CITY OF RICHMOND
DEPARTMENT OF PUBLIC UTILITIES
GAS AND LIGHT DIVISION
OPERATIONS CETNER

April 16, 2015

Mr. Byron Coy, PE
Director, Eastern Region
Pipeline & Hazardous Materials Safety
Administration - Eastern Region
820 Bear Tavern Road, Suite 103
West Trenton, New Jersey 08628

RE: Notice of Amendment - CPF 1-2015-0006M

Dear Mr. Coy:

The City of Richmond received the Pipeline & Hazardous Materials Safety Administration's March 17, 2015, Notice of Amendment on the above matter on March 18, 2015.

The City of Richmond reviewed your letter concerning the issues inspectors from the Virginia State Corporation Commission (SCC) found and the proposed outcome of this matter. We appreciate PHMSA for allowing the City of Richmond to respond to the Notice of Amendment and would like to accept the proposed Notice of Amendment as specified per CPF 1-2015-0006M. As promised, the City has fulfilled all the proposed remedial action items given to the SCC dating back to December 6, 2013, which includes:

1) Independent study performed by qualified consultant to research and make improvements to existing Cathodic Protection criteria.
2) Implementing the improved Cathodic Protection criteria.
3) Modification to the pipe condition report form.
4) Training our leak repair crew on how to document potential reads on the new pipe condition report form.
5) Revision to Corrosion Control Monitoring Section of the Operations and Maintenance Manual to reflect these changes.

Per your request, enclosed is a copy of the City's revised ***Corrosion Control Monitoring*** procedure of the Operations and Maintenance Manual for your review.

If you have any questions or concerns, please do not hesitate to contact me at (804) 646-8052.

Sincerely,

Sang J. Yi
Engineer III
Department of Public Utilities, Gas & Lights

cc: Robert Steidel, Director, DPU
Alfred Scott, Deputy Director II, Gas & Lights, DPU

Enclosure: ***DPU Natural Gas O&M Vol. II. Section 4-II Corrosion Control Monitoring***

REFERENCES:
Title 49 CFR 192, Subpart I, Requirements for Corrosion Control.
Title 49 CFR 192, Appendix D, Criteria for Cathodic Protection and Determination of Measurements

I. POLICY

A. This procedure is categorized as an O&M procedure subject to 49 CR 192.605 (see procedure I.1.I)

B. It is the policy of this gas system to conduct its construction, operations, and maintenance activities in a responsible and safe manner.

C. Corrosion control procedures, including those for the design, installation, operation and maintenance of cathodic protection systems, will be carried out under the direction of the Supervisor of Corrosion Technicians.

D. Questions regarding application of this procedure should be directed to the Deputy Director of Gas and Lights.

II. DEFINITIONS

A. Corrosion – The tendency of metals to combine with oxygen to form the more stable oxide (rust). This process is intensified in the presence of moisture and acidic condition such as present in the soil.

B. Corrosion Protection – Efforts to prevent the oxide formation on pipeline thereby prevent the formation of rust that may degrade the pipe. DPU uses three methods to protect pipelines:
   1. Isolation from other dissimilar metals by placing dielectric insulating fittings at the risers or meter connection, and the main connection to CI, DI or copper services.
   2. Coating the pipe and fittings to prevent oxygen and moisture from reaching the surface of the pipe.
   3. Cathodic protection where breaks or scratches in the coating exists. a barrier is provided to prevent oxygen from reaching the surface of the metal.

C. Cathodic Protection – The prevention of electrolytic corrosion in underground metallic pipes by making the pipe the cathode in a cathode-anode electrolytic cell.

III. REQUIREMENTS

A. Design, installation, operation and maintenance of the cathodically protected systems shall be performed by persons OQ qualified in pipeline corrosion control methods.

B. DPU shall protect its metallic pipeline from external, internal and atmospheric corrosion according to the following criteria:

1. New Facilities – After July 31, 1971

   a. Each buried metallic pipeline installed after July 31, 1971 as part of new construction, maintenance or repair must be protected against external corrosion.
      (1) The pipe installed must be "coated" with an appropriate coating
      (2) If the coating is damaged or removed, or if a short piece of bare pipe is used for a tie-in, a field applied coating must be utilized.
      (3) Within one year of completion of construction, a cathodic protection system designed by the Corrosion Department must be installed and placed in operation, meeting established cathodic protection criteria.

   b. The following are exempt from the requirements above:
      (1) Electrically isolated, coated metal alloy fittings listed in the material standards for plastic pipelines.

2. Existing Facilities – Before August 1, 1971

   a. Cast iron and ductile iron need not be cathodically protected.
   b. Coated steel distribution pipelines will be cathodically protected if practical. These pipeline facilities that have been cathodically protected at the discretion of the DPU do not fall under the monitoring or remedial action requirements of the Federal regulations, except that they must be evaluated for active corrosion per paragraph IV. E of procedure II.4.I.
   c. Bare or coated distribution pipelines shall be cathodically protected or replaced if the Corrosion Department determines that the pipeline is in an area of active corrosion per paragraph IV.G of procedure II.4.I.

3. Cathodic Protection Criteria

   a. The minimum acceptance criteria for cathodically protected pipeline tests shall be at least one of the following:
      (1) A negative (cathodic) potential of at least 0.85 volt, with reference to a saturated copper-copper sulfate half cell, with IR drop considered. Determination of this voltage must be made with the protective current applied, and in accordance

with sections II and IV of appendix D of Title 49 CFR 192, voltage (IR) drops other than those across the structure-electrolyte boundary must be considered. Refer to Exhibit A, "Pipe to Soil Measurement Procedure" for additional guidance for considering IR drop.

(2) A negative polarized potential of at least 0.85 volt, with reference to a saturated copper-copper sulfate half cell. Determination of this voltage must be in accordance with sections II and IV of appendix D of Title 49 CFR 192.

(3) A minimum negative (cathodic) polarization voltage shift of 100 millivolts. This polarization voltage shift must be determined in accordance with sections III and IV of appendix D of Title 49 CFR 192.

IV. PROCEDURE

A. Bi-Monthly Monitoring: Rectifier, Reverse Current Switches and Interference Bonds

1. The Supervisor of Pipeline Corrosion Technicians maintains an archive list of rectifiers, reverse current switches and interference bond with the last inspected condition listed.
2. Readings are taken bi-monthly (**six times each calendar year, but with intervals not exceeding 2-1/2 months**) usually in February, April, June, August, October, and December.
3. Each cathodic protection rectifier or other impressed current power source must be inspected to ensure that it is operating.
    a. Record output voltage and current of rectifier. Determine if operating within designated limits.
    b. If the rectifier is not operating properly, corrective action should be taken before the next scheduled reading.
        (1) The Supervisor of Pipeline Technicians generates work orders for replacement of rectifiers that cannot be repaired. Replacement must be completed within one year.
4. Each reverse current switch, each diode, and each interference bond whose failure would jeopardize structure protection must be electrically checked for proper performance.
    a. If the device being checked is not operating properly, corrective action should be taken before the next scheduled reading.
        (1) The Supervisor of Pipeline Technicians generates work orders for replacement of reverse current switches and interference bond that cannot be repaired. Replacement must be completed within one year.
5. The Supervisor of Pipeline Corrosion Technicians ensures records are updated in the Pipeline Compliance system as frequently as information becomes available.
6. Monitoring results are recorded electronically using handheld devices or recorded on the Corrosion Survey Form (Exhibit F)

7. Records are maintained for at least 5 years.
8. The Supervisor of Pipeline Corrosion Technicians files a bi-monthly, completed inspection schedule with Operations Manager of Gas.

B. Annual Monitoring: Cathodically Protected Systems and Interference Bonds

1. The Supervisor of Pipeline Corrosion Technicians maintains an archive list of rectifiers and anode protected systems.
2. After cathodic protection has initially been established, each electrically connected segment of pipeline with a common cathodic protection system must be tested **at least once each calendar year, but with intervals not exceeding 15 months**, to determine whether the cathodic protection meets the minimum requirements specified in paragraph III.B.3, above.
3. Rectifier protected systems:
   a. Record output voltage and current of rectifier. Determine if operating within designated limits.
   b. Record pipe to soil potential at a sufficient number of locations to assure complete cathodic protection and evaluate utilizing the criteria stated in III.B.3.a. (2) while using the procedure as outlined in Exhibit A, "Pipe to Soil Measurement Procedure", Procedure 1.
   c. The operator shall take prompt remedial action to correct any deficiencies indicated by the monitoring IAW Title 49 CFR 192 Article 465 (d). The OPS would expect that, under normal conditions, the operator should have the evaluations and decisions made and action started within a few month, (proportionally less where required is less than a year or where deficiencies could result in an immediate hazard to the public), and correction completed by the time of the next scheduled monitoring.
4. Anode protected systems:
   a. Record pipe to soil potential at a sufficient number of locations to assure complete cathodic protection and evaluate utilizing the criteria stated in III.B.3.a. (1) while using the procedure as outlined in Exhibit A, "Pipe to Soil Measurement Procedure", Procedure 2.
   b. The operator shall take prompt remedial action to correct any deficiencies indicated by the monitoring IAW Title 49 CFR 192 Article 465 (d). The OPS would expect that, under normal conditions, the operator should have the evaluations and decisions made and action started within a few month, (proportionally less where required is less than a year or where deficiencies could result in an immediate hazard to the public), and correction completed by the time of the next scheduled monitoring.
5. Interference Bonds:
   a. Each interference bond whose failure would jeopardize structure protection shall be read as part of the "Annual Readings."
      (1) The definition of a "failure that would jeopardize structure protection" is any instant off potential reading that is more negative than -1.2 volts.

6. The Supervisor of Pipeline Corrosion Technicians ensures records are updated in the Pipeline Compliance system as frequently as information becomes available.
7. Monitoring results are recorded electronically using handheld devices or recorded on the Corrosion Survey Form (Exhibit F)
8. Records are maintained for the life of the pipeline.
9. The Supervisor of Pipeline Corrosion Technicians files a monthly, completed inspection schedule with Operations Manager of Gas.

C. Ten Percent Monitoring

1. Short sections of cathodically protected mains (not in excess of 100 feet) and separately protected service lines (insulated at the main) may be surveyed on a sampling basis. **At least 10 percent** of these protected pipelines, distributed over the entire system must be **surveyed each calendar year**, with a different 10 percent checked each subsequent year, so that the entire system is tested in each 10-year period.
2. The Supervisor of Pipeline Corrosion Technicians maintains an archive list of these ten percent mains and services.
3. Record the I-R free pipe to soil potential.
4. If readings are less than the required potential, corrective action must be taken before the end of the next full calendar year.
5. If, in the course of other work, a previously unidentified protected service line is discovered, it shall be monitored as detailed above and reported to the Supervisor of Pipeline Corrosion Technicians.
6. The Supervisor of Pipeline Corrosion Technicians ensures records are updated in the Pipeline Compliance system as frequently as information becomes available.
7. Records are maintained for the life of the pipeline or service.
8. The Supervisor of Pipeline Corrosion Technicians files a monthly, completed inspection schedule with Operations Manager of Gas.

D. Periodic Monitoring: Casings

1. The Supervisor of Pipeline Corrosion Technicians maintains an archive list of casings.
2. **Once every three years**, electrical tests must be made to assure that electrical isolation of casings from carrier pipelines is adequate. If the casing is shorted to the carrier, corrective action shall be taken.
   a. An attempt shall be made to clear possible contacts at the casing ends.
   b. If the contact cannot be cleared at the ends, the ends shall be sealed and the annular space filled with a non-conductive material.
3. The Supervisor of Pipeline Corrosion Technicians ensures records are updated in the Pipeline Compliance system as frequently as information becomes available.
4. Records are maintained for 5 years.
5. The Supervisor of Pipeline Corrosion Technicians files a monthly, completed inspection schedule with Operations Manager of Gas.

E. Atmospheric Corrosion Monitoring including Bridge Crossing Inspections

1. Each pipeline that is exposed to the atmosphere shall be inspected **at least once every three calendar years but at intervals not exceeding thirty nine months**.
   a. The Supervisor Pressure Control is responsible for inspecting exposed piping in all gate stations and regulator stations during the annual inspection. See Operating Procedure II.5.I Pressure Limiting and Regulator Stations.
   b. Meter sets will be inspected for atmospheric corrosion as part of the walking leak survey. See Operating Procedure II.6.I.
   c. Gas & Water Service Technicians and Commercial Meter Technicians are responsible for inspecting and identifying any corrosion issues on meter sets during any meter related work (set meter, turn-ons, etc.)
   d. Pipelines, other than those specified above, will be inspected by the Corrosion Department.
2. The Supervisor of Pipeline Corrosion Technicians generates an inspection schedule to allow inspections of pipelines under bridges or other pipelines exposed to the atmosphere. The schedule includes the location, map etc.
3. The Pipeline Corrosion Technicians inspects the exposed lines for visible corrosion and also check:
   a. Wrappings,
   b. Coating,
   c. Rollers,
   d. Isolation from bridge,
   e. Natural Gas warning signs.
4. Particular attention is paid to the pipe at the soil to air interfaces, under thermal insulation, under disbanded coatings, at pipe supports and in splash zones for spans over water.
5. If remedial action is necessary to maintain protection against atmospheric corrosion, it should be scheduled for completion before the next full calendar year. It must be completed within three calendar years.
6. The Supervisor of Pipeline Corrosion Technicians ensures records are updated in the Pipeline Compliance system as frequently as information becomes available.
7. Records are maintained for 5 years.
8. The Supervisor of Pipeline Corrosion Technicians files a monthly, completed inspection schedule with Operations Manager of Gas.

F. Visual Inspection - External Corrosion

1. **Whenever any metallic pipe is exposed**, the condition of the pipe shall be inspected for evidence of corrosion.
2. This requirement applies to all Gas Operations, Maintenance, Construction, Pressure Control employees and all contractors employed by these departments.

3. A Pipe Condition Report (See Exhibit E) shall be completed and forwarded to the Corrosion Department.
    a. Pressure Control documents the pipe condition on their regulator inspection records. If they need to excavate any pipe, the pipe condition report is used.
4. If severe corrosion is found,
    a. The Supervisor of Pipeline Corrosion Technicians should be notified while the hole is still open so that inspection testing and analysis can be performed.
    b. Investigate beyond the exposed section of pipe to determine whether additional corrosion exists.
    c. DPU shall replace the affected segment if the wall thickness is less than that required for the MAOP or less than 30 percent of the nominal wall thickness.
    d. However, pipe that does not require replacement can be repaired to serviceability.
5. The Pipe Condition report is maintained for the life of the pipeline.

G. Visual Inspection - Internal Corrosion

1. **Whenever any pipe is removed** from a metallic pipeline for any reason, the internal surface must be inspected for evidence of corrosion.
2. This requirement applies to all Gas Operations, Maintenance, Construction, Pressure Control employees and all contractors employed by these departments.
3. A Pipe Condition Report (See Exhibit E) shall be completed and forwarded to the Corrosion Department.
4. If internal corrosion is found,
    a. The Supervisor of Pipeline Corrosion Technicians should be notified while the hole is still open so that inspection testing and analysis can be performed.
    b. The adjacent pipe must be investigated to determine the extent of the corrosion.
    c. DPU shall replace the affected segment if the wall thickness is less than that required for the MAOP or less than 30 percent of the nominal wall thickness.
    d. Steps must be taken to minimize the internal corrosion.
5. The Pipe Condition report is maintained for the life of the pipeline.

V. EXHIBITS

A. Pipe to Soil Measurement Procedure
B. Checking a Gas Service for Cathodic Protection
C. Locating Shorts
D. Locating Opens
E. Testing Insulators
F. Pipe Condition Report
G. Corrosion Survey Form
H. Model 601 Insulator Tester Instructions

I. Model 702 Insulator Tester Instructions
J. Model 715 Pipe & Cable Locator

EXHIBIT A
Pipe to Soil Measurement Procedure

Precautions and Guidance for Performance:

(1) A high impedance voltmeter (minimum of 10 megohm input impedance should be used). This is critical for the consideration of IR drop. It ensures that the pipe-to-soil potential reading on the voltmeter is a high percentage of the actual pipe-to-soil potential measurement. It often renders the effect of IR drop to a negligible level.
(2) Perform a field check of the voltmeter and test leads to ensure proper operation.
(3) Ensure that the voltmeter is within calibration date range.
(4) Keep the copper/copper sulfate half-cell full of solution.
(5) Ensure half-cell is within calibration date range.
(6) Keep the porous tip of the half cell covered when not in use to avoid drying of the tip.
(7) To reduce IR drop in the circuit, place the half-cell directly over or as close as practical to the pipeline.
(8) The half-cell must make good contact with the electrolyte. If necessary water may be used to saturate soil or wet concrete in dry conditions.

Procedure 1

(1) Read and record as-found potentials at the rectifier.
(2) Install interrupter in rectifier IAW manufacturer's instructions.
(3) Set the interrupter to a long "on" and a short "off " cycle, such as 8 seconds on and 2 seconds off.
(4) Turn the multimeter on and set to measure DC voltage IAW manufacturer's instructions.
(5) Connect positive lead to the structure or structure lead in the test station.
(6) Connect the negative lead to the reference cell.
(7) Place the reference cell in contact with soil or concrete IAW manufacturer's instructions.
(8) Observe and record "on" and "instant off" readings. "Instant off" readings should be -850 mV or greater but less negative than -1200 mV.
(9) If any "instant off" potentials are found to be out of the given range, the Supervisor of Corrosion Technicians should be informed.

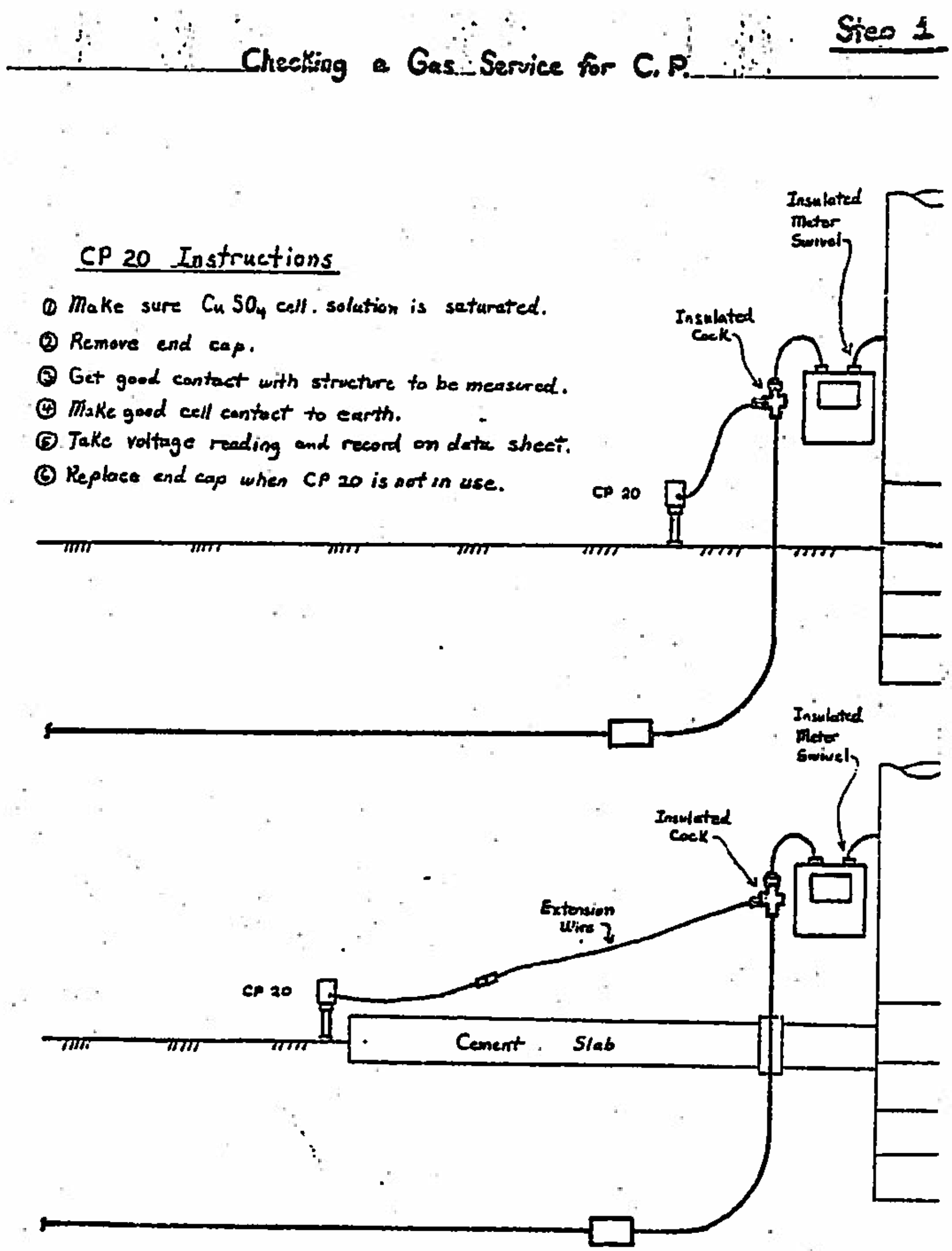
Procedure 2

(1) Turn the multimeter on and set to measure DC voltage IAW manufacturer's instructions.
(2) Connect positive lead to the structure or structure lead in the test station.
(3) Connect the negative lead to the reference cell.
(4) Place the reference cell in contact with soil or concrete IAW manufacturer's instructions.
(5) Observe and record "on" potential readings. "On" readings should be equal to or greater than -850mV + IR Drop value as defined in III.B.3.a(1).
(6) Evaluate all "on" + IR Drop potentials.
   a. If the overall potentials are less than -850 mV + IR Drop, a criteria change to III.B.3.a. (3) will be implemented.
   b. If an area is found to be less than -850 mV + IR Drop and the rest of the system is greater than -850 mV + IR Drop, further evaluation is required to determine the reason for the low potential prior to changing the criteria to III.B.3.a. (3).
(7) If any "on" potentials are found to be less negative than 850 mV. Continue to read all test stations in this manner recording the "on" readings. The criteria as stated in III.B.3.a. (3) will now be applied by using the procedure as outlined in Exhibit A, "Pipe to Soil Measurement Procedure", Procedure 3.

Procedure 3

(1) Turn the multimeter on and set to measure DC voltage IAW manufacturer's instructions.
(2) Connect positive lead to the structure or structure lead in the test station.
(3) Connect the negative lead to the reference cell.
(4) Place the reference cell in contact with soil or concrete IAW manufacturer's instructions.
(5) Observe and record "on" potential readings. If any "on" potentials are found to be less negative than 850 mV, continue to read all test stations in this manner recording the "on" readings.
(6) Disconnect all anodes from all test stations.
(7) Allow the pipe line to depolarize.
(8) Observe and record "native readings".
(9) Subtract the "native readings" from the "on" readings and record the difference as delta V. A delta V of 100 mV or greater should be achieved.
(10) If any delta V of less than 100 mV is found, the Supervisor of Corrosion Technicians should be informed.

EXHIBIT B
Checking a Gas Service for Cathodic Protection



STEPS 2&3

CHECKING A GAS SERVICE for C.P

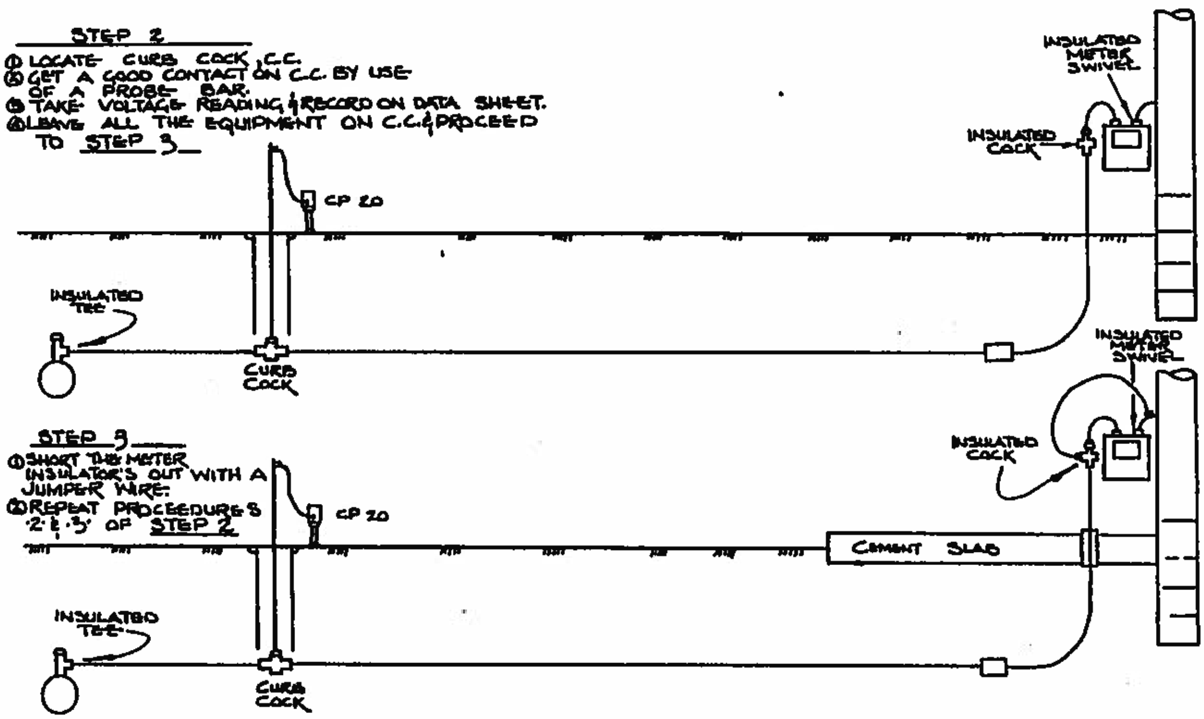


EXHIBIT C

Locating Shorts

Using Potentials and Current flow/Short locating Equipment

1. If pipe to soil voltage is below -.85 a possible short may exist and the following should be done.

2. If the annual monitoring shows a pipe soil voltage drop of 300 millivolt (0.3v) from previous year, also low resistance and increased current flow at test stations with anodes, investigate for a possible short, recognizing:
   a. Pipe to soil voltage will decrease in extremely dry conditions.
   b. Pipe to soil voltage will decrease in the event of extensive coating damage.

3. Localizing Shorted Area
   a. Check pipe to soil potential and current flow at various location on the cathodically protected structure
   b. A Short will be in the vicinity of the lowest pipe to soil voltage reading and the highest current flow reading.

4. Pinpointing the Short
   a. Utilizes short locating equipment (Pipe and Cable Locator).
   b. Connect short Locator to structure according manufacture, see exhibit I.
   c. As the antenna is move back and forth across the pipe to which the transmitter is connected, a distinct sound in the received signal will be observed when the antenna is directly over the pipe.
   d. Using this method (Conductive Principal), it is possible to trace the path of the pipeline as long as there is relatively large amount of audio-current flowing in it.
   e. If the coated pipe is in contact with a foreign system the distinct sound will change, a different sounding signal will be heard where there should not be. The audio-current will leave the coated pipe at this point and audio-current will flow in the foreign system.
   f. The same effect will then be present on the foreign system as on the coated pipe from the audio transmitter to the point of contact.
   g. Short location is at the point the audio-current leaves the coated pipe.

EXHIBIT D
Locating Opens
Using Potentials/Current flow/Pipe Locating Equipment

1. When testing a distribution system for electrical open circuit it is necessary to first apply some external source of D.C. power which can be turned on and off.
    a. This can be accomplished with either an existing cathodic protection system or temporary groundbed setup.
    b. Once the D.C. power supply has been interrupted pipe to soil potentials should be taken at all available test points.

2. If the entire section of gas piping is electrically continuous then the pipe to soil measurements would then reflect pickup or a cathodic shift.
    a. If the pipe to soil measurements does not reflect a pickup or a cathodic shift then there is an indication of an open circuit.

3. Scenario: On a segment of gas pipe with four test points,1,2,3,4.
    a. At the first three test points 1, 2,3, the pipe to soil measurements reflect a cathodic shift.
    b. Test point 4 will show a depressed potential with the test current applied. This would indicate that the temporary groundbed is actually interfering with the piping at test point 4. This interference is caused by the discharge of the test current from the piping on the downstream side of the coupling through the earth back to its source.
    c. Test current is picked up on the piping downstream of the coupling but there is no means of completing the circuit through the piping itself because of the open circuit.
    d. The piping upstream of the open will show definite pickup of test current with corresponding higher potentials. If the data obtain from this over –the-line survey is plotted, there should show a definite decrease in potential shift due to the test current on the pipe section downstream from the open.

4. Once the location of the open coupling has been narrowed down, a gradient profile can be performed over the area in question to narrow it even closer.
    a. With the temporary groundbed still set up, the half-cell is run out at two foot intervals using only one negative connection.
    b. One other way of narrowing down an open is the use of a pipe and cable locator.
        i. When tracing a buried pipe line a sudden loss of signal along the path means either an open or a ground connection.

EXHIBIT E
Testing Insulators

1. Procedure for testing insulators.
    a. The insulphone tester is capable of detecting the presence of AC or DC currents that are always present across an effective insulator and is dependent on the piping system being well grounded on both sides of the insulator.
    b. The test is conducted by contacting the pipeline on each side of the insulated fitting with the sharp pointers of the instrument. When making the initial test, make a solid contact to the pipe with one probe and intermittent contact with the other probe on the opposite side of the insulator.
    c. To insure the insulator tester is working, contact the probes across an ordinary 1½ volt flashlight battery. If a click is denoted, tester is functioning properly (click will be abrupt at contact -- not sustained)
    d. It is recommended that insulated swivels, unions, or flanges be checked with the tester each time a meter is set or changed and if the insulator is faulty, it is to be changed. If there is doubt as to the effectiveness of an insulator, a job order should be written requesting a check of the insulator.
    e. A description of tests and their results follows:
        i. When insulator is being checked and a tone (buzz or tone) is heard, the insulator is good.
        ii. When insulator is being checked and no tone is heard, insulator is faulty, the exception to this is if fuel line piping is not grounded. If no gas water heater is present, make sure fuel line is grounded and recheck insulator. Do this by attaching a wire from the fuel line to the ground rod or water line.
        iii. When insulator is being checked and tone is very faint, there could be a high resistance short. If faint tone exists, check by separating piping at insulator and rechecking. If tone increases, insulator is not effective. If no increase in tone, piping is poorly grounded.
        iv. When testing an insulator at a meter on a Multi-Meter Manifold with another insulator ahead of the insulator you are testing, first check for a tone at the primary insulator. If no tone, the insulator is defective and a job order should be written to replace the insulator and rebuild the meter set. If a tone is detected, the insulator is operating and there would be no need to test further.
            1. If there is no primary insulator, check at the insulator on the meter. If there is no tone, write up a job order to have primary insulator installed and meter set rebuilt. If there is a tone, insulator is operating.

EXHIBIT F
Pipe Condition Report

CITY OF RICHMOND DEPARTMENT OF PUBLIC UTILITIES
PIPE CONDITION REPORT

Date Examined			Map Page			
LOCATION INFORMATION						
Address						
House Number	Number Suffix	Street Name	Street Type	Direction	Unit Type	Unit Number
Or Intersection						
First Street			Second Street			
Jurisdiction ☐ Richmond ☐ Henrico ☐ Chesterfield ☐ Hanover						
Location Description (Physical)						
MATERIAL INFORMATION						
Facility Type ☐ Main ☐ Service						
Pipe Material ☐ Steel ☐ Bare Steel ☐ Plastic ☐ Cast Iron ☐ Ductile Iron ☐ Galvanized ☐Copper			Pipe Size ☐1/4" ☐1/2" ☐3/4" ☐1" ☐1-1/4" ☐1-1/2" ☐2" ☐3" ☐4" ☐6" ☐8" ☐10" ☐12" ☐14" ☐16"			
Pipe Coating ☐ Fusion Bond Epoxy ☐ Polyethylene ☐ Powercrete ☐ Tapecoat ☐ Denso ☐ Dual Coat ☐ Heat Shrink ☐ Yellow Jacket Polyethylene ☐ Galvanized ☐ Green Fusion Bond Epoxy ☐ Blue Fusion Bond Epoxy ☐ Brown Fusion Bond Epoxy ☐ Mill Wrap ☐ Coal Tar ☐ Unknown ☐ None						
Part ☐ Pipe ☐ Regulator ☐ Valve ☐ Tapping Tee ☐ Fitting ☐ Drip ☐ Other (include comments)						
INSPECTION INFORMATION						
External Pipe Condition (Expose) ☐ Good ☐ Bad ☐ Severe (call corrosion supervisor)						
Date Installed			Internal Corrosion ☐ Yes ☐ No ☐ NA			
Examined By			Checked By Unit Number			
Depth of Pipe (in)			Exposed Length (ft)			
Cathodic Protection Read of Pipe - Pipe to Soil Reading:						
Comments						
X Coordinate			Y Coordinate			

Revised 07/2014

EXHIBIT G
Corrosion Survey Form - page 1

Part 1

City of Richmond
Department of Public Utilities Gas & Water Distribution
CORROSION SURVEY

Page ___ of ___
Geo-Zone ___ Scheduled
For Periodic Monitoring the
Month of ________

Location-Area/Subdivision ______________________ Map Page Plat # ______

Section Number ________
Main Size ________ Main Footage ________ Date Protected ________
Service Size ________ Service Footage ________ Date Installed ________
Type of Coating on Pipe ________ Type of Pipe Joints ________

SKETCH/DRAWING
Attached

NACE Corrosion Tech.
Name ________
____

Original Data Posted to
Map/plat Book in Office ____
Submitted to Drafting ____
Index CP Log ____
CP GeoZone File ____ Finals/Prelims.
Periodic Field Book ____ Copies
Periodic Office Book ____ Originals

PERIODIC		TEST STA									
CHECK		CONTACT PT									
DATE	TECH	METER									
		E-RECT									
		I-RECT									
		I-MAGS									
		REF LOC									
		ON-CC									
		OFF-CC									
		DELTA									
		RVG									
		ON-CC									
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		OFF-CC									
		DELTA									
		RVG									

EXHIBIT G
Corrosion Survey Form - page 2

Part 2

City of Richmond
Department of Public Utilities Gas & Water Distribution
CORROSION SURVEY

Page ___ of ___

PERIODIC		TEST STA									
CHECK		CONTACT PT									
DATE TECH.		METER									
		E-RECT									
		I-RECT									
		I-MAGS									
		REF. LOC.									
		ON-CC									
		OFF-CC									
		DELTA									
		RVG									
		ON-CC									
		OFF-CC									
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EXHIBIT H
Model 601 Insulator Tester Instructions

I. BATTERY TEST:
1. REMOVE PLASTIC PROBE GUARDS.
2. MOVE LEFT HAND TOGGLE SWITCH TO THE "ON" POSITION.
3. TURN THE POTENTIOMETER UNTIL THE METER POINTER GOES FULL SCALE.
4. IF THE METER SCALE WILL NOT GO FULL SCALE, THE TWO "C" CELL BATTERIES MUST BE REPLACED.

(NOTE: TO CHANGE THE BATTERIES – TAKE THE 4 SCREWS OUT THAT ARE IN THE CORNERS OF THE FRONT PANEL AND LIFT THE FRONT PANEL OFF.

II. INSTRUMENT ADJUSTMENT:
THERE ARE TWO DISTINCT CHECKING CIRCUITS ON THE 601 INSULATION CHECKER. BOTH CIRCUITS HAVE THE SAME RELIABILITY. THESE ARE:

CIRCUIT NO. 1. CHECKING—USING THE TWO FIXED PROBES.

CIRCUIT NO. 2. CHECKING—USING THE RIGHT HAND FIXED PROBE (MARKED WITH THE DOT) AND THE FLEXIBLE LEAD ON THE OUTSIDE OF THE CASE.

1. USING CIRCUIT NO. 1.:
   a. TURN THE INSTRUMENT "ON" WITH THE LEFT HAND TOGGLE SWITCH.
   b. FLIP THE RIGHT HAND TOGGLE SWITCH TO THE "ZERO" POSITION.
   c. ADJUST THE POTENTIOMETER KNOB UNTIL THE POINTER IS AT "ZERO".
   d. FLIP THE RIGHT HAND TOGGLE SWITCH TO THE "TEST POSITION. (POINTER WILL JUMP HARD TO THE RIGHT POINTER STOP).
   e. AN OCCASIONAL CHECK MAY BE MADE BY SHORTENING ACROSS THE PROBES WITH A SCREWDRIVER, KNIFE, ETC. THIS SHOULD SHOW A DIRECT SHORT, DEFLECTING THE POINTER TO "ZERO" OR BELOW.

THE INSTRUMENT IS NOW READY TO TEST THE INSULATING UNIT.

2. USING CIRCUIT NO. 2.:
   a. WITH THE INSTRUMENT TURNED ON, PUT THE RIGHT HAND TOGGLE SWITCH TO THE "TEST" POSITION.
   b. TOUCH (SHORT) THE FLEXIBLE TEST PROBE TO THE RIGHT HAND FIXED PROBE MARKED WITH A DOT ON THE FACEPLATE.
   c. ADJUST THE POTENTIOMETER UNTIL THE POINTER GOES PAST "ZERO" AND JUST TOUCHES THE LEFT HAND METER STOP. THIS ALLOWS FOR THE ADDITIONAL LENGTH OF THE TEST LEAD.
   d. BREAK THE CONTACT BETWEEN THE POINTS---THE POINTER WILL JUMP HARD TO THE RIGHT HAND METER STOP.

THE INSTRUMENT IS NOW READY TO TEST THE INSULATING UNIT.
NOTE: IT IS IMPERATIVE WHEN USING THE AUXILIARY TEST LEAD THAT THE RIGHT HAND FIXED PROBE ONLY MAKES CONTACT WITH THE INSULATING UNIT.

III. INSULATION TEST PROCEDURE:
1. MAKE CONTACT WITH EACH PROBE ACROSS THE INSULATOR IN QUESTION. THE FOLLOWING RESULTS WILL BE OBTAINED:
   a. AN INSULATOR THAT IS GOOD, WILL READ FULL SCALE.
   b. IF AN INSULATOR IS SHORTED, THE METER POINTER WILL BE DEFLECTED TO OR NEAR "ZERO" ON THE METER SCALE.

EXHIBIT H
Model 601 Insulator Tester Instructions (continued)

IV. LOCATING A SHORTED BOLT:

METHOD NO. 1:

a. ADJUST THE INSTUMENT AS DESCRIBED IN SECTION II.
b. ON A DOUBLE INSULATED FLANGE UNIT, MAKE CONTACT FORM ONE FLANGE TO THE BOLT ON THE OPPOSITE FLANGE.
c. ON A SINGLE INSULATED FLANGE (WHERE THE BOLTS ARE INSULATED THRU ONE FLANGE ONLY) MAKE CONTACT WITH ONE PROBE ON THE INSULATED FLANGE AND THE OTHER PROBE ON THE BOLT ON THE SAME SIDE OF THE FLANGE UNIT.
d. IN EITHER OF THE ABOVE DESCRIBED TEST PROCEDURES, THE INSTRUMENT WILL INDICATE THE SHORTED BOLT OR BOLTS AS DESCRIBED IN THE TEST PROCEDURE.
e. IF AN INSULATED FLANGE UNIT SHOWS A DEFINITE SHORT, BUT EACH BOLT INDICATES IT IS INSULATED, THE SHORT EXISTS ACROSS THE FLANGE GASKET.

METHOD NO. 2.:

a. ADJUST THE METER AS DESCRIBED IN SECTION II.
b. WITH THE PROBES MAKING CONTACT WITH THE FLANGE, ADJUST THE METER POINTER TO 50 ON THE METER SCALE.
c. WALK THE INSTRUMENT AROUND THE FLANGES AT EACH BOLT LOCATION CAREFULLY WATCHING THE METER INDICATION.
d. THE SHORTENED BOLT OR BOLTS EXISTS AT THE POINT OF LOWEST READING.

EXHIBIT I
Model 702 Insulator Tester Instructions

Underground Insulation Checker – Model 702

Casing Testing Instructions

To Test D-Cell Batteries:

Flip the switch up to the Charge position

- If the needle is above 30 uA, the batteries are good
- If meter reads less than 30 uA, replace the D-Cell batteries

Setup Meter for Test:

Flip the switch down to the Test position and Zero the meter with the Knob (if the meter will not zero, replace the AA batteries)

Once the meter is set on Zero, leave knob set and flip the switch to the Off position.

Connect the leads, black to the Pipe and red to the Casing.

Testing Process:

Flip the switch up to the Charge position for at least 30 seconds (large pipes may need to charge for a longer time)

After 30 seconds, immediately flip the switch down to the Test position.

Results:

- If the needle drops to Zero, the casing is shorted (metallic short).
- If the needle pegs out (jumps hard to the right), the casing is clear.
- If the needle reads more than zero but less than 50 uA, the casing is electrolytically shorted. (You may purposely short the casing to see if the needle goes to Zero to confirm your results)

EXHIBIT J
Model 715 Pipe & Cable Locator

NILSSON MODEL 715

SOLID STATE

PIPE & CABLE LOCATOR

INSTRUCTION MANUAL

NILSSON ELECTRICAL LABORATORY, INC.
SPECIALISTS IN ELECTRONIC AND ELECTRICAL MEASUREMENTS

CONTENTS

NILSSON ELECTRICAL LABORATORY, INC. PIPE & CABLE LOCATOR MODEL 715

☆ ☆ ☆

MODEL 715

The Model 715 contains no moving parts, such as vibrator contacts or relays, to wear out and require adjustment. Full advantage is taken of modern solid state technology to provide efficient transfer of a signal current into a ground circuit and accurate tracing of the signal in the substructure being investigated.

ASK US FOR TECHNICAL INFORMATION ABOUT YOUR PARTICULAR INSTRUMENT REQUIREMENTS Page 1

EXHIBIT J
Model 715 Pipe & Cable Locator (continued)

Section 1
PHYSICAL CONSTRUCTION

The physical design emphasizes versatility in the use of accessories to best suit the needs of the problem at hand. The locator is light weight, rugged and compact, intended for industrial use under adverse field conditions. The entire unit is housed in a deep drawn vinyl clad aluminum case, with storage space for accessories. The transmitter is mounted in the case with a panel containing all controls. The receiver, removed from its storage in the case, is designed as a basic "handle" into which antenna and output accessories are plugged.

1.1 TRANSMITTER

The transmitter is designed to operate from a 12 volt D.C. power source. It contains a circuit that generates a distinctive A.C. signal. The pitch of the signal is variable by means of the "FREQUENCY" control. The signal is also periodically interrupted to make the tone more distinctive. The rate of interruption is adjustable with the "RATE" control.

With the use of these two controls, the signal may be adjusted to be readily distinguished from any background noise such as power line hum, traffic noise, etc.

Three output impedance ranges are provided, selected by the "IMPEDANCE" switch. This allows the operator to select the best match of transmitter output circuit to the existing conditions.

A low battery warning lamp is provided. This is NOT a pilot light. It will ONLY light when the battery voltage is down to 9-10 volts, indicating the need to replace or recharge the battery.

1.2 RECEIVER

The receiver, stored behind a clamp under the transmitter, is housed in a square phenolic tube. It contains input circuitry, on-off volume control, amplifier, batteries and an output jack. It forms the handle for the flat coil antenna.

In operation the antenna is inserted into a jack at the volume control end—and headphones or an output accessory is plugged into the jack at the opposite end. The unit is now ready for use. Whenever the headphones or other output device is unplugged, the batteries are automatically disconnected, preventing accidental battery drain.

The antenna coil is moulded in an epoxy compound and mounted on a hinge joint rod. A bubble level is moulded in which indicates both horizontal and 45 degree inclination.

The proper output *impedance* match is 600 ohms. The headphones supplied are of 600 ohm impedance. (Do not confuse impedance with the resistance of the phones.)

Page 2

The aluminum plate under the volume control as well as the receiver name plate strip are connected to the receiver ground. When holding the receiver in a normal manner it assures body contact to receiver ground and prevents feedback howl when headphones are used. When working with gloves on and using headphones, it is recommended that some simple way, such as a bare wire through a finger of the glove, be used to establish finger contact with receiver ground.

1.3 OPTIONAL EQUIPMENT

The Model 715 locator consists of case, mounted transmitter, antenna, receiver, one extension rod and 600 ohm headphone. The additional options listed below are available.

LOUD SPEAKER

The loud speaker is housed in a small metal case containing a transformer and 2¼ inch speaker, arranged to plug into the ouput jack in place of the headphones. The receiver amplifier has ample drive for this and a loud clear signal is heard. A clip is provided in the case cover for storage.

OUTPUT METER

The output meter is housed in a small metal case. It is a ruggedized sealed meter, properly damped to visually display and follow the received signal. A jack in the case permits using the headphones at the same time, providing an audio-visual display for exacting work.

ANTENNA EXTENSION ROD

The antenna and receiver combination provides a "wand" 17 inches long. One extension rod (supplied) extends this to 28 inches. Additional 11 inch extension rods may be purchased.

ANTENNA CABLE

The antenna may also be coupled to the receiver by a cable. Thus an extra antenna may be mounted on a truck and wired into the receiver in the cab for riding surveys. When an area for close investigation is found, the receiver is disconnected and another antenna added in the usual manner. Cables are supplied to order at length specified.

MODEL 110 RECHARGEABLE 12 VOLT BATTERY PACK

Will outlast hundreds of 12 volt lantern batteries. Full description on page 10.

Page 3

EXHIBIT J
Model 715 Pipe & Cable Locator (continued)

Section 2
THEORY OF OPERATION

The Model 715 operates on what is known as the "conductive" principle.

The transmitter generates a distinctive electrical signal current. By proper application, *the* current is caused to flow in a loop circuit part of which is the pipe or cable (hereafter called the conductor) being invest igated.

An electric current flowing in a conductor generates a magnetic field around that conductor in a circular pattern. If an antenna coil is placed within that field, an electric current is induced in the antenna. This current can be amplified and heard in headphones or loud speaker.

The relative loudness of the signal, together with the position of the antenna coil, enables the operator to determine with precision the course of the conductor and its depth below ground surface.

An understanding of these principles, and experience in the use of this equipment, enables the operator to deduce many other factors, such as location of branches, contacts with other metallic structures, condition of insulating joints, location of opens and grounds, etc.

Section 3
OPERATING INSTRUCTIONS

The "OUTPUT" binding posts of the transmitter should be connected to the conductor in one of the several ways described in Section 5.

Remove the receiver from the case and assemble with the antenna and headphones or other output accessory. Turn on both units.

NOTE

After the transmitter has been turned on, the operator should not contact the output bind ing posts or wiring. A shock may be received which is not dangerous but may be annoying, especially in the "H I" position of the impedance switch.

Listen to the signal and adjust the "FREQUENCY" and "RATE" controls for the most distinctive tone for the conditions.

Listen to the received signal some twenty feet away AT A LOW VOLUME SETTING. Try the three positions of the "IMPEDANCE" switch and select the one which gives the best signal.

You are now ready to trace the path of the conductor. Best receiver operation will occur with the volume set to the lowest level at which it can be heard comfortably. This will reduce the effect of background noise and make smal l changes in signal strength more easily detected.

Page 4

Section 4
ANTENNA POSITIONS

It is important that the operator gain a thorough understanding of the relationship between the position of the antenna, the strength of the signal received, and the position of the conductor.

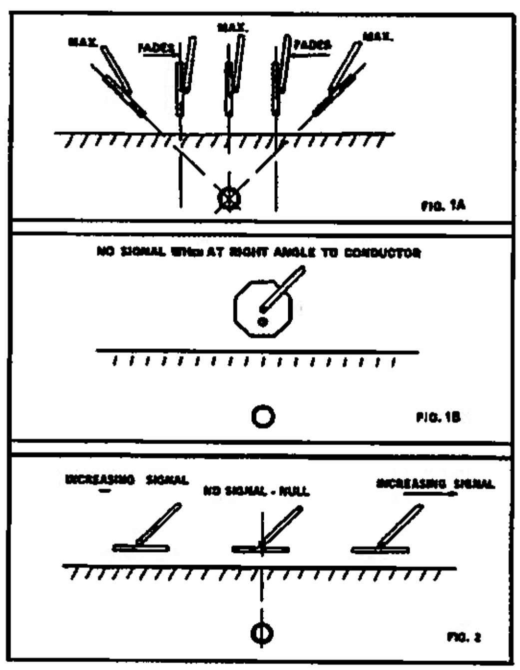
4.1 The *loudest* (MAXIMUM POSITION) *signs/ is* heard when the edge of the antenna disc points directly at the conductor and the disc is *para//e/* with the conductor. (Figure 1A) The signal fades as the disc moves away from this position. If the disc is exactly at *right angles* to the conductor, no signal will be heard. (Figure 1 B)

4.2 *Minimum signs/ will be heard (NULL* POS IT I ON) when the flat side of the disc faces the conductor and is parallel with it. (Figure 2)

A very critical position can be found where the signal is inaudible. This position is very sharp, often only a fraction of an inch wide, depending on diameter of conductor, and depth.

With the disc held flat, close to the ground, with the bubble centered, the conductor lies directly below the center of the disc. This null is very accurate. However another metallic structure close by may disturb it to some extent.

Usual practice is to use the maximum position



Page 5

EXHIBIT J
Model 715 Pipe & Cable Locator (continued)

for general quick tracing and the NULL position for pin pointing the location.

4.3 DEPTH DETERMINATION

When an exact null (4.2) is obtained, the position of the center of the disc is marked on the ground surface. The disc is then tipped to 45 degrees (bubble touching the outer edge of the ring on the level). The disc is then moved horizontally sideways from the mark until another NULL is obtained. The distance moved is equal to the depth of the conductor below the first NULL. (Figure 3)

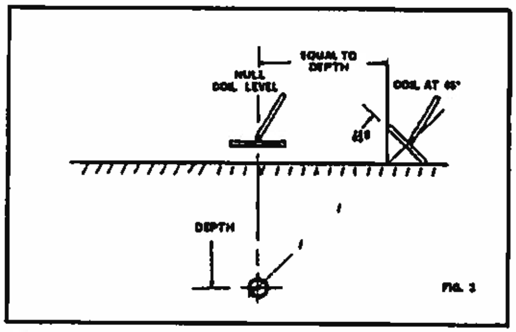


FIG. 3

Section 5
ESTABLISHING THE SIGNAL CURRENT CIRCUIT

The signal current is established by a number of methods, depending upon the circumstance. The objective is to establish a series loop circuit between the output binding posts which will include the conductor as a part. The signal current travels through metallic conductors just as any other current would. Its nature is such that it will pass through the soil surrounding the conductor. It will also pass through the electrical capacitance between the conductor and its surroundings. All these paths are taken advantage of in setting up the circuit.

a. When two points on the conductor are available some distance apart and the path between them is to be traced, one output binding post is connected to one point on the conductor. An insulated wire is run from the other binding post to the second point on the conductor. The wire should be kept about 50 feet away from the probable path of the conductor to minimize the signal from the wire. The low impedance switch position will probably be best in this situation. Be sure that all connections are tight. (Figure 4)

b. When one point on a conductor is available and there is within reaching distance a metallic structure which may be used as a ground connection, connect the point on the conductor to one output binding post, and the other to the grounding structure. The loop circuit is then closed between them by soil conductance and capacitance. The signal will be heard in both the conductor and the grounding structure. The best impedance will be found by trial. (Figure 5)

Examples of grounding structures are:

- Water systems
- Gas systems
- Steel building frames
- Power circuit ground wires or conduits
- Manhole and drain covers
- Valve boxes
- Chain fencing and metal fence posts
- Metal traffic signs
- Metal road guard rails

c. When one point of the conductor is available and no convenient ground is nearby, a metal rod may be driven for a ground approximately 50 feet or so away from the probable path of the conductor and the connection completed as in b. In many cases a good signal is obtained with a rod about 18 inches long pushed by hand into a moist soil. If a high resistance soil condition is found, a longer rod should be driven several feet into the ground. Water poured around the rod will also help. (Figure 6)

On a pipe protected with buried anodes, the connection to the anode may be opened and the anode used as a ground.

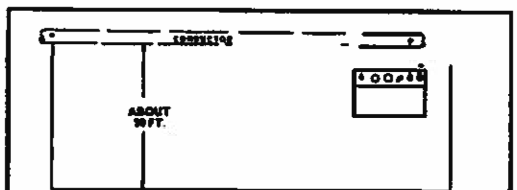


FIG 4

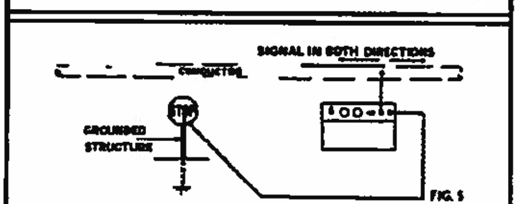


FIG. 5

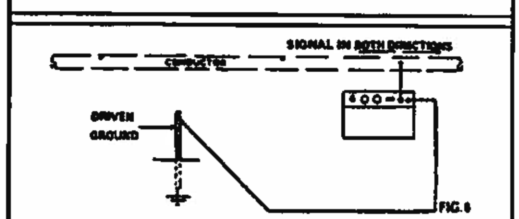


FIG. 6

EXHIBIT J
Model 715 Pipe & Cable Locator (continued)

Section 6
OPERATING NOTES

6.1 The distance a signal will carry depends upon a number of conditions. If the conductor is a well coated pipe, it is not uncommon to follow the signal for several miles in each direction from the point of connection. If this point is made near one terminus of the line, all the signal goes in one direction, and a greater distance is achieved.

On a bare line the signal can be expected to carry several hundred feet. On pipe networks the distance will also depend on the number of branches which absorb signal.

Insulated joints cause a sharp drop in signal as they are passed. This is used as an indication of insulator condition. If the insulators can be shorted out as they are reached in succession, the line can be surveyed without moving the transmitter, and the shorts removed on retrace.

The depth at which a conductor can be effectively located depends largely on the strength of the signal current. Particular attention should be given to transmitter connections. Depths of 20 to 30 feet are possible.

6.2 When tracing a buried cable, a sudden loss of signal along the path means either an open or ground. If open, a traverse around the point of loss will not reveal any signal in another direction. However another strong signal in another direction indicates a bend. If the second signal widens out and becomes "mushy", the probability is that a ground exists at that point due to signal current leaving the cable and spreading out in the soil. (Figure 7)

6.3 A pipe or cable may be traced at a river crossing by connecting the transmitter near the bank and following the signal out into the river in a boat. Two stations on shore, equipped to take bearings on the boat on signal, will enable the course of the conductor to be plotted.

6.4 BENDS AND STUB ENDS: When the signal fades out on a pipe run, it may mean a stub end or change in direction. Sweeping a traverse around the point of signal loss may reveal one or two signal paths in another direction, indicating an elbow or T connection. (Figure 8)

6.5 BRANCH TAPS AND FOREIGN CONTACTS: Branch taps such as water or gas services off a main can be found by walking to one side of the main, holding the antenna as in Figure 1 B. Very little signal will be heard from the main, but each tap will produce a signal as it is reached. (Figure 9)

In the same manner, a strange signal where none should exist would indicate a contact with a foreign

conductor which is taking off signal current.

6.6 BUILDING ELECTRIC CIRCUITS AND PIPING: Active power cables may be traced with the receiver only. The power hum and appliance noise acts just the same as signal current.

Wiring conduits may be traced by setting up a loop circuit such as in Figure 4, connecting the far end of the conduit to a water or gas line to complete the loop back to the transmitter.

Conductors buried in concrete floor slabs will usually respond to the ground return circuit of Figure 5, using a ground connection to the building frame.

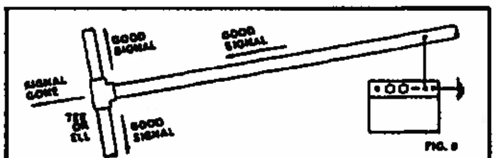


FIG. 8

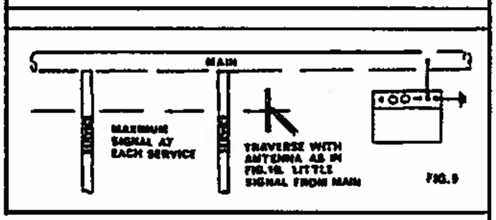


FIG. 9

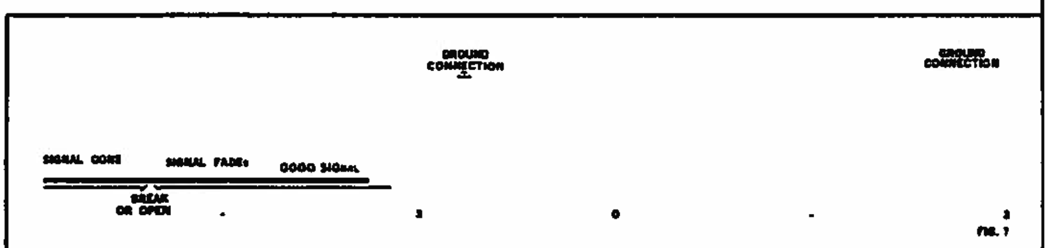


FIG. 7

EXHIBIT J
Model 715 Pipe & Cable Locator (continued)

Section 7
BATTERIES AND REPLACEMENT

The transmitter operates on a 12 volt battery. The battery connection is made with a short cable and Cinch-Jones S302CCT or equal connector. The wide blade is positive and the transmitter input is diode protected against accidental reversal.

The battery supplied is a NEDA No. 926, Eveready No. 732, or Burgess No. TW2, 12 volt latern battery. Two 6 volt batteries, Eveready No. 510S or Burgess F4BP may be used in series and will fit the same space. The Nilsson Model 110 rechargeable 12 volt battery pack will clamp directly into the same space.

The battery drain is from 800 to 1000 M. A., depending upon the transmitter loads. The higher the frequency, the less drain.

The plug in cable allows the use of other batteries such as a car or truck source. A suitable connector cable is easily made for this purpose.

The receiver is powered by two snap top 9 volt transistor radio batteries, connected in series for 18 volts. NEDA No. 1604, Eveready No. 216, or Burgess 2U6 are suitable.

To change receiver batteries, remove the two screws located at each end of the name plate strip and one under the input jack. Slide the chassis out of the phenolic case. Snap one battery on each of the polarized snap connectors, making sure the snaps fit properly.

Receiver battery drain is 10 M.A. standby, 12 M.A. when a strong signal is received.

As with any battery powered device, if the locator is not to be used for long periods of time, batteries should be removed to prevent damage from leaking electrolyte.

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Section 8
REPLACEABLE PARTS AND REPAIRS

Normally no maintenance except battery replacement is required.

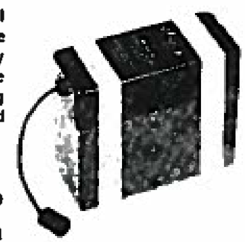
Repairs are promptly handled at our factory. Return the instrument, properly packed, to:

NILSSON ELECTRICAL LABORATORY, INC.
111 EIGHTH AVENUE
NEW YORK, N. Y.10011
TELEPHONE: (212) 675-7944

Include in the package suitable paper work and instructions.

MODEL 110
RECHARGEABLE 12 VOLT BATTERY PACK
will outlast hundreds of 12 volt lantern batteries
SPECIALLY DESIGNED FOR USE WITH
NILSSON MODEL 715 PIPE& CABLE LOCATOR
AND OTHER NILSSON INSTRUMENTS

The Model 110 battery pack will clamp directly in the same space as the 12 volt lantern battery normally supplied. It can be used over a wide operating temperature range under rugged field conditions.



RECHARGES OVERNIGHT
CANNOT BE OVERCHARGED

Plugs into any 1 10 or 230 volt A.C. outlet. It can be recharged hundreds of times.

Printed in U.S.A. 3-84

Hughes, Joyce C. - DPU

From: Yi, Sang - DPU
Sent: Monday, April 13, 2015 9:43 AM
To: Hughes, Joyce C. - DPU; Scott, Alfred - DPU; James, Carl - DPU
Subject: Approved O&M Revision Sign Off
Attachments: Approved Procedure Revisions_04-13-15.docx; II4II Corrosion Control Monitoring Revised 4-08-15.doc; signoff II 4 II Corrosion Control Monitoring-Revised 04-08-15.doc

Carol- Attached are approved copies of revised O&M to be signed off and uploaded to our sharepoint.

Al/Carl- If possible, please review and sign off on the changes as soon as we can. The final copy of this procedure in PDF will be part of the PHMSA Notice of Amendment response letter.

Thanks,

Sang J. Yi
Engineer III

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