U.S. Department
of Transportation

**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, D.C. 20590

AUG 1 8 2009

Mr. K. G. (Kevan) McCrae
Environmental Coordinator
ExxonMobil Pipeline Company
800 Bell Street – (PL-EMB-603B)
Houston, TX 77002

Dear Mr. McCrae:

On January 30, 2009, you wrote to the Pipeline and Hazardous Materials Safety Administration (PHMSA) to request an interpretation of the corrosion control monitoring requirements in 49 CFR Part 195 of the Federal pipeline safety regulations that apply to your Portland to Bangor, Maine pipeline system. You stated that you are requesting an interpretation of § 195.567(a) which requires electrical test leads for monitoring the adequacy of corrosion control. As a result of an April 2008 inspection of the Portland to Bangor pipeline system, on July 28, 2008, the PHMSA Eastern Region issued a warning letter to ExxonMobil Pipeline Company (EMPCo) for not following the requirements of § 195.567(a). The warning letter alleged that EMPCo committed a probable violation of § 195.567(a) by taking electrical readings directly from exposed piping in three specified locations rather than having test leads in place.

You expressed your disagreement with the interpretation reflected in the warning letter. You believe that test leads are only necessary when a pipeline and its appurtenances are not physically accessible to take cathodic protection readings. You stated that EMPCo's pipeline facilities are equipped with test leads where the pipelines and appurtenances are buried and inaccessible but not where pipe and appurtenances were accessible. You stated that the pipeline in question is 124.7 miles long and includes 95 total test points. Of the 95 test points, 17 pipe-to-soil readings are taken directly off the pipeline or its appurtenances and the remaining 78 pipe-to-soil readings are taken at test lead stations.

You further stated that: (1) you checked with other pipeline operators on this issue and all operators confirmed in taking direct readings where facilities are accessible on both gas and hazardous liquid pipelines as a standard industry practice; (2) EMPCo's previous and recent experience with PHMSA have not identified its cathodic protection survey procedures as inadequate; and (3) PHMSA's regulations governing natural gas pipeline corrosion control monitoring recognizes contact points other than test leads as legitimate (§ 192.469) and you believe there is no technical basis for treating a hazardous liquid pipeline differently. In addition, you provided an independent opinion letter by CC Technologies to support your assertion that taking pipe-to-soil readings where a pipeline is physically accessible is an acceptable practice.

Ensuring cathodic protection maintained at adequate levels is a key part of pipeline safety. Pipeline operators are obligated to install and maintain test leads at intervals frequent enough to obtain measurements indicating the adequacy of cathodic protection. To the extent readings sufficient to indicate the adequacy of cathodic protection at a particular location can be obtained from exposed pipe and appurtenances, it is unnecessary to install test leads at that point. Therefore, taking readings directly from exposed pipe that is physically accessible is not a violation of § 195.567(a). However, collecting cathodic protection readings directly from the pipe has the potential to compromise the protective coatings on the pipe, subjecting that exposed pipe to atmospheric corrosion. It is also important to recognize that test leads may be necessary for certain portions of buried pipeline facilities, even though they are in close proximity to exposed pipe.

I hope that this information is helpful to you. If I can further assist you with this or any other pipeline safety regulatory matter, please contact me at (202) 366-4046.

Sincerely,

John A. Gale
Director, Office of Regulations

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K. G. (Kevan) McCrae
Manager
Safety, Health And Environment Department

ExxonMobil
Pipeline

January 30, 2009

Office of Pipeline Safety
Pipeline and Hazardous Materials Safety Administration
U. S. Department of Transportation
East Building, 2nd Floor
Mailstop: E24-455
1200 New Jersey Avenue, SE
Washington, D. C. 20590

Re: Request for Interpretation
49 CFR 195.567

Dear Sir:

ExxonMobil Pipeline Company (EMPCo) requests an interpretation of 49 CFR 195.567(a), in response to a PHMSA Eastern Region Warning Letter dated July 28, 2008.

The subject Warning Letter was issued subsequent to an April 2008 inspection of Mobil Pipeline Company's Portland to Bangor, Maine pipeline system. It states that the PHMSA inspector observed probable violations of the referenced section of the Hazardous Liquid Pipeline regulations during a field audit when "...ExxonMobil attached voltmeter test lead to a flaw in coating of exposed piping to conduct pipe to soil tests to monitor the effectiveness of the cathodic protection. The pipeline is subject to the criteria in the regulation, necessitating the need for test leads since December 27, 2004." The correspondence additionally identifies 3 mainline valve locations where test leads were absent.

EMPCo respectfully disagrees with the foregoing interpretation of 49 CFR 195.567. The regulation states:

195.567 Which pipelines must have test leads and what must I do to install and maintain the leads?
(a) General. Except for offshore pipelines, each buried or submerged pipeline or segment of pipeline under cathodic protection required by this subpart must have electrical test leads for external corrosion control. However, this requirement does not apply until December 27, 2004 to pipelines or pipeline segments on which test leads were not required by regulations in effect before January 28, 2002.

It is EMPCo's opinion that test leads are necessary when a pipeline and its appurtenances are not physically accessible to take cathodic protection readings. EMPCo's pipeline facilities are equipped with test leads where the pipelines and appurtenances are buried and inaccessible. EMPCo additionally takes cathodic protection readings on accessible sites along the entire pipeline length; this can be at pump stations, valve sites, manifolds, etc. EMPCo's cathodic protection survey procedures are consistent with the preceding procedures and are documented in its Facilities Inspection and Maintenance Manual, Cathodic Protection Program:

> *"...test points are defined as locations where cathodic protection readings are taken. These locations may include test lead wires, aboveground valves, valves in vaults, and other contact points on the structure."*

The Portland to Bangor pipeline is 124.7 miles long and includes 95 total test points. Of the total, 17 pipe to soil readings are taken directly off the pipeline or its appurtenances, with the remaining 78 points read at test lead stations. EMPCo concludes the survey and its procedures comply with 49 CFR 195.567(a) and includes the following supportive information:

- EMPCo solicited input from other pipeline operators and all confirmed similar practices, i.e., taking direct readings where facilities are accessible on both gas and hazardous liquid pipelines. EMPCo submits this is 'standard industry practice'.

- EMPCo's previous and recent experiences with PHMSA have not identified its cathodic protection survey procedures as inadequate:

    a. PHMSA conducted a 5 year review of EMPCo's Operating and Maintenance procedures during April 2007, including a thorough review of corrosion control procedures/programs and found no exception to cathodic protection survey procedures.

    b. Numerous field audits have included cathodic protection readings witnessed by DOT/State inspectors. No inspector has articulated an objection to taking direct readings on a hazardous liquid pipeline until the subject audit in April 2008.

- The PHMSA regulations governing natural gas pipeline corrosion control monitoring recognize contact points other than test leads as legitimate measurement locations:

    Part 192 Transportation of Natural and Other Gas By Pipeline, Subpart I Requirements for Corrosion Control, Section 192.469 External Corrosion Control: Test Stations

    Each pipeline under cathodic protection required by this subpart must have sufficient test stations or other contact points for electrical measurement to determine the adequacy of cathodic protection.

EMPCo submits that there is no difference in this case between a natural gas pipeline and a hazardous liquid pipeline; contact points (direct readings) can be utilized when pipeline facilities are accessible in addition to electrical readings taken at test leads/stations.

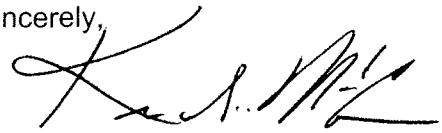
- EMPCo obtained a written opinion (copy attached) from CC Technologies, Inc, whose principals are recognized subject matter experts in pipeline corrosion. CC Technologies, Inc.'s letter states, "*Based upon our review of the PHMSA warning letter, an extensive review of the CP history and operating details of the EMPCo Portland Bangor Pipeline System, a review of EMPCo's Procedures and Practices, a review of applicable NACE Standards, standard industry practice, and published literature, we offer the following opinion regarding DOT's allegation of the need for test leads at each test point:*

  There is no fundamental technical basis nor regulatory basis for PHMSA to conclude that the use of aboveground pipeline appurtenances for contact points is inappropriate....."

It is EMPCo's intent to conduct safe operations as a prudent operator. In our judgment, EMPCo's corrosion control annual measurement procedures are consistent with PHMSA's intent and regulations, and contribute to the overall safety and integrity of its facilities. We would appreciate PHMSA's response and explanation pertaining to this important interpretation.

If you have questions or require additional information, please contact Cathey Casey at 713-656-6913.

Sincerely,



K. G. (Kevan) McCrae
Safety, Health, Environment Manager

Attachment

CC Technologies
a DNV company

ExxonMobil Pipeline Company (EMPCo)
Attention: K.G. (Kevan) McCrae
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Your ref.:	Our ref.:	Date:
Warning Letter CPF 1-2008-5003W	84084891	January 29, 2009

Topic: Independent Opinion Letter for EMPCo – Allegation regarding test leads

Dear Mr. McCrae:

This document offers a written opinion on a PHMSA-alleged probable violation following an audit in the week of April 8, 2008, and listed in Warning Letter CPF 1-2008-5003W, dated July 28, 2008 from the U.S. Department of Transportation (DOT) – Pipeline and Hazardous Materials Safety Administration (PHMSA) to ExxonMobil Pipeline Company (EMPCo). Reference is made to Pipeline Safety Regulations, Title 49, Code of Federal Regulations, Part 195 – Transportation of Hazardous Liquids by Pipeline, Subpart H – Corrosion Control.

The following text includes the paragraphs cited in the warning letter, gives background information available for the pipeline, cites references, provides opinions as to what is considered common industry practice, and offers an independent opinion regarding the validity of PHMSA's concerns.

1. **§195.567 Which pipelines must have test leads and what must I do to install and maintain the leads?**

   (a) General. Except for offshore pipelines, each buried or submerged pipeline or segment of pipeline under cathodic protection required by this subpart must have electrical test leads for external corrosion control. However, this requirement does not apply until December 27, 2004 to pipelines or pipeline segments on which test leads were not required by regulations in effect before January 28, 2002.

   DOT Allegation: During the field review of the pipeline, ExxonMobil attached the voltmeter test lead to a flaw in the coating of exposed piping to conduct pipe-to-soil tests to monitor the effectiveness of the cathodic protection. The pipeline is subject to the criteria in the regulation, necessitating the need for test leads since December 27, 2004.

CC Technologies: The purpose of the described test is to establish if the cathodic protection (CP) system is functional, and the method of establishing electrical contact is a matter of convenience.

The essence of making a pipe-to-soil potential measurement is to form a continuous electrical circuit that includes the sample (pipe) to be measured, the electrolyte (soil), a reference electrode, and a volt meter. As long as electrical continuity to the pipe is assured, the location of the electrical contact should not affect the reading.

The following excerpts from standard corrosion texts are provided to show that common industry practice includes taking potential readings by contacting the closest, easily accessible point of electrical conductivity, simply as a matter of convenience. Taking such potential readings is not in contradiction with a general requirement of having test leads for overall cathodic protection monitoring for inaccessible areas such as buried structures. Obtaining a reading by making electrical contact at a convenient aboveground location, such as a valve, is quite common.

The likely intent of the regulations is to prevent damage to the pipeline coating, by having permanent test leads installed. As described more than 20 years ago by John Morgan (1987) [Ref. 1], in his text book Cathodic Protection, it was common practice at that time to drive a steel probe into the ground to contact a buried pipe. To achieve electrical contact, coating damage was unavoidable. The following is an excerpt from Morgan's book: *"Many structures that are cathodically protected are inaccessible or difficult of access for the measurement of protection potentials. Perhaps the most common structure to which it is difficult to make an electrical connection is a buried pipeline. The technique often adopted is to use a steel probe with a sharp hardened tip and to drive this through the ground to contact the pipe; where the pipe is laid near to the surface in soft ground and its position is accurately marked, this technique is successful. Under other conditions it is preferable to attach permanent cathode leads to the pipe and to bring these to the surface at marker posts. The leads are usually welded or brazed to a pad or stud on the pipeline and this junction and the electric cable are insulated. More than one lead may be brought to the surface and these may be connected to either end of a calibrated section of the line so that current flow in the pipeline may be determined. Similarly, the connections between a sacrificial anode and the structure can be brought to the surface so that the anode current can be measured. It is usual to use an 'elephants's foot,' concrete pillar or similar device both to hold these connections and to indicate the location of the structure. The majority of other structures will be accessible so that electrical connections can be made to them."* The point of highlighting this section of text is to show that in the past, pipeline coating damage was unavoidable, unless permanent test leads were installed. In EMPCo's pipeline, the aboveground valves are easily accessible appurtenances that do not have that risk of pipeline coating damage, and thus are suitable for making electrical contact for a pipe-to-soil potential test.

Allen and Barnes, in Pipeline Rules of Thumb Handbook (2005) [Ref. 2], chapter on Advances in Pipeline Protection – Specialized Corrosion Surveys for Buried Pipelines: Methods Experience wrote: *"The performance of the cathodic protection system is usually assessed by regular monitoring of pipe-to-soil potentials at selected intervals along the pipeline. .... Under most circumstances, such measurements at selected locations will provide an acceptable indication of the overall level of corrosion protection being achieved on the pipeline. These measurement locations, ... are generally selected for ease of access ..."*

49CFR195 includes by reference Standard Practice NACE SP0502 (2002) [Ref. 3]. Paragraph A4.5.1 on Typical Methodology for Close-Interval Potential Surveys reads *"An insulated wire is*

electrically connected to a test station, valve, or other electrically continuous pipeline appurtenance and one terminal of the voltmeter. The other terminal of the voltmeter is attached to the reference electrode to be used for the potential measurements."

The Appalachian Underground Corrosion Short Course - Advanced Course (2008) curriculum – Chapter 1, Pipe-To-Soil Potential Surveys and Analysis [Ref. 4] echoes NACE SP0502: *"The connection to the structure under test can be a valve, riser pipe, test station, etc., any point electrically continuous with that portion of pipe being evaluated."*

Similarly, Peabody's text book on Control of Pipeline Corrosion (2001) [Ref. 5] lists as one of the items of information typical to be accumulated before starting a field survey: *"* Location and construction details of all corrosion test points that have been installed along the line. If no test points have been installed for corrosion test purposes, determine locations where contact can be made with the pipeline for test purposes (other than by driving contact bars down the pipe)."* The author does not mention the need for test leads to establish electrical contact to the pipeline.

Mohitpour et al. in their text book on Pipeline Operation & Maintenance (2005) [Ref. 6] describe the installation procedures for test leads pipelines below finished grade. They write: *"Test leads provide a quick and easy metallic connection for measuring potentials on buried structures such as pipelines, casing, and flanges. They also provide a location where the cathodic protection current can be measured and controlled if desired. At pipeline crossings they provide a metallic connection to both pipelines to measure potentials or existing interfering currents."* The text contains no mention of completing test lead electrical connections above grade.

A second textbook by Mohitpour et al., on Pipeline Design & Construction (2007) [Ref. 7] chapter on Pipeline Protection – Cathodic Protection Monitoring, describes the test to be done at "some type of metallic connection." The referenced paragraph reads: *"... corrosion technicians use special instruments to monitor cathodic protection. This is carried out by measuring the pipe-to-soil potential difference using a high-input impedance potentiometer with a reference cell (usually a saturated copper/copper sulfate reference cell) and some type of metallic connection to the pipeline – a test lead."* This text does not appear to preclude making a connection to an accessible electric connection point, such as an aboveground valve.

Von Baeckmann et al. in Handbook of Cathodic Corrosion Protection [Ref. 8] describe Test Points, by writing: *"In general, NYY-O cable is used with a minimum copper cross-section of 2 x 2.5 mm. The cable is connected to the pipeline by a suitable process, and the connections carefully coated. The cable is usually connected to aboveground test points and covered with hoods, tiles or a cable ribbon."* In this text, it is implied that the pipeline is completely underground, and thus test leads to aboveground test points are needed. In the following paragraphs, then, the authors explain how to install the ends of the test leads either aboveground or belowground, as follows: *"Aboveground test points are usually installed in marker posts with a closable flap. The measuring cable is attached to a plastic plate with terminals."* and *"Belowground test points should be installed in built-up areas only in exceptional circumstances. In this case watertight, flush-mounted test stations are installed under a street-level covering and can be kept dry only by the most careful construction."* Note that these latter

sentences do not refer to aboveground accessible appurtenances, which do not require test leads to make electrical contact for measuring pipe/soil potentials.

As stated earlier, the location of electrical contact (allowing for voltage drop considerations) should not affect the reading, and the above-referenced texts do not indicate otherwise.

DOT Allegation: The inspector observed the lack of test leads during the field review at the mainline valve stations Meadow Lane (MP 116.6), Winter Port (MP 110.9) and at Litchfield (MP 52.52).

CC Technologies: CC Technologies reviewed EMPCo-provided data for the EMPCo Portland to Bangor pipeline, including length of line, total number and locations of test points, number and location of test leads, number and location of other test points, rectifier and anode bed locations, and annual survey results for the period, 1990 through 2008. The CP data show consistent readings for the locations with and without lead wires.

The absence of test leads at specific locations should only be of concern if a lead was specified for that location. The locations identified by the auditor were at three of the valves, and those are not specified to have leads because electrical contact can be made aboveground. EMPCo's FIMMS [Ref. 9] manuals on Cathodic Protection and Close-interval Surveys, include the following statement: *"For the purposes of this document, test points are defined as locations where cathodic protection readings are taken. These locations may include test lead wires, aboveground valves, valves in vaults, and other contact points on the structure."*

Following this definition of test points, a corrosion technician is allowed to take the pipe-to-soil potentials at locations that do not have test leads.

OPINION

Based upon our review of the PHMSA warning letter, an extensive review of the CP history and operating details of the EMPCo Portland Bangor Pipeline System, a review of EMPCo's Procedures and Practices, a review of applicable NACE Standards, standard industry practice, and published literature, we offer the following opinion regarding DOT's allegation of the need for test leads at each test point:

There is no fundamental technical basis nor regulatory basis for PHMSA to conclude that the use of aboveground pipeline appurtenances for contact points is inappropriate. A pipe-to-electrolyte potential measurement requires a contact point or point of connection to the pipeline for one part of the measurement circuit. Any metallic point of sufficient electrical continuity with the pipeline can serve this purpose. Metallic contact points have been successfully used by the authors of this letter on regulated and unregulated structures to evaluate corrosion activity and to assess the efficacy of cathodic protection for over 34 years in practice as corrosion engineers. This practice can be documented for at least 50 years prior to that. It is common industry practice to assess cathodic protection in booster pump stations, terminals, tank farms and refineries where there are abundant aboveground piping contact points and negligible or no wire test leads without ever compromising the integrity of the measurement in any way.

The regulatory requirement for test leads attached to an underground pipeline is intended to ensure that where there are insufficient aboveground contact points, test leads are installed to facilitate gathering the measurements and data to establish the overall level of protection afforded the pipeline under investigation. We conclude that tests can be conducted with no test leads, at points where electrical contact can be readily made, without compromising the measurements from which to determine the efficacy of the cathodic protection system.

Thus, CC Technologies finds no basis for PHMSA's warning.

Respectfully,

Kevin C. Garrity, P.E.
Head of Section

Michiel P. Brongers, P.E.
Sr. Project Manager

REFERENCES

1. John Morgan, "Cathodic Protection", 2nd edition, Chapter 10 – Instruments for Cathodic Protection, pp. 481-482, Monitoring - Test Points, NACE, 1987.
2. Pipeline Rules of Thumb Handbook, 6th edition, Edited by E. W. McAllister, Chapter "Advances in Pipeline Protection – Specialized Corrosion Surveys for Buried Pipelines: Methods Experience", authors: M. D. Allen and N. R. Barnes, p. 239, Gulf Professional Publishing, Butterworth-Heinemann, 2005.
3. NACE SP0502-2008 (formerly RP0502-2002), "Standard Practice – Pipeline External Corrosion Direct Assessment Methodology", NACE International, Houston, TX, Item No. 21097.
4. Curriculum Text to "Appalachian Underground Corrosion Short Course (AUCSC) – Advanced Course", Education and Training for Corrosion Control, Chapter 1 – Pipe-To-Soil Potential Surveys and Analysis, page 1-2, West Virginia University, Morgantown, WV, Revision 2008.
5. A.W. Peabody, "Control of Pipeline Corrosion", 2nd edition, Edited by R.L. Bianchetti, Chapter 5 – Survey Methods and Evaluation Techniques, p. 66, NACE, 2001.
6. M. Mohitpour, J. Szabo, and T. Van Hardeveld, "Pipeline Operation & Maintenance – A Practical Approach", Chapter 4 – Pipeline System Maintenance – 4.6.2.2. Cathodic Protection, p. 192, ASME Press, 2005.
7. M. Mohitpour, H. Golshan, and A. Murray, "Pipeline Design & Construction – A Practical Approach", Third Edition, Chapter 10 - Pipeline Protection – Cathodic Protection Monitoring, p. 535, ASME Press, 2007.
8. W. Von Baeckmann, W. Schwenk, and W. Prinz, Handbook of Cathodic Corrosion Protection, 3rd Edition, Chapter 10 – Pipelines, 10.3.2 Test Points, p. 276, 1997.
9. ExxonMobil Pipeline Company FIMMS Manual, Facilities Inspection & Maintenance Management System, Corrosion Programs – Chapter 2. Cathodic Protection and Chapter 3. Close Interval Surveys.