Induced AC Voltage

- Alternating current can be induced on to steel pipelines from the Electromagnetic Force (EMF) of parallel high-voltage AC overhead power lines.
- Underground pipelines are more at risk if they are well-coated and electrically isolated for cathodic protection.
Induced AC Voltage
AC Voltage

- A fault condition can also cause stray voltage on pipelines or other metallic structures in the vicinity.
Mitigation

- Permanent mitigation in place
  - 50 Volts below ground pipe
  - 15 volts above ground pipe
  - zinc ground grids, ground rods, crushed rock, decouplers, electric ground loop systems etc.
Protecting Employees

• Unitil (follows NACE Standard) policy is greater than 15 volts must ground prior to work.

• Below 15 volts can proceed with work, although an abnormal condition exists and voltage must be monitored if choose not to ground.
Testing for Voltage

- Employees will check for voltage on all steel pipe and structures prior to start of work.
- Use a Voltage indicator (tick tracer)
Testing for Voltage

• If voltage is found, stop work and have technician check with a voltage meter.

• If voltage is less than 15 volts, proceed. Greater than 15 volts – ground.
Testing for Voltage

- A driven ground rod or telescopic cane is used for testing voltage to get a proper structure to electrolyte (or pipe to soil) measurement.
Testing for Voltage

- Pipe coating must be removed carefully to get an accurate voltage reading. Class 0 rubber gloves are required when removing any coating to protect the employee in the event there is voltage on the pipe.
Grounding

• If voltage is over 15 vAC, grounding is required.

• Grounding is accomplished using ground rods and clamps.
Following Testing Procedures for Approaching Structures

Test pipe with Voltmeter

- **Greater than 15 Volts**
  - YES
  - Document test, time, date, location, structures tested and current conditions
  - Ground structure to remove voltage per Unitil procedure

- **Below 15 volts**
  - Perform Work and monitor hourly

- **NO**
  - Perform Work

Stop Work if voltage increases > 15vac

Test pipe with Voltmeter
Grounding

- Ground rods should be installed a minimum of 4 feet deep, if terrain is rocky, use multiple rods to ensure system is well grounded.
Why do we ground?

- Touch potential – voltage between an energized object and person in contact with the object.
Why do we ground?

- Step potential – the voltage across a worker who steps across an energized path of earth.
Protecting Employees

- Protecting employees from known hazards is our goal.
- Awareness, training, equipment and PPE are required to ensure everyone is safe.
Be sure to record all information and readings on internal forms – DOCUMENT!

<table>
<thead>
<tr>
<th>Test Station Location / Road Crossing Station Number</th>
<th>Date</th>
<th>Time</th>
<th>AC Voltage Reading</th>
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For More Information

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