSA Cathodic Protection Regulations

- Requirements for Written Procedures
- Person Qualified in Pipeline Corrosion Control Methods
- Operator Qualification Requirements
- CP Criteria and IR drop error
Title 49
Code of Federal Regulations

- Part 190: Pipeline Safety Programs/Rulemaking
- Part 191: Reporting Requirements
- Part 192: Natural Gas Pipelines
  - Subpart I – Requirements for Corrosion Control
- Part 193: LNG Facilities
- Part 194: Response Plans – Onshore Oil (OPA)
- Part 195: Hazardous Liquid Pipelines
  - Subpart H – Corrosion Control
- Part 199: Drug and Alcohol
Cathodic Protection Procedural Requirements

• § 192.605(a) Each operator shall prepare and follow …a manual of written procedures for;
  (2) Controlling corrosion in accordance with the operations and maintenance requirements of subpart I
  • Must have written cathodic protection procedures
  • Explain “how to do …”
  • Do not just copy regulation language
Qualifications of Corrosion Personnel

- Two areas of regulations apply
  - § 192.453 General Requirements
  - Subpart N-Qualification of Pipeline Personnel (OQ)
§ 192.453 General Requirements

- Corrosion procedures must be carried out by or under direction of a person qualified in corrosion control methods
- Includes:
  - CP design
  - CP installation
  - CP operation
  - CP maintenance
- **Person** means any individual, firm, joint venture, partnership, corporation, association, State, municipality, cooperative association, or joint stock association, and including any trustee, receiver, assignee, or personal representative thereof.
  - Could include you, your employees, your contractors, your consultants etc.
§ 192.453 General Requirements

- Procedures need to define what a person qualified in corrosion control methods is for your operation.
- You may need more than one definition:
  - Example: you or your employees operate and maintain your CP systems but you hire a consultant to design CP systems and a contactor to install CP systems.
§ 192.453 General Requirements

• Sources of qualification
  – University’s
  – Trade Schools
  – Seminars & short courses
  – Industry associations
  – On the job training
  – Practical experience

• Records
  – Degree’s
  – Certifications
  – Test scores
  – Records of attendance
  – Job history
Subpart N-Qualification of Pipeline Personnel
OQ Rule

• Covered Task – 4 Part Test
  – Is Performed on Pipeline Facility
  – Is a Operations or Maintenance task
  – Is a requirement of Part 192
  – Affects Operations or Integrity of Pipeline

• Typical CP Covered Tasks (not all inclusive)
  – Pipe-to-soil potential measurements
  – Checking rectifiers
  – Testing bonds
  – Installing anodes
Subpart N-Qualification of Pipeline Personnel

OQ Rule

• Ensure through Evaluation that individuals are qualified
  – Must demonstrate Knowledge, Skills and Ability to perform covered task
  – Must be able to recognize and react to abnormal operating conditions (AOC’s)

• Non-Qualified individual may perform covered tasks under direction and observation of a qualified individual
  – Need to define span of control for each covered task
    • How many non-qualified individuals can qualified individual direct and observe?

• Must have written OQ Plan
  – Identify Covered Tasks
  – Provisions for Evaluating Individuals
CP CRITERIA

§192.463 Requires Cathodic Protection to Comply with Appendix D of Part 192
CP CRITERIA

- Negative 850 mV
- 100 mV Polarization Decay
- Negative 300 mV Shift
- Net Protective Current
- E log I (Gas)

Written Procedures need to identify what criteria are used
A negative (cathodic) voltage of at least 0.85 volt, with reference to a saturated copper-copper sulfate half cell. Determination of this voltage must be made with the protective current applied, and in accordance with sections II and IV of this appendix.

II. Interpretation of voltage measurement. Voltage (IR) drops other than those across the structure electrolyte boundary must be considered for valid interpretation of the voltage measurement …

• Written procedures need to explain how IR drop is considered!
IR Drop Definition

Voltage drop in resistor caused by current flow
Reference Cell Placement
Soil (Electrolyte) IR in P/S
IR Drop in Metal Path
850 mv Criteria

Protected Levels Considering IR Drop

Acceptable

Not Acceptable
100 mv Polarization Criterion

Adequate protection demonstrated
IR Drop Removal

Ignore
Offset
Instant Off
PVC Tube
Permanent Reference Cell

Unit 02: Removal - Negligible
Coupon Test Station

- Plastic Tube
- Steel Coupons
- Soil
- Pipeline
- Test Head
- Portable Reference Electrode
- Test Wire
Ignore IR Drop

Demonstrating that IR Drop is Negligible

Not the Same as Ignoring IR Drop
Negligible IR Drop

Must Demonstrate IR Drop is Negligible

Not Just Assume it is Negligible
IR Drop - Conclusion

- Instant Off is PHMSA’s preferred method
- Where instant off is impractical other methods using sound engineering practice are acceptable
- Once IR drops, polarized potentials, and/or polarization have been determined, they may be used for correcting future potential measurements, provided conditions have not changed
- Use of in-line inspection data is not sufficient to demonstrate compliance with any of the CP criteria
Summary

- Must have written procedures for CP functions
- Must explain “how to” not just quote code language
- Must define “person qualified in corrosion control methods”
- Must list CP Covered Tasks in OQ Plan
- Must specify how individuals will be evaluated (KSA’s)
- Must specify CP criteria being used
- Must consider IR drop in a technically sound manner
Questions