

## Gas Construction and Maintenance Demonstration of Compliance with 100 mV Shift Criteria Using a Coupon Test Station

### Tools

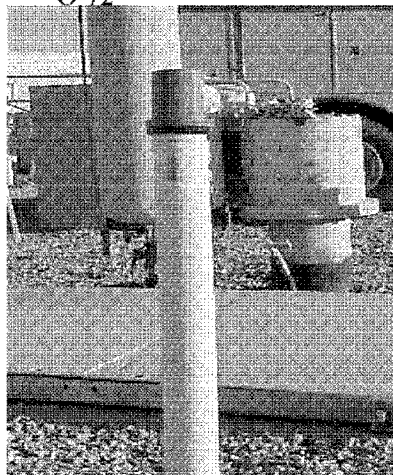
- Approved Multimeter
- Alligator type multimeter leads
- Approved copper copper-sulfate reference electrode
- Bottle of tap water

### References

- Gas Standard O-16 “Corrosion Control of Gas Facilities”
- Gas Standard O-10.2 “Installation and Monitoring of Coupon Test Stations”.
- Gas Standard O-71 “Copper Copper-Sulfate Reference Electrodes”
- Gas Standard O-72 “Approved Multimeters”

### Precautions

- Carefully read and follow directions listed on copper-sulfate MSDS
- Coupon test stations must be properly installed and prepared for use as described in Gas Standard 10.2 in order for representative coupon-to-soil potentials to be measured
- Reference electrodes must be maintained and checked in accordance with Gas Standard O-71.
- Multimeters must be calibrated in accordance Gas Standard O-72

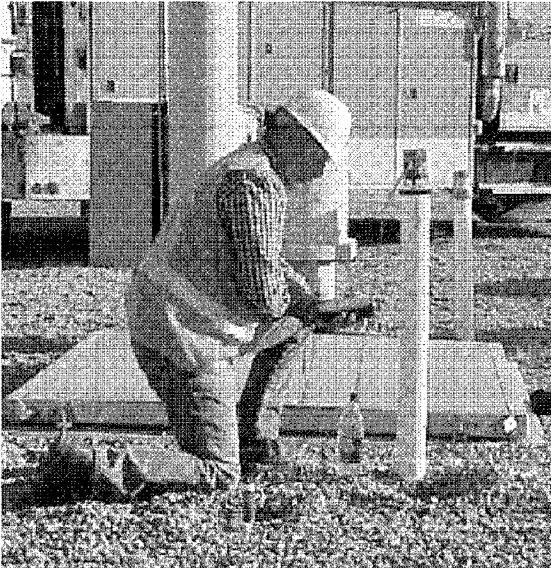


*CTS Station*

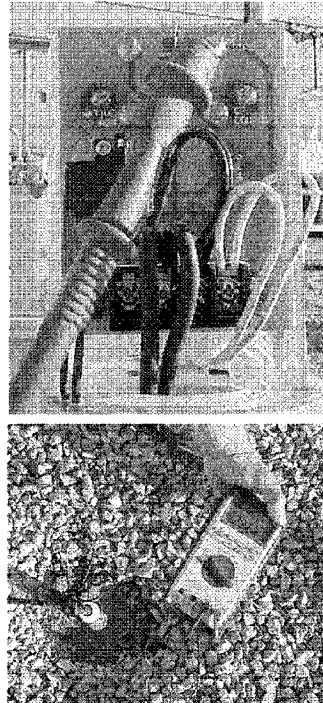
## Step One: Pipeline Pipe-to-Soil Potential Measurement

1. Make a small depression in the soil directly over the pipeline. Remove all rock, concrete or other obstructions.
2. Pour about 4 ounces of tap water onto the soil in the depression
3. Remove the plastic cap from the porous plug end of a copper copper-sulfate reference electrode and place the porous plug end of the reference electrode in the wetted soil in the depression.
4. Set the multimeter to DC volts
5. Connect the multimeter negative lead to the copper terminal on the reference electrode.
6. Remove the orange cap covering the CTS terminal board and connect the multimeter positive lead to the terminal stud labeled "PIPE" on the face of the CTS terminal board
7. Read and record the potential measurement obtained.

Note: The pipeline pipe-to-soil potential measured in this step is not used in the determination of compliance with the 100 mV shift criteria.

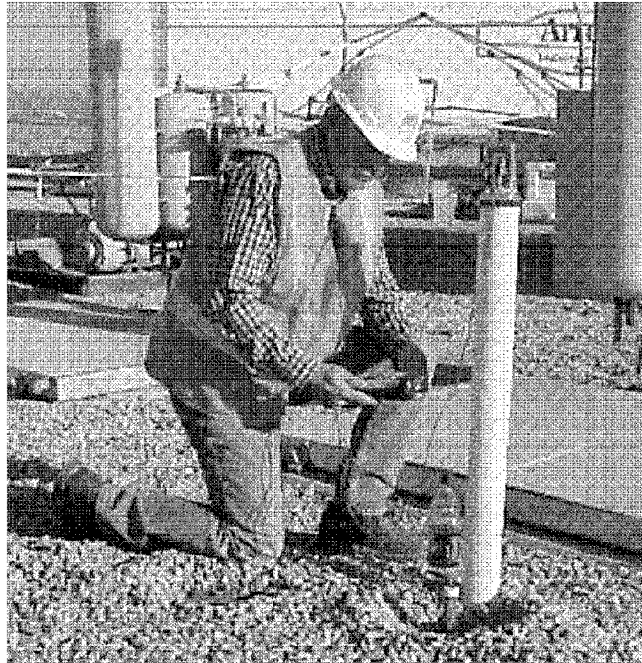
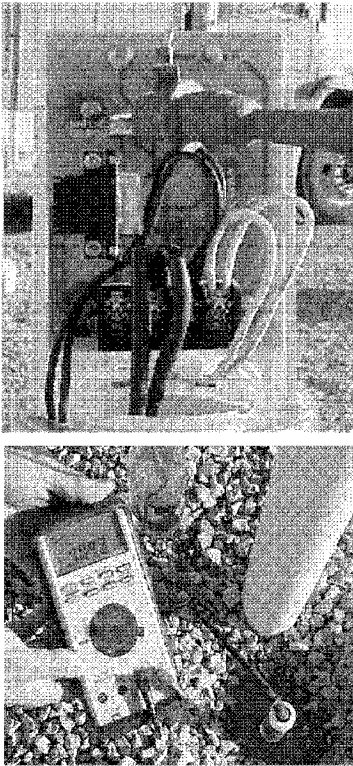


*Technician Taking  
Pipe-to-Soil Potential Measurement*



## Step Two: Native Coupon-to-Soil Potential Measurement

1. Make a small depression in the soil at the base of the CTS. Remove all rock, concrete or other obstructions.
2. Pour about 4 ounces of tap water onto the soil in the depression
3. Remove the plastic cap from the porous plug end of a copper copper-sulfate reference electrode and place the porous plug end of the reference electrode in the wetted soil in the depression.
4. Set the multimeter to DC volts.
5. Connect the multimeter negative lead to the copper terminal on the reference electrode.
6. Remove the orange cap covering the CTS terminal board and connect the multimeter positive lead to the terminal stud labeled "NATIVE COUPON" on the face of the CTS terminal board.
7. Read and record the potential measurement obtained.

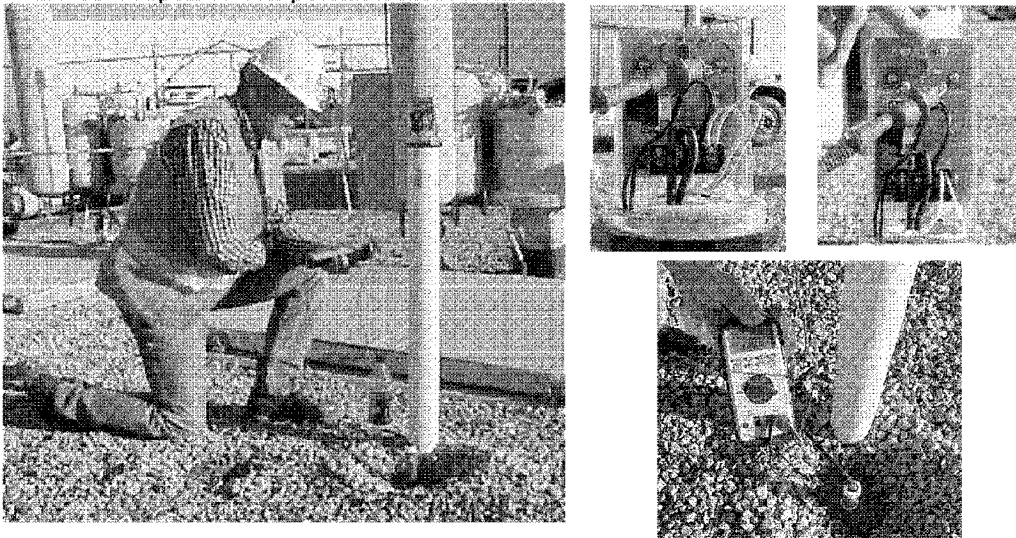


*Technician taking Native Coupon-to-Soil Potential*

### Step Three: CP Coupon-to-Soil Potential Measurement

1. Make a small depression in the soil at the base of the CTS. Removal all rock, concrete or other obstructions.
2. Pour about 4 ounces of tap water onto the soil in the depression
3. Remove the plastic cap from the porous plug end of a copper copper-sulfate reference electrode and place the porous plug end of the reference electrode into the wetted soil in the depression.
4. Set the multimeter to DC volts
5. Connect the multimeter negative lead to the copper terminal on the reference electrode.
6. Remove the orange cap CTS cap and connect the multimeter positive terminal to the terminal stud labeled "CP COUPON" on the CTS terminal board.
7. Verify the micro switch labeled "SW1" is in the "on" position. While observing the multimeter display screen switch off the micro switch labeled "SW1" on the CTS terminal board. The numbers displayed on the multimeter will change rapidly for about one second, stabilize on a potential indication and then begin to decrease slowly. The number displayed when the multimeter first stabilizes is the IR free (Instant Off) potential. Read and record this potential.
8. Return the micro switch labeled "SW1" on the CTS terminal board to the on position.
9. Replace the orange plastic covering the CTS terminal board.

Note: The micro switch labeled "SW1" must have been in the on position for at least 2 weeks prior to making a CP coupon-to-soil potential measurement. The micro switch may be turned off for short periods of time (less than 5 minutes) without seriously effecting the CP coupon-to-soil potential measurement.



*Technician taking CP Coupon-to-Soil Potential Measurement*

#### **Step Four: 100 m V Shift Criteria Compliance Determination**

1. Compare the Native Coupon-to-Soil Potential obtained in Step 2 to the CP Coupon-to-Soil Potential obtained in Step 3. If the CP Coupon-to-Soil Potential obtained is at least 100 mV more negative than the Native Coupon-to-Soil Potential obtained then compliance with the 100 mV shift criteria has been demonstrated.
2. If compliance with the 100 mV shift criteria is not demonstrated by making the potential comparison described above repeat Step 2, Step 3 and Step 4.
3. If compliance with the 100 mV shift criteria cannot be demonstrated an abnormal operating condition (AOC) exists and prompt action should be taken to restore sufficient cathodic protection to the pipeline.