

Introduction

The materials contained in this document consist of guidance, techniques, procedures and other information for internal use by the PHMSA pipeline safety enforcement staff. This guidance document describes the practices used by PHMSA pipeline safety investigators and other enforcement personnel in undertaking their compliance, inspection, and enforcement activities and is intended to be used solely as a reference by PHMSA personnel. This document is U.S. Government property and is to be used in conjunction with official duties.

The Federal pipeline safety regulations (49 CFR Parts 190-199) discussed in this guidance document contains legally binding requirements. This document is not a regulation and creates no new legal obligations. In the event of a conflict between this document and any regulation, the document would not be controlling. The materials in this document are explanatory in nature and reflect PHMSA's current application of the regulations in effect at the time of the issuance of the guidance to the implementation scenarios presented in the materials. Alternative approaches are not precluded if they satisfy the requirements of the applicable regulation(s).

Nothing in this guidance document is intended to diminish or otherwise affect the authority of PHMSA to carry out its statutory, regulatory or other official functions or to commit PHMSA to taking any action that is subject to its discretion. Nothing in this document is intended to and does not create any legal or equitable right or benefit, substantive or procedural, enforceable at law by any person or organization against PHMSA, its personnel, State agencies or officers carrying out programs authorized under Federal law.

Decisions about specific investigations and enforcement cases are made according to the specific facts and circumstances at hand. Investigations and compliance determinations often require careful legal and technical analysis of complicated issues. Although this guidance document serves as a reference for the staff responsible for investigations and enforcement, no set of procedures or policies can replace the need for active and ongoing consultation with supervisors and colleagues in enforcement matters.

Comments and suggestions for future changes and additions to this guidance document are invited and should be forwarded to your supervisor.

The materials in this guidance document may be modified or revoked without prior notice by PHMSA management.

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Executive Summary

In 2000, the OPS decided to update the Enforcement Manual utilized as a reference document by OPS Engineers for guidance in better understanding and enforcing the regulations included in 49 CFR Parts 192 & 195. This part of the Enforcement Manual was published on 11/17/2005 and covers Part 192, Subpart I - Requirements for Corrosion Control.

It is OPS intention that the following enforcement guidelines will provide clarification to the code language by providing enforcement criteria, applicable definitions and examples of possible violations for each code section in Part 192, Subpart I. Subpart I contains the minimum requirements for the protection of metallic pipelines from external, internal, and atmospheric corrosion. While a person needs not be an expert in corrosion control area, a basic knowledge of corrosion theory is required to correctly apply to the regulations included in Subpart I. Completion of the Corrosion I and II courses at the Transportation Safety Institute should provide engineers enough knowledge to understand the application of corrosion control techniques to metallic pipeline systems and to be able to identify possible violations of the regulations included in Part 192-Subpart I. A basic understanding of corrosion control phenomena and the regulations will be sufficient for a larger percentage of pipeline carriers, regulated by the OPS. That is, most applications of corrosion control are straight forward and do not vary with physical locations. There are, however, special circumstances in the field of corrosion control that are outside normal situations encountered. OPS engineers must be vigilant and inquisitive concerning application of the minimum requirements for controlling corrosion and whenever conditions exist that are outside those routinely found, consult one of OPS' Senior Engineers for more information. Some types of situations or indications requiring additional expertise include cathodic protection of amphoteric metals such as aluminum pipelines, bacteriological corrosion, stress corrosion cracking (SCC), internal corrosion and cathodic protection in harsh climates.

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192 Corrosion Control

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Terms & Definitions

Amphoteric Metal:	A metal that is susceptible to corrosion in both acidic and alkaline environments.
Close Interval Survey:	A potential survey with pipe-to-soil readings generally taken a maximum of three (3) feet apart.
Conductivity:	The ability of a substance (measured in ohm-cm) to conduct an electric charge or current due to the presence of positively or negatively charged ions.
Conventional Ground Bed:	A shallow burial ground bed using one or more anodes in one location. The anodes are usually placed in a line perpendicular to the pipeline.
Cathodic Protection:	The change of the electrode potential in the active (negative) direction caused by current across the electrode/electrolyte interface.
Coating:	A liquid, liquefiable, or mastic composition that, after application to a surface, is converted into a solid protective, decorative, or functional adherent film.
Corrosion:	The deterioration of a material, usually a metal, that results from a reaction with its environment.
Corrosion Rate:	The rate at which corrosion proceeds.
Coupon:	A small, carefully weighed and measured specimen of metal that is used to determine metal loss caused by corrosion over a specified period of time.
Criteria:	Standards for assessment of the effectiveness of a cathodic protection system.
Critical Bond:	A bond installed to mitigate interference where the damage would be caused to an operator's facilities if the bond fails.
Current Density:	The current to or from a unit area of an electrode surface.
Deep Ground Bed:	A ground bed in which the anodes are placed far below the earth's surface in a single vertical hole. Deep ground beds are typically considered 50 feet or deeper.
Disbondment:	The loss of adhesion between a coating and the substrate (pipe surface.)
Distributed Ground Bed:	A ground bed where the anodes are spread over a wide geographical area. Usually employed to protect densely routed buried piping systems, such as in compressor station yards.
Electrode:	An electronic conductor used to establish electrical contact with an electrolyte as part of a cathodic protection circuit.
Electrolytically Shorted Casing:	A casing with a low casing to pipe resistance due to the presence of an electrolyte in the casing/pipe annulus. Electrolytically shorted casings are not considered to be metallically shorted.
Erosion:	Abrasive metal loss caused by high surface velocity of the transported media, particularly when entrained solids or particulates are present.
Electrical Isolation:	The condition of being electrically separated from other metallic structures or the environment.
Electrical Resistance:	An electronic probe that can be used in systems where
Probes:	Gas or liquids (including hydrocarbons) are present to determine metal loss over time by measuring the increase in the resistance of the electrode as its cross-sectional area is reduced by corrosion. The resistance of the electrode is then compared with the resistance of a

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	reference electrode.
Electrolyte:	A chemical substance containing ions that migrate in an electric field.
Environment:	The surroundings or conditions (physical, chemical, mechanical) in which a material exists.
Foreign Structure:	Any metallic structure that is not intended as a part of a system under cathodic protection.
Galvanic Corrosion:	Accelerated corrosion of a metal because of an electrical contact with a more noble metal or non-metallic conductor in a corrosive electrolyte.
General Corrosion:	Corrosion that is distributed more or less uniformly over the surface of a material.
Graphitization:	The formation of graphite in iron or steel, usually from decomposition of iron carbide at elevated temperatures.
Holiday:	A discontinuity in a protective coating that exposes unprotected surface to the environment.
Impressed Current:	An electric current supplied by a device employing a power source that is external to the electrode system.
Inhibitors:	An additive used to retard undesirable chemical action in product when added in small quantity.
Instant -Off Potential:	The structure to soil potential immediately after all cathodic protection current is interrupted and prior to polarization decay.
Instant - On Potential:	The structure to soil potential immediately after cathodic protection current is applied and prior to polarization.
Interference:	Ionic current discharged through the electrolytic path from a metallic structure due to the suppression with the cathodic protection system of that structure.
Interference Bond:	A metallic connection designed to control electrical current between metallic systems.
IR Drop:	The voltage drop across a resistance in accordance with Ohm's law.
Ion:	An electrically charged atom or group of atoms.
Oxidation:	(1) Loss of electrons by a constituent of a chemical reaction. (2) Corrosion of a metal that is exposed to an oxidizing gas at elevated temperatures.
pH:	The negative logarithm of the hydrogen ion concentration in a solution. A pH of 7.0 is neutral. A pH lower than 7.0 is acidic, while a pH greater than 7.0 is alkaline.
Pitting:	Localized corrosion of a metal surface that is confined to a small area and takes the form of cavities called pits
Polarization:	The change from the open circuit potential as a result of current across the electrode /electrolyte interface.
Polarized Potential:	The potential across the structure/electrolyte interface that is the sum of the corrosion potential and the cathodic polarization.
Protective Coating:	A coating applied to a surface to protect the substrate from corrosion.
Reference Electrode:	An electrode whose open-circuit potential is constant under similar conditions of measurement, which is used for measuring the relative potentials of other electrodes.
Remote Earth:	A location on the earth far enough from the affected structure that the soil Potential gradients associated with currents entering the earth from the affected structure are insignificant.
Resistance Bond:	A metallic path, where the amount of current is controlled by a permanent or adjustable resistance, installed to provide a return path for cathodic

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	protection current thus to prevent corrosion due to interference or stray current.
Reverse-Current Switch:	A bond designed and constructed such that cathodic protection current can pass in only one direction.
Shielding:	High resistance or non-conducting material preventing cathodic protection current from reaching the structure, or low resistance material diverting the current away from the structure to be protected.
Shorted Pipeline Casing:	A casing that is in direct metallic contact with the carrier pipe.
Stray Current:	Current through paths other than the intended circuit.
Stress Corrosion Cracking:	Cracking of a material produced by the combined action of corrosion and tensile stress (residual or applied).
Ultimate Strength:	The maximum stress that a material can sustain.

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.451	Corrosion Control Procedure Rewrite Committee
Heading	§192.451 Scope	
Existing Code Language:	(a) This subpart prescribes minimum requirements for the protection of metallic pipelines from external, internal, and atmospheric corrosion. (b) [Reserved]	
Origin of Code	Authority: Natural Gas Pipeline Act of 1968 (49 U.S.C. sec. 1671 et seq.), Part I regulations of Office of the Secretary of Transportation, 49 CFR Part I, and delegation of authority to Director, Office of Pipeline Safety, 33 FR 16468, unless otherwise noted.	
Last FR Amendment	Amdt. 192-4, 36 FR 12302, June 30, 1971, Amdt. 192-27, 41 FR 34606, Aug. 16, 1976; Amdt. 192-33, 43 FR 39389, Sept. 5, 1978]	
Enforcement Language	Procedures for controlling corrosion are required by §192.13(c) and §192.605(b)(2) including those for the design, installation, operation and maintenance of CP systems. This section, 192.451, states that the procedures are required for external, internal, and atmospheric corrosion control on metallic (steel, aluminum, copper, cast iron, ductile iron, and other metals as applicable) pipelines. Criteria for CP are contained in Appendix D to Part 192.	
Pending NPRM	None	
Interpretation 1 Excerpts	May 16, 1972 Jan 29, 1974 Nov 1, 1988 July 9, 1992	
Other Ref. Material & Source	None	
Guidance Material	None	
Examples of a Violation	None	
Evidence Guidance	None	
Other Special Notifications	None	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.452	Corrosion Control Procedure Rewrite Committee
Heading	§192.452 Applicability to converted pipelines.	
Existing Code Language:	Notwithstanding the date the pipeline was installed or any earlier deadlines for compliance, each pipeline which qualifies for use under this part in accordance with §192.14 must meet the requirements of this subpart specifically applicable to pipelines installed before August 1, 1971, and all other applicable requirements within 1 year after the pipeline is readied for service. However, the requirements of this subpart specifically applicable to pipelines installed after July 31, 1971, apply if the pipeline substantially meets those requirements before it is readied for service or it is a segment which is replaced, relocated, or substantially altered.	
Origin of Code	NGPSA of 1968	
Last FR Amendment	[Amdt. 192-30, 42 FR 60146, Nov. 25, 1977]	
Enforcement Language	<p>First, If the line was substantially in compliance with 192.455, prior to conversion, 192.455 still applies and the CP system must be continuously maintained per the requirements of 192 Subpart I. Second, if the line was not substantially in compliance with 192.455, the line must meet the requirements of 192.457 within 1 year of conversion.</p> <p>Note: Substantially means that if CP was installed & applied to the pipeline even though all requirements of subpart I are not available for review, the CP system must be maintained and brought into compliance with all requirements of subpart I within 1 year.</p>	
Pending NPRM	None	
Interpretation 1 Excerpts	None	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	If the line was substantially in compliance with 192.455, or if a segment was replaced, relocated, or altered, 192.455 applies and the CP system must be continuously maintained per the requirements of 192 Subpart I; otherwise, the pipeline must meet the requirements of 192.457 and all other requirements of subpart I within one (1) year after the pipeline is readied for service.	
Examples of a Violation	<p>A violation of 192.452 exists if:</p> <p>(a) A pipeline was under CP prior to conversion and the CP was not maintained per the requirements of 192.455.</p> <p>(b) A pipeline was not under CP prior to conversion and CP was not installed within 1 year per the requirements of 192.457.</p>	
Evidence Guidance	Lack of documentation or inadequate field tests and surveys for the pipeline to be converted to insure that cathodic protection can be applied to the pipeline to meet the requirements of subpart I within 12 months of the conversion. The tests and surveys may include electrical surveys, pipe examination, coating examination, current requirement tests and soil tests.	
Other Special	Note: Substantially means that if CP was installed & applied to the pipeline	

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Notifications	even though all requirements of subpart I are not available for review, the CP system must be maintained and brought into compliance with all requirements of subpart I within 1 year.
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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005			
Code Reference Number	192.453	Corrosion Control Procedure Rewrite Committee			
Heading	§192.453				
Existing Code Language:	The corrosion control procedures required by §192.605(b)(2), including those for the design, installation, operation, and maintenance of cathodic protection systems, must be carried out by, or under the direction of, a person qualified in pipeline corrosion control methods.				
Origin of Code	NGPSA 1968				
Last FR Amendment	[Amdt. 192-71, 59 FR 6575, Feb. 11, 1994]				
Enforcement Language	None				
Pending NPRM	None				
Interpretation 1 Excerpts	Oct 24, 73 Jan 7, 97	Oct 15, 75 Aug 16, 77	May 25, 76 Jun 20, 78	Aug 30, 76 Apr 10, 79	Sep 20, 76 Jul 16, 92
Other Ref. Material & Source					
Guidance Material	The operator must have a written definition of, or a list of criteria defining, a qualified person or contractor personnel and specifically identify the position or individuals performing these functions. These persons should have knowledge of the physical sciences, principles of engineering and mathematics acquired by education and/or practical experience and shall be qualified to engage in the practice of corrosion control, as applicable, for external, internal and atmospheric corrosion. The operator must also specify what documentation is needed to substantiate this qualification. Each operator shall maintain qualification records for these individuals.				
Examples of a Violation	<p>A violation of 192.453 exists if:</p> <p>(1) The operator does not have written definition or cannot demonstrate stating the training and level of experience required to be a qualified person or cannot have a qualified contractor.</p> <p>(2) The operator does not have documentation of the qualified person's training and/or experience.</p> <p>(3) Numerous violations and recurring violations of other requirements of this subpart, may imply that the person overseeing the corrosion control program is not qualified.</p>				
Evidence Guidance	Documentation of training records and/or experience.				
Other Special Notifications	None				

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.455	Corrosion Control Procedure Rewrite Committee
Heading	§192.455(a) External corrosion control: Buried or submerged pipelines installed after July 31, 1971.	
Existing Code Language:	(a) Except as provided in paragraphs (b), (c), and (f) of this section, each buried or submerged pipeline installed after July 31, 1971, must be protected against external corrosion, including the following: (1) It must have an external protective coating meeting the requirements of §192.461. (2) It must have a cathodic protection system designed to protect the pipeline in accordance with this subpart, installed and placed in operation within 1 year after completion of construction.	
Origin of Code	NGPSA 1968	
Last FR Amendment	[Amdt. 192-85 , 63 FR 37500, July 13, 1998]	
Enforcement Language	<p>A violation of § 192.455(a) exists if:</p> <p>1. A pipeline installed after July 31, 1971, is not externally coated pursuant to the requirements of § 192.461 and the operator has not demonstrated the absence of a corrosive environment pursuant to § 192.455 (b) or (c).</p> <p>2. A pipeline installed after July 31, 1971, does not have a cathodic protection system within 1 year after completion of construction and the operator has not demonstrated the absence of a corrosive environment pursuant to § 192.455 (b) or (c).</p> <p>Evidence of violation:</p> <p>1. a. Documentation showing pipeline installed after July 31, 1971, including but not limited to, operator's records (construction contracts and project reports), or construction permits.</p> <p>b. Documentation showing that pipeline is not externally coated pursuant to requirements of § 192.461, including operators' records showing lack of external coating (construction specifications) and photographs of exposed pipe.</p> <p>c. Documentation showing that operator does not have a cathodic protection system meeting requirements of subpart I: (I) Operator records kept pursuant to § 192.491 as they relate to requirements in §192.463. (ii) Statements of investigator's field observations of operator's random sampling of pipe-to-soil potential measurements and description of testing equipment.</p> <p>d. Documentation showing pipeline was constructed more than 1 year earlier.</p>	
Pending NPRM	None	

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Interpretation 1 Excerpts	Oct 14, 71 Apr 12, 72 Aug 14, 72 Feb 2, 74 Feb 2, 74 Oct 31, 73 Jul 16, 76 Aug 8, 74 Jun 2, 75 Jul 2, 75 Apr 21, 76 Jan 19, 77 Dec 6, 76 Aug 16, 77 Oct 18, 77 Apr 10, 79 Jul 9, 81
Other Ref. Material & Source	Industry Standards, Glossary
Guidance Material	<p>Most pipelines are coated when installed and cathodically protected shortly after completion of construction. "Completion of construction" is generally considered to be when the pipeline or pipeline section has been tested, backfilled, and ready for gas to flow.</p> <p>It is not often that an operator will attempt to install a bare unprotected steel pipeline under 192.455(b), or a copper pipeline under 192.455(c), as it is very difficult to demonstrate that a non-corrosive environment exists around the pipeline.</p>
Examples of a Violation	<p>A violation of exists if:</p> <p>192.455(a)(1): A pipeline installed after July 31, 1971, is not externally coated pursuant to the requirements of § 192.461.</p> <p>192.455(a)(2): A pipeline installed after July 31, 1971, does not have a cathodic protection system installed and in operation exceeding 1 year after completion of construction.</p>
Evidence Guidance	<p>Documentation showing pipeline installed after July 31, 1971, including operators' records, (construction contracts and project reports), or construction permits.</p> <p>Documentation showing operator has not designed, installed and energized a CP system within one (1) year after completion of construction.</p>
Other Special Notifications	None

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.455	Corrosion Control Procedure Rewrite Committee
Heading	§192.455(b) External corrosion control: Buried or submerged pipelines installed after July 31, 1971.	
Existing Code Language:	(b) An operator need not comply with paragraph (a) of this section, if the operator can demonstrate by tests, investigation, or experience in the area of application, including, as a minimum, soil resistivity measurements and tests for corrosion accelerating bacteria, that a corrosive environment does not exist. However, within 6 months after an installation made pursuant to the preceding sentence, the operator shall conduct tests, including pipe-to-soil potential measurements with respect to either a continuous reference electrode or an electrode using close spacing, not to exceed 20 feet (6 meters), and soil resistivity measurements at potential profile peak locations, to adequately evaluate the potential profile along the entire pipeline. If the tests made indicate that corrosive condition exists, the pipeline must be cathodically protected in accordance with paragraph (a)(2) of this section.	
Origin of Code	NGPSA 1968	
Last FR Amendment	[Amdt. 192-85 , 63 FR 37500, July 13, 1998]	
Enforcement Language	<p>A violation of exists if:</p> <p>The pipeline is not externally coated or cathodically protected and the operator has not demonstrated the absence of a corrosive environment. Note: Within 6 months after an installation made pursuant to 192.455(b)(no coating &/or no CP system), the operator shall conduct tests, including determination of various chemical constituents in the soil environment(chlorides, sulfates, sulfides and bicarbonates); including pipe-to-soil potential measurements with respect to either a continuous reference electrode or an electrode using close spacing, not to exceed 20 feet(6 meters), and soil resistivity measurements at potential profile peak locations.</p> <p>Operator must plot the close interval survey (CIS) to identify peak locations in which to take soil resistivity measurements to adequately evaluate the potential profile along the entire pipeline. Measurements must be taken to determine soil resistivity at the depth of the pipe. If the tests made indicate that a corrosive condition exists(areas with lower soil resistivity in areas of more negative potentials or areas where chemical constituents are present which may indicate a propensity for aerobic or anaerobic bacterial corrosion), the pipeline must be cathodically protected in accordance with paragraph 192.455(a)(2). If tests indicate that a corrosive condition does not exist (areas of high resistivity soil in areas with less negative potentials), the operator must follow the requirements of 192.465(e).</p> <p>Evidence of violation:</p> <p>Lack of documentation or inadequate demonstration of absence of corrosive environment by operator, including a copy of and an analysis of operators' records of tests, which must include soil resistivity measurements, tests for</p>	

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	<p>corrosion accelerating bacteria, and, within 6 months after installation, pipe-to-soil potential measurements and soil resistivity measurements at potential profile peak locations as specified in §192.455(b).</p> <p>Note for inspector: A review of leak records of other facilities in the area (where similar environmental conditions exist) may indicate a potential for leaks on this structure.</p>																		
Pending NPRM	None																		
Interpretation 1 Excerpts	<table border="0"> <tr> <td>Oct 14, 71</td> <td>Apr 12, 72</td> <td>Aug 14, 72</td> <td>Feb 2, 74</td> <td>Feb 2, 74</td> <td>Oct 31, 73</td> </tr> <tr> <td>Jul 16, 76</td> <td>Aug 8, 74</td> <td>Jun 2, 75</td> <td>Jul 2, 75</td> <td>Apr 21, 76</td> <td>Jan 19, 77</td> </tr> <tr> <td>Dec 6, 76</td> <td>Aug 16, 77</td> <td>Oct 18, 77</td> <td>Apr 10, 79</td> <td>Jul 9, 81</td> <td></td> </tr> </table>	Oct 14, 71	Apr 12, 72	Aug 14, 72	Feb 2, 74	Feb 2, 74	Oct 31, 73	Jul 16, 76	Aug 8, 74	Jun 2, 75	Jul 2, 75	Apr 21, 76	Jan 19, 77	Dec 6, 76	Aug 16, 77	Oct 18, 77	Apr 10, 79	Jul 9, 81	
Oct 14, 71	Apr 12, 72	Aug 14, 72	Feb 2, 74	Feb 2, 74	Oct 31, 73														
Jul 16, 76	Aug 8, 74	Jun 2, 75	Jul 2, 75	Apr 21, 76	Jan 19, 77														
Dec 6, 76	Aug 16, 77	Oct 18, 77	Apr 10, 79	Jul 9, 81															
Other Ref. Material & Source	Industry Standards, Glossary																		
Guidance Material	None																		
Examples of a Violation	The operator has not demonstrated the absence of a corrosive environment and the pipe is not externally coated or cathodically protected. The operator did not conduct tests within 6 months after an installation made, the tests include pipe-to-soil potential and soil resistivity measurements at potential profile peak locations.																		
Evidence Guidance	None																		
Other Special Notifications	None																		

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL					Date:11/17/2005 Revised: 11/17/2005	
Code Reference Number	192.455	Corrosion Control Procedure Rewrite Committee				
Heading	§192.455(c) External corrosion control: Buried or submerged pipelines installed after July 31, 1971.					
Existing Code Language:	(c) An operator need not comply with paragraph (a) of this section, if the operator can demonstrate by tests, investigation, or experience that - (1) For a copper pipeline, a corrosive environment does not exist, or (2) For a temporary pipeline with an operating period of service not to exceed 5 years beyond installation, corrosion during the 5-year period of service of the pipeline will not be detrimental to public safety.					
Origin of Code	NGPSA 1968					
Last FR Amendment	[Amdt. 192-85 , 63 FR 37500, July 13, 1998]					
Enforcement Language	<p>A violation of § 192.455(c) exists if: The pipeline is copper and the operator has not demonstrated the absence of a corrosive environment; or</p> <p>The pipeline is temporary with an intended service life not to exceed 5 years and the operator did not demonstrate that corrosion which might occur within that period is not detrimental to public safety.</p> <p>Evidence of violation: Corrosion control design and construction specifications showing operator installed a copper line without cathodic protection. Statement from inspector concerning actual witnessing CP readings that indicate inadequate cathodic protection and leak history. The operator's records state that a pipeline is a temporary pipeline(service life not to exceed 5 years) and the line has been in service beyond the 5 years, or Corrosion occurring during the 5 year service life of the pipeline would be detrimental to public safety.</p> <p>Note: OPS would expect the operator to demonstrate why continued operation would not be detrimental to public safety.</p>					
Pending NPRM	None					
Interpretation 1 Excerpts	Oct 14, 71 Jul 16, 76 Dec 6, 76	Apr 12, 72 Aug 8, 74 Aug 16, 77	Aug 14, 72 Jun 2, 75 Oct 18, 77	Feb 2, 74 Jul 2, 75 Apr 10, 79	Feb 2, 74 Apr 21, 76 Jul 9, 81	Oct Jan
Other Ref. Material & Source	Industry Standards, Glossary					
Guidance Material	None					
Examples of a Violation	No documented tests or experience to prove the absence of a corrosive environment for a copper pipeline.					
Evidence Guidance	None					

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Other Special Notifications	None
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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005				
Code Reference Number	192.455	Corrosion Control Procedure Rewrite Committee				
Heading	§192.455(d) External corrosion control: Buried or submerged pipelines installed after July 31, 1971.					
Existing Code Language:	Notwithstanding the provisions of paragraph (b) or (c) of this section, if a pipeline is externally coated, it must be cathodically protected in accordance with paragraph (a)(2) of this section					
Origin of Code	NGPSA 1968					
Last FR Amendment	[Amdt. 192-85 , 63 FR 37500, July 13, 1998]					
Enforcement Language	A violation of § 192.455(d) exists if: Pipeline is coated and not cathodically protected within 1 year of construction. Evidence of violation: Construction records and dates of initial CP readings.					
Pending NPRM	None					
Interpretation 1 Excerpts	Oct 14, 71 Jul 16, 76 Dec 6, 76	Apr 12, 72 Aug 8, 74 Aug 16, 77	Aug 14, 72 Jun 2, 75 Oct 18, 77	Feb 2, 74 Jul 2, 75 Apr 10, 79	Feb 2, 74 Apr 21, 76 Jul 9, 81	Oct Jan
Other Ref. Material & Source	Industry Standards, Glossary					
Guidance Material	None					
Examples of a Violation	The operator did not apply cathodic protection on its coated pipeline within 1 year of construction.					
Evidence Guidance	None					
Other Special Notifications	None					

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005				
Code Reference Number	192.455	Corrosion Control Procedure Rewrite Committee				
Heading	§192.455(e) External corrosion control: Buried or submerged pipelines installed after July 31, 1971.					
Existing Code Language:	Aluminum may not be installed in a buried or submerged pipeline if that aluminum is exposed to an environment with a natural pH in excess of 8, unless tests or experience indicates its suitability in the particular environment involved.					
Origin of Code	NGPSA 1968					
Last FR Amendment	[Amdt. 192-85 , 63 FR 37500, July 13, 1998]					
Enforcement Language	<p>A violation of § 192.455(e) exists if: The line is aluminum, the soil Ph is >8 and the operator has not performed tests or documented experience indicating suitability in that particular environment.</p> <p>Evidence of violation: Lack of documentation that appropriate tests were made to determine pH of the soil along the entire pipeline right-of-way(ROW) Lack of documentation showing tests/experience indicating suitability in an environment where Ph is 8. Review of documentation that the operator performed appropriate tests and incorrectly applied the findings.</p>					
Pending NPRM	None					
Interpretation 1 Excerpts	Oct 14, 71 Jul 16, 76 Dec 6, 76	Apr 12, 72 Aug 8, 74 Aug 16, 77	Aug 14, 72 Jun 2, 75 Oct 18, 77	Feb 2, 74 Jul 2, 75 Apr 10, 79	Feb 2, 74 Apr 21, 76 Jul 9, 81	Oct Jan
Other Ref. Material & Source	Industry Standards, Glossary					
Guidance Material	None					
Examples of a Violation	The operator has not performed tests or documented experience indicating suitability of aluminum pipeline in an environment with a pH in excess of 8.					
Evidence Guidance	None					
Other Special Notifications	None					

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL					Date:11/17/2005 Revised: 11/17/2005	
Code Reference Number	192.455	Corrosion Control Procedure Rewrite Committee				
Heading	§192.455(f) External corrosion control: Buried or submerged pipelines installed after July 31, 1971.					
Existing Code Language:	This section does not apply to electrically isolated, metal alloy fittings in plastic pipelines, if: (1) For the size fitting to be used, an operator can show by test, investigation, or experience in the area of application that adequate corrosion control is provided by the alloy composition, and (2)The fitting is designed to prevent leakage caused by localized corrosion pitting.					
Origin of Code	NGPSA 1968					
Last FR Amendment	[Amdt. 192-85 , 63 FR 37500, July 13, 1998]					
Enforcement Language	<p>A violation of § 192.455(f) exists if: The pipeline is a plastic line with isolated metal alloy fittings that are not cathodically protected and the operator cannot show by test, investigation, or experience in the area of application that adequate corrosion control is provided by the alloy composition. The operator has experienced a corrosion leak on one of these components.</p> <p>The pipeline is a plastic line with isolated metal alloy fittings that are not designed to prevent leakage caused by local corrosion pitting.</p> <p>Evidence of violation: Lack of documentation or inadequate demonstration of tests, investigation or experience to show that electrically isolated metal alloy fittings in plastic pipelines are protected from corrosion.</p>					
Pending NPRM	None					
Interpretation 1 Excerpts	Oct 14, 71 Jul 16, 76 Dec 6, 76	Apr 12, 72 Aug 8, 74 Aug 16, 77	Aug 14, 72 Jun 2, 75 Oct 18, 77	Feb 2, 74 Jul 2, 75 Apr 10, 79	Feb 2, 74 Apr 21, 76 Jul 9, 81	Oct Jan
Other Ref. Material & Source	Industry Standards, Glossary					
Guidance Material	None					
Examples of a Violation	<p>The isolated metal alloy fittings in plastic pipelines are not cathodically protected. No adequate corrosion control is provided by the alloy composition. The operator has experienced a corrosion leak on its metal alloy fittings.</p> <p>The isolated metal alloy fittings are not designed to prevent leakage caused by local corrosion pitting.</p>					
Evidence Guidance	None					
Other Special Notifications	Committee called a few manufacturers who all noted that they do not specify a statement in their literature as to the corrosion resistance of any of their metal fittings. Also, a statement was made concerning the cost of stainless steel					

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	fittings and the fact that most LDC's are not going to purchase a stainless steel fitting to prevent corrosion because of the cost involved. They also stated that most fittings are available in plastic so most LDC's do not attempt to install metallic fittings anyway.
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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005			
Code Reference Number	192.457	Corrosion Control Procedure Rewrite Committee			
Heading	§192.457(a) External corrosion control: Buried or submerged pipelines installed before August 1, 1971.				
Existing Code Language:	Except for buried piping at compressor, regulator, and measuring stations, each buried or submerged transmission line installed before August 1, 1971, that has an effective external coating must be cathodically protected along the entire area that is effectively coated, in accordance with this subpart. For the purposes of this subpart, a pipeline does not have an effective external coating if its cathodic protection current requirements are substantially the same as if it were bare. The operator shall make tests to determine the cathodic protection current requirements.				
Origin of Code	NGPSA 1968				
Last FR Amendment	[Amdt. 192-4, 36 FR 12297, June 30, 1971, as amended by Amdt. 192-33, 43 FR 39389, Sept. 5, 1978]				
Enforcement Language	<p>A violation of § 192.457(a) exists if:</p> <ol style="list-style-type: none"> 1. A transmission pipeline, other than buried piping at compressor, regulator, or measuring stations, installed before August 1,1971, has an effective external coating and is not cathodically protected along entire area that is effectively coated. <p>Evidence of violation:</p> <ol style="list-style-type: none"> 1. a. Documentation showing pipeline is not at a compressor, regulator, or measuring station, including photographs, operators' records, etc.; and <ul style="list-style-type: none"> b. Documentation that transmission line does have an effective coating (operators' inspection and maintenance records, construction records, etc.). If the operator claims that the coating is ineffective, documentation that its cathodic protection current requirements are substantially the same as if it were a bare pipeline. Include copy of your analysis of operators' records of tests to determine current requirements, records per §192.491; and c. Documentation showing pipeline is not cathodically protected pursuant to Subpart I along entire area that is effectively coated. 				
Pending NPRM	None				
Interpretation 1 Excerpts	Jul 22, 71 Nov 2, 76 Dec 14, 73 May 30, 75 Jan 7, 76 Jun 10, 76 Jul 20, 76 Sep 10, 76 Sep 17, 76	Aug 9, 71 Aug 16, 77 May 10, 74 Jul 7, 75 Jan 30, 76 Jun 23, 76 Jul 20, 76 Sep 10, 76 Nov 2, 76	Feb 28, 72 Aug 1, 72 Jul 18, 74 Jul 8, 75 Mar 1, 76 Jul 8, 76 Aug 2, 76 Sep 10, 76 Dec 1, 76	Jun 16, 72 Sep 13, 72 Jan 9, 75 Jul 23, 75 Apr 15, 76 Jul 12, 76 Aug 26, 76 Sep 14, 76 Dec 28, 76	Jul 11, 72 Jan 8, 73 Jan 21, 75 Aug 5, 75 May 21, 76 Jul 16, 76 Sep 2, 76 Sep 15, 76 Mar 11, 76

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	<p>Mar 28, 77 May 1, 77 Nov 10, 77 Dec 13, 77 Dec 16, 77 Jan 13, 78 Nov 15, 78 Dec 14, 78 Aug 28, 79 Sep 10, 79 Jun 30, 82 Jan 31, 83 Mar 22, 83 Oct 28, 85 Mar 31, 89 Jul 15, 93 Jul 31, 98 Oct 28, 96</p>
Other Ref. Material & Source	Industry Standards, Glossary
Guidance Material	<p>192.457(a) - Current Requirement Calculation</p> <p>The current required for cathodic protection depends upon the corrosion rate and the surface area of metal exposed to the electrolyte. Anything that increases the corrosion rate increases the current required for protection. Effectively coated pipelines require much less cathodic protection current than those that are bare or poorly coated. As a rule of thumb, the current requirement between protecting bare and coated lines is approximately one hundred (100) times.</p> <p>For example, the theoretical current required to cathodically protect 20 miles of 8-inch diameter, bare steel pipeline exposed to a well-aerated neutral soil could be 440 amperes (assuming a current density requirement of 2 ma per sq. ft). If the same structure was well coated and had a coating efficiency of 99% (99% of the surface area is protected by the coating), the current required for protection would be reduced to about 4.4 amperes (assuming the same current density requirement of 2 ma per sq. ft).</p> <p>If the operator chooses to treat a poorly coated pipeline as if it were bare, the testing and monitoring requirements are greatly reduced. Bare lines are required to be electrically monitored on a three (3) year cycle rather than on an annual basis.</p> <p>A violation of § 192.457(a) exists if:</p> <p>A transmission pipeline, other than buried piping at compressor, regulator, or measuring stations, installed before August 1, 1971, has an effective external coating and is not cathodically protected.</p> <p><u>Inspector Note:</u> The inspector should question the operator as to leaks on the line. Obviously, the line is not cathodically protected if the line is experiencing corrosion leaks. If corrosion leaks have occurred, the operator should be prepared to demonstrate that the CP system has been re-evaluated and additional measures taken to correct any shortcomings. These include but are not limited to: installing additional test wires; additional anodes; increasing the output of the rectifier; a close interval survey to determine areas of inadequate protection, etc.)</p> <p>Evidence:</p> <p>Documentation showing pipeline is not at a compressor, regulator, or measuring station, including photographs, operators' records, etc.; and documentation that the line does have an effective coating (operators' inspection and maintenance records, construction records, etc.). If the operator claims that the coating is ineffective, the operator is required to have</p>

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	documentation to show that its cathodic protection current requirements are substantially the same as if it were a bare pipeline. Also, documentation showing pipeline is not cathodically protected pursuant to Subpart I along entire area that is effectively coated.
Examples of a Violation	Except buried piping at compressor, regulator, or measuring stations, a transmission pipeline installed before August 1, 1971, with an effective external coating but not cathodically protected.
Evidence Guidance	Documentation/operator's records showing: pipeline is not cathodically protected along entire area that is effectively coated, pipeline is not at a compressor, regulator or measuring stations & transmission line does have an effective coating.
Other Special Notifications	None

Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.457	Corrosion Control Procedure Rewrite Committee
Heading	§192.457 (b) External corrosion control: Buried or submerged pipelines installed before August 1, 1971.	
Existing Code Language:	Except for cast iron or ductile iron, each of the following buried or submerged pipelines installed before August 1, 1971, must be cathodically protected in accordance with this subpart in areas in which active corrosion is found: (1) Bare or ineffectively coated transmission lines. (2) Bare or coated pipes at compressor, regulator, and measuring stations. (3) Bare or coated distribution line.	
Origin of Code	NGPSA 1968	
Last FR Amendment	[Amdt. 192-4, 36 FR 12297, June 30, 1971, as amended by Amdt. 192-33, 43 FR 39389, Sept. 5, 1978]	
Enforcement Language	<p>Inspection Guidelines for §192.457 (b)(I)</p> <p>1. Determine the method the operator used to locate areas of active corrosion on its bare or ineffectively coated sections of transmission pipeline. For the areas that OPS considers continuing corrosion to be active corrosion, see enforcement guidelines for §192.465 (e)</p> <p>Evidence of violation - § 192.457 (b) (1): (</p> <p>1. Documentation including photographs, operators' records, etc., showing transmission line was installed before August 1, 1971; showing pipeline is not cathodically protected; and that transmission line is bare (operator's inspection and maintenance records, construction records, etc.).</p> <p>2. If the operator claims that the coating is ineffective, documentation that its cathodic protection current requirements are substantially the same as if it were a bare pipeline. Include a copy of documentation and your analysis of operators' records of tests to determine current requirements, records per §</p>	

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	192.491; or 3. Lack of documentation which would verify that an operator has attempted to locate areas of corrosion and to cathodically protect areas of active corrosion. Include any operator statements to this effect; or documentation that an operator has active corrosion on transmission line (see Part D), and documentation which shows that programs initiated by an operator to cathodically protect or replace the pipeline in areas of active corrosion is inadequate, i.e., operator is unable to show a decline or stabilized minimal corrosion rate in areas where the corrosion was determined to be active. (The inspector must explain why the program is inadequate.); or 4. Lack of documentation to show that an operator has taken action to mitigate areas of active corrosion, which were located by electrical surveys or other special studies performed by the operator. See 2b for §192.455.
Pending NPRM	None
Interpretation 1 Excerpts	Jul 22, 71 Aug 9, 71 Feb 28, 72 Jun 16, 72 Jul 11, 72 Nov 2, 76 Aug 16, 77 Aug 1, 72 Sep 13, 72 Jan 8, 73 Dec 14, 73 May 10, 74 Jul 18, 74 Jan 9, 75 Jan 21, 75 May 30, 75 Jul 7, 75 Jul 8, 75 Jul 23, 75 Aug 5, 75 Jan 7, 76 Jan 30, 76 Mar 1, 76 Apr 15, 76 May 21, 76 Jun 10, 76 Jun 23, 76 Jul 8, 76 Jul 12, 76 Jul 16, 76 Jul 20, 76 Jul 20, 76 Aug 2, 76 Aug 26, 76 Sep 2, 76 Sep 10, 76 Sep 10, 76 Sep 10, 76 Sep 14, 76 Sep 15, 76 Sep 17, 76 Nov 2, 76 Dec 1, 76 Dec 28, 76 Mar 11, 76 Mar 28, 77 May 1, 77 Nov 10, 77 Dec 13, 77 Dec 16, 77 Jan 13, 78 Nov 15, 78 Dec 14, 78 Aug 28, 79 Sep 10, 79 Jun 30, 82 Jan 31, 83 Mar 22, 83 Oct 28, 85 Mar 31, 89 Jul 15, 93 Jul 31, 98 Oct 28, 96
Other Ref. Material & Source	Industry Standards, Glossary
Guidance Material	Performance of electrical survey, its impracticality. Areas of active corrosion. Study of corrosion and leak history records
Examples of a Violation	The operator has not determined areas of active corrosion by data obtained from electrical survey, in-line inspection, corrosion leak history, corrosion surveys and as such no cathodic protection has been applied.
Evidence Guidance	Photographs, operating & maintenance records, O & M manual, operator's personnel statements, corrosion surveys.
Other Special Notifications	None

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.459	Corrosion Control Procedure Rewrite Committee
Heading	§192.459 External corrosion control: Examination of buried pipeline when exposed.	
Existing Code Language:	Whenever an operator has knowledge that any portion of a buried pipeline is exposed, the exposed portion must be examined for evidence of external corrosion if the pipe is bare, or if the coating is deteriorated. If external corrosion requiring remedial action under Sections 192.483 through 192.489 is found, the operator shall investigate circumferentially and longitudinally beyond the exposed portion (by visual examination, indirect method, or both) to determine whether additional corrosion requiring remedial action exists in the vicinity of the exposed portion.	
Origin of Code	NGPSA 1968	
Last FR Amendment	[Amdt. 192-4, 36 FR 12297, June 30, 1971, as amended by Amdt. 192-87, 64 FR 56978, Oct. 22, 1999]	
Enforcement Language	None.	
Pending NPRM	None	
Interpretation 1 Excerpts	Oct 27, 81	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	<p>The Inspector should check for this procedure in the operator's O&M manual. Determine if they have a reporting requirement listed. Ask to see these reports and any subsequent maintenance orders generated by these reports. Leak reports may contain this information also. If the operator does not have this procedure spelled out in their manual; ask how they comply and what evidence they have to confirm that it is carried out. This may be a violation.</p> <p>The purpose of the regulation is to prevent accidents due to the existence of harmful corrosion near the area of pipe exposure. This regulation was intentionally designed to permit varying approaches to compliance because of the different conditions that are encountered at excavation sites. Assuming each operator's approach is sufficient to determine the extent of harmful corrosion found at an excavation, the regulation should be effective overall.</p> <p>There is an issue of how far to carry an investigation of harmful corrosion found at an excavation. The operator should be concerned that harmful corrosion located near the exposed portion of pipe would go undetected if operators investigated only for corrosion that adjoins corrosion observed on the exposed portion. However, recognizing the complexity of specifying the scope of investigation, the regulation allows operators to use their own judgment on where to stop investigating for corrosion.</p> <p>In conclusion, a reasonable effort should be required to find corrosion in the vicinity of an exposed, corroded pipe.</p>	

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	If deteriorated coating or external corrosion is found, the operator shall continue to investigate further until corroded or other damaged areas requiring remedial action are no longer encountered.
Examples of a Violation	A Violation exists if: Exposed pipe is not examined for evidence of external corrosion, i.e. No documentation (491(c)).
Evidence Guidance	No documentation of Bell Hole inspection, pictures, maintenance records.(491(c)).
Other Special Notifications	None

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005	
Code Reference Number	192.461	Corrosion Control Procedure Rewrite Committee	
Heading	§192.461(a) External corrosion control: Protective coating.		
Existing Code Language:	Each external protective coating, whether conductive or insulating, applied for the purpose of external corrosion control must- (1) Be applied on a properly prepared surface; (2) Have sufficient adhesion to the metal surface to effectively resist underfilm migration of moisture; (3) Be sufficiently ductile to resist cracking; (4) Have sufficient strength to resist damage due to handling and soil stress; and, (5) Have properties compatible with any supplemental cathodic protection.		
Origin of Code	NGPSA 1968		
Last FR Amendment	None		
Enforcement Language	None.		
Pending NPRM	None		
Interpretation 1 Excerpts	Oct 14, 71 Jul 16, 76	Oct 31, 72	Oct 12, 73 Jan 9, 75 Mar 31, 83
Other Ref. Material & Source	Industry Standards, Glossary		
Guidance Material	No procedure to guide operator personnel in applying coating including surface preparation and application techniques. No specification to assure that purchased coating material is sufficiently ductile, has proper adhesion characteristics, designed to withstand expected handling and installation conditions, and is compatible with cathodic protection used on the pipeline.		
Examples of a Violation	Violation exists if: 1. No coating procedures or specifications. 2. No evaluation of the coating in terms of its application, compatibility with the existing coating system and maintenance requirements. 3. Damaged or disbonded coating is found. Example: Accident site A lack of examination of the coating is a violation. Coating material damaged or improperly installed must be repaired. If not, this is a violation.		
Evidence Guidance	Manufacturer's maintenance recommendations, O&M Manual, maintenance records, pictures.		
Other Special Notifications	None		

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Enforcement Manual, Code Compliance Guidelines		Date:11/17/2005
SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Revised: 11/17/2005
Code Reference Number	192.461	Corrosion Control Procedure Rewrite Committee
Heading	§§192.461 (b) External corrosion control: Protective coating.	
Existing Code Language:	Each external protective coating which is an electrically insulating type must also have low moisture absorption and high electrical resistance.	
Origin of Code	NGPSA 1968	
Last FR Amendment	None	
Enforcement Language	None.	
Pending NPRM	None	
Interpretation 1 Excerpts	Oct 14, 71 Oct 31, 72 Oct 12, 73 Jan 9, 75 Mar 31, 83 Jul 16, 76	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	None - See 461(a)	
Examples of a Violation	Violation exists if: No coating specification(s).	
Evidence Guidance	Operators purchase specifications, manufacturer's literature, O&M Manual, maintenance records, pictures.	
Other Special Notifications	None	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.461	Corrosion Control Procedure Rewrite Committee
Heading	§192.461 (c) External corrosion control: Protective coating.	
Existing Code Language:	Each external protective coating must be inspected just prior to lowering the pipe into the ditch and backfilling, and any damage detrimental to effective corrosion control must be repaired.	
Origin of Code	NGPSA 1968	
Last FR Amendment	None	
Enforcement Language	None.	
Pending NPRM	None	
Interpretation 1 Excerpts	Oct 14, 71 Oct 31, 72 Oct 12, 73 Jan 9, 75 Mar 31, 83 Jul 16, 76	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	<p>The Inspector should check for visual and electrical testing (jeeping) of the coating. The Inspector should inquire about the voltage level used for the test; inspect the “jeep” for the required test setting; proper operation of the “jeep” (i.e. grounded, etc.). If the operator insists that “jeeping” is not necessary; ask how the operator has designed his cp system (i.e. new designs use a current requirement/sq. foot for the pipe; if the operator does not “jeep”, what are his designs based upon for current requirements, or is the operator prepared to conduct extensive testing of the line after construction - close interval survey for example.</p> <p>Inspector Note: Jeeping should be considered an electrical inspection. The inspector must consider the NACE standard and manufacturer’s specifications (coating & instrument) to determine applicable settings for the tool being utilized.</p>	
Examples of a Violation	<p>Violation exists if:</p> <ol style="list-style-type: none"> 1. No coating inspection procedures. 2. Coating not inspected prior to lowering into ditch. 3. There is evidence that coating damage existed prior to lowering pipe into the ditch and operator took no corrective action. 	
Evidence Guidance	Manufacturer(s)’ inspection recommendations, O&M Manual, installation records, pictures.	
Other Special Notifications	None.	

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Enforcement Manual, Code Compliance Guidelines		Date:11/17/2005	
SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Revised: 11/17/2005	
Code Reference Number	192.461	Corrosion Control Procedure Rewrite Committee	
Heading	§192.461 (d) External corrosion control: Protective coating.		
Existing Code Language:	Each external protective coating must be protected from damage resulting from adverse ditch conditions or damage from supporting blocks.		
Origin of Code	NGPSA 1968		
Last FR Amendment	None		
Enforcement Language	None.		
Pending NPRM	None		
Interpretation 1 Excerpts	Oct 14, 71	Oct 31, 72	Oct 12, 73 Jan 9, 75 Mar 31, 83 Jul 16, 76
Other Ref. Material & Source	Industry Standards, Glossary		
Guidance Material	Look for evidence/records that pipe ditch and backfill was inspected for rocks, evidence that rock shields or ditch padding were used if necessary.		
Examples of a Violation	Lack of or inadequate procedural guidance for evaluation of fill material to determine need for padding.		
Evidence Guidance	Operator's O&M manual		
Other Special Notifications	None.		

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.461	Corrosion Control Procedure Rewrite Committee
Heading	§192.461 (e) External corrosion control: Protective coating.	
Existing Code Language:	If coated pipe is installed by boring, driving, or other similar method, precautions must be taken to minimize damage to the coating during installation.	
Origin of Code	NGPSA 1968	
Last FR Amendment	None	
Enforcement Language	None.	
Pending NPRM	None	
Interpretation 1 Excerpts	Oct 14, 71 Oct 31, 72 Oct 12, 73 Jan 9, 75 Mar 31, 83 Jul 16, 76	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	<p>Look for installation records that show pipe was installed by pulling, boring, or other similar method.</p> <p>The operator should have developed procedures for taking precautions to protect the coating while installing pipe in such a manner. Some operators may elect to install an abrasion-resistant coating, such as various concrete materials, over the dielectric coating used for the cathodic protection. The operator should utilize an appropriate bore size/diameter ratio and a sufficient bend radius to minimize potential damage to the coating (and possibly to the pipe). The operator should also have procedures for inspecting for damage on the pipe visible in the bore's exit pit. Damage noted to the coating and/or pipe in the exit pit might indicate that additional undetected damage may have occurred during the installation to the coating and/or the pipe that is not visible.</p>	
Examples of a Violation	<p>Missing or inadequate procedural guidance for taking precautions to minimize damage to the pipe coating during boring installations or for inspecting pipe which has been installed by pulling, boring, or other similar method.</p> <p>Missing or incomplete records of taking the appropriate precautions, inspecting the installed pipe, and/or repairing damage to the pipe coating.</p>	
Evidence Guidance	Manufacturer's maintenance recommendations, O&M Manual, maintenance records, pictures.	
Other Special Notifications	None.	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005			
Code Reference Number	192.463	Corrosion Control Procedure Rewrite Committee			
Heading	§192.463(a) External corrosion control: Cathodic protection.				
Existing Code Language:	(a) Each cathodic protection system required by this subpart must provide a level of cathodic protection that complies with one or more of the applicable criteria contained in Appendix D of this part. If none of these criteria is applicable, the cathodic protection system must provide a level of cathodic protection at least equal to that provided by compliance with one or more of these criteria.				
Origin of Code	NGPLSA 1968				
Last FR Amendment	None				
Enforcement Language	<p>A violation exists if:</p> <p>1. Required cathodic protection does not meet level established by one or more applicable criteria in appendix D of Part 192.</p> <p>Evidence of Violation:</p> <p>1. a. Documentation that cathodic protection is required for pipeline at issue, including evidence required to show pipeline must be cathodically protected under §§192.455, 192.457, and 192.483 (e.g., evidence that pipeline was installed after July-31, 1971, and that the operator did not demonstrate the absence of a corrosive environment).</p> <p>b. Documentation of level of cathodic protection provided, including: (i) If the -0.85-volt criterion is used, field observations of operator's random sampling of pipe-to-soil potential measurements and descriptions of testing equipment used. (ii) If the 300-millivolt change criterion is used, determinations of the value and location of original measurements and field observations of the operator's random sampling of the same points to determine the amount of change.</p> <p>c. Calculation of level of cathodic protection required by one of the applicable criteria in appendix D of Part 192. Operator's records should indicate what criterion the operator is using.</p>				
Pending NPRM	None				
Interpretation 1 Excerpts	Dec 20, 71 Jul 16, 76 Nov 7, 91	Feb 2, 74 Oct 17, 97 Nov 23, 92	Apr 10, 74 Jul 9, 81 Jul, 16, 93	Jan 9, 75 Mar 31, 83	May 29, 81 Mar 31, 89
Other Ref. Material & Source	Industry Standards, Glossary				
Guidance Material	<p>The operator is required to meet one of the criteria in Appendix D.</p> <p>Special Conditions In some situations, such as the presence of sulfides, bacteria, elevated temperatures, acid environments and dissimilar metals, the criteria in (a) of this</p>				

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section may not be sufficient.

1. When a pipeline is encased in concrete or buried in dry or aerated high resistivity soil, values less negative than the criteria in (a) of this section may be sufficient.
2. Caution is advised against using polarized potentials less negative than -850mv for cathodic protection of pipelines when operating pressures and conditions are conducive to stress corrosion cracking, e.g. elevated temperatures (>100 degrees F).
3. The use of excessive polarized potentials (>-1200mV) on coated pipelines should be avoided to minimize disbondment of the coating. (The amount of CP current required is directly proportional to the quality and integrity of the coating.)
4. Excessive impressed CP may result in the generation of hydrogen which may cause (hydrogen) embrittlement of steel structures. (particularly higher strength steel (API-5L-X70 pipe).
5. Uniform methods for determining voltage drops and polarization shall be selected. Once voltage drop(s) (IR Drops), polarized potentials, and/or polarization have been determined, they may be used for correcting future potential measurements at the same location, providing conditions such as pipe and cathodic protection system operating conditions, soil characteristics, and external coating quality remain similar.
6. When it is impractical or considered unnecessary to disconnect all current sources to correct for voltage drop(s) in the structure-to-electrolyte potential measurements, sound engineering practices should be used to ensure that adequate cathodic protection has been achieved. This may be the case for galvanic systems.
7. In-line inspection of pipelines may be helpful in determining the presence of corrosion damage.
8. Situations may exist where a single criterion for evaluating the effectiveness of cathodic protection may not be satisfactory for all conditions.
9. The criterion for determining adequate cathodic protection for each pipeline or pipeline segment shall be identified.

A violation exists if:

Cathodic protection system does not provide a level of cathodic protection established by one or more of the applicable criteria in appendix D of Part 192.

Evidence of Violation:

1. Documentation that cathodic protection is required for pipeline at issue, including evidence required to show pipeline must be cathodically protected under §§192.455, 192.457, and 192.483 (i.e., evidence that

	<p>pipeline was installed after July-31, 1971, and that the operator did not demonstrate the absence of a corrosive environment).</p> <p>2. Is the line experiencing corrosion leaks; if so, how can it be cathodically protected? The Inspector should recognize that it is the operators responsibility under 192.471 to provide sufficient test stations on their entire protected system to determine the adequacy of the criteria used.</p> <p>2. Calculation of level of cathodic protection required by one of the applicable criteria in appendix D of Part 192. Operator's records should indicate what criterion the operator is using.</p> <p>3.</p>
Examples of a Violation	Operator's records and field measurements indicate that a satisfactory level of cathodic protection is not achieved according to the one or more of the applicable criteria in appendix D of Part 192.
Evidence Guidance	Operator's corrosion control procedures, maintenance records, field measurements by the inspector & verification of low readings, photographs.
Other Special Notifications	None

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Enforcement Manual, Code Compliance Guidelines					Date:11/17/2005	
SUBPART I: REQUIREMENTS FOR CORROSION CONTROL					Revised: 11/17/2005	
Code Reference Number	192.463		Corrosion Control Procedure Rewrite Committee			
Heading	§192.463 (b) External corrosion control: Cathodic protection.					
Existing Code Language:	<p>(b) If amphoteric metals are included in a buried or submerged pipeline containing a metal of different anodic potential</p> <p>(1) The amphoteric metals must be electrically isolated from the remainder of the pipeline and cathodically protected; or</p> <p>(2) The entire buried or submerged pipeline must be cathodically protected at a cathodic potential that meets the requirements of Appendix D of this part for amphoteric metals.</p>					
Origin of Code	NGPLSA 1968					
Last FR Amendment	None					
Enforcement Language	<p>A violation exists if:</p> <p>The amphoteric metals are not electrically isolated from the remainder of the pipeline and not cathodically protected.</p> <p>Calculation of level of cathodic protection required by one of the applicable criteria in appendix D of Part 192. Operator's records should indicate what criterion the operator is using.</p>					
Pending NPRM	None					
Interpretation 1 Excerpts	Dec 20, 71	Feb 2, 74	Apr 10, 74	Jan 9, 75	May 29, 81	
	Jul 16, 76	Oct 17, 97	Jul 9, 81	Mar 31, 83	Mar 31, 89	
	Nov 7, 91	Nov 23, 92	Jul, 16, 93			
Other Ref. Material & Source	Industry Standards, Glossary					
Guidance Material	<p>Amphoteric metals are those that are susceptible to corrosion in both acid and alkaline environments. The following is from Peabody page 63-64:</p> <p><i>“Criterion For Dissimilar Metal Piping</i> <i>RP0169-96 contains a single criterion for dissimilar metal piping. Under paragraph 6.2.5.1, the following criterion is listed: “A negative voltage between all pipe surfaces and a stable reference electrode contacting the electrolyte equal to that required for the protection of the most anodic metal should be maintained.”</i></p> <p><i>There is one precautionary note, under Paragraph 6.2.5.2: “Amphoteric materials that could be damaged by high alkalinity created by CP should be electrically isolated and separately protected.” Amphoteric metals include aluminum, titanium, and zirconium. In practice, this criterion applies only where carbon steel or cast iron is coupled to a more noble metal such as copper. In this situation, either of the 850 mV criterion would apply: [850 mV (CSE) with the CP applied or a polarized potential of 850 mV (CSE).] Other criteria, such as the 100 mV of polarization</i></p>					

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	<p><i>criteria would not be applicable.”</i></p> <p>Inspector’s note: If you are unfamiliar with amphoteric metals and the application of CP to them, seek information from a qualified person. Amphoteric materials that could be damaged by high alkalinity created by cathodic protection should be electrically isolated and separately protected.</p>
Examples of a Violation	No electrical isolation between amphoteric metals and the remainder of the pipeline. No satisfactory level of cathodic protection is provided.
Evidence Guidance	Operator’s corrosion control procedures, maintenance records, photographs.
Other Special Notifications	None

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Enforcement Manual, Code Compliance Guidelines		Date:11/17/2005			
SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Revised: 11/17/2005			
Code Reference Number	192.463	Corrosion Control Procedure Rewrite Committee			
Heading	§192.463 (c) External corrosion control: Cathodic protection.				
Existing Code Language:	The amount of cathodic protection must be controlled so as not to damage the protective coating or the pipe.				
Origin of Code	NGPLSA 1968				
Last FR Amendment	None				
Enforcement Language	A violation exists if: An excessive amount of cathodic protection may damage the protective coating or pipeline itself.				
Pending NPRM	None				
Interpretation 1 Excerpts	Dec 20, 71 Jul 16, 76 Nov 7, 91	Feb 2, 74 Oct 17, 97 Nov 23, 92	Apr 10, 74 Jul 9, 81 Jul, 16, 93	Jan 9, 75 Mar 31, 83	May 29, 81 Mar 31, 89
Other Ref. Material & Source	Industry Standards, Glossary				
Guidance Material	<p>1. The use of polarized potentials more negative than approximately -1100 to -1200mV on coated pipelines should be avoided to minimize disbondment of the coating.</p> <p>2. Excessive impressed CP may result in the generation of hydrogen which may cause (hydrogen) embrittlement of steel structures. (particularly higher strength steel (API-5L-X70 pipe or older pipe with hard spots).</p>				
Examples of a Violation	Excessive polarized pipe-to-soil readings that may lead to disbondment damage of the coating.				
Evidence Guidance	Operator's maintenance records, verification of coating damage by bell hole inspection, photographs.				
Other Special Notifications	None				

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.465	Corrosion Control Procedure Rewrite Committee
Heading	§192.465(a) External corrosion control: Monitoring	
Existing Code Language:	Each pipeline that is under cathodic protection must be tested at least once each calendar year, but with intervals not exceeding 15 months, to determine whether the cathodic protection meets the requirements of §192.463. However, if tests at those intervals are impractical for separately protected short sections of mains or transmission line, not in excess of 100 feet (30 meters), or separately protected service line, these pipelines may be surveyed on a sampling basis. At least 10 percent of these protected structures, 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.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt. 192-85 , 63 FR 37500, July 13, 1998]	
Enforcement Language	<p>Examples of violations of 192.465(a) include:</p> <ol style="list-style-type: none"> 1. A cathodically protected pipeline is not inspected at least once each calendar year or at intervals less than 15 months to determine whether one or more requirements of §192.463 are met, and pipeline is not a separately protected service line or a section of protected pipeline less than 100 feet in length. 2. Less than 10 percent of separately protected service lines or sections of protected pipeline of less than 100 feet, distributed over the entire section, is surveyed each calendar year. See inspection guideline (ii). 3. The sampling procedure required for separately protected structures does not result in a survey of a different 10 percent each subsequent year, so that the entire system is tested in each 10-year period, See inspection guideline (ii). <p>Inspection guidelines for § 192.465 (a)</p> <ol style="list-style-type: none"> 1. For distribution system operators. <ol style="list-style-type: none"> I. The OPS inspector must look at the distribution operator's total program before the operator is cited for being in probable violation of paragraph (a). To meet these requirements, the operator must have developed an effective program to monitor its cathodically protected pipe. Piping under cathodic protection must be monitored by electrical measurement each calendar year with intervals not exceeding 15 months. The operator must have documentation to prove that he is monitoring his short, less than 100 feet, separately protected isolated sections of piping (services, short sections of coated steel pipeline, and anodes installed according to § 192.483 (c) and §192.457 (b) on a 10 percent annual basis. At least 10 percent of these protected structures, distributed over the entire system, must be surveyed each 	

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	<p>calendar year, with a different 10 percent checked each subsequent year, so that the entire system is tested in each 10-year period.</p> <p>ii. Operators who are electrically monitoring their entire bare (ineffectively coated) sections of pipeline on a 3-year basis (one third per year) would not have to include their hot spot protected sections of pipe in the 10 percent monitoring program.</p> <p>iii. Anodes installed due to construction or just to take advantage of an open hole need not be included in the 10 percent monitoring program.</p> <p>2. For transmission line operators.</p> <p>To meet the requirements of paragraph (a), transmission line operators must test by electrical measurement all cathodically protected pipe once each calendar year with intervals not exceeding 15 months. Short sections of separately protected coated and hot spot protected bare (ineffectively coated) sections of pipeline must be surveyed on an annual 10 percent basis with a different 10 percent checked each subsequent year so that all these sections are tested in each 10-year period. Transmission operators who are electrically monitoring their entire bare (ineffectively coated) sections of pipeline on a one-third per year basis would not have to include their hot spot protected sections of pipeline in a 10 percent monitoring program.</p> <p>Evidence of violation - § 192.465 (a):</p> <p>1. a. Documentation showing pipeline is cathodically protected and not tested within required interval and documentation showing that pipeline is not a separately protected structure. Operator's records kept pursuant to § 192.491.</p> <p>2. a. Number of separately protected structures and number of separately protected structures that are inspected each calendar year and documentation that the 10 percent sampling is not distributed throughout the entire system. Operator's records kept under § 192.491; or</p> <p>3. Documentation that survey sample selection process does not result in survey of entire system every 10 years, including operator's records kept under § 192.491. (See § 192.465 (a), 2b.)</p>																				
Pending NPRM	None																				
Interpretation 1 Excerpts	<table border="0"> <tr> <td>Oct 20, 70</td> <td>Oct 1, 71</td> <td>Feb 8, 72</td> <td>Feb 24, 72</td> <td>Mar 3, 72</td> </tr> <tr> <td>Jul 16, 76</td> <td>Jun 27, 97</td> <td>May 9, 72</td> <td>May 9, 73</td> <td>Sep 26, 73</td> </tr> <tr> <td>Jan 24, 74</td> <td>Feb 26, 76</td> <td>Oct 17, 97</td> <td>Mar 3, 76</td> <td>Oct 18, 85</td> </tr> <tr> <td>May 19, 89</td> <td>Apr 3, 91</td> <td>Nov 7, 91</td> <td>Jul 31, 98</td> <td></td> </tr> </table>	Oct 20, 70	Oct 1, 71	Feb 8, 72	Feb 24, 72	Mar 3, 72	Jul 16, 76	Jun 27, 97	May 9, 72	May 9, 73	Sep 26, 73	Jan 24, 74	Feb 26, 76	Oct 17, 97	Mar 3, 76	Oct 18, 85	May 19, 89	Apr 3, 91	Nov 7, 91	Jul 31, 98	
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Other Ref. Material & Source	Industry Standards, Glossary																				
Guidance Material	<p>This requirement is usually referred to as the "annual CP survey". The inspector needs to be able to identify a few different requirements of subpart I in order to determine if a pipeline is adequately protected in its entirety.</p> <p>The inspector needs to determine if the operator has a sufficient number of test</p>																				

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	<p>points read annually to show the adequacy of the CP system.</p> <p>The inspector needs to know which criteria the operator is using to show adequate CP.</p> <p>The inspector should review past year's annual surveys to find out if an on/off survey has ever been performed on this system.</p> <p>The inspector should review past annual CP surveys to identify areas of questionable or low CP readings.</p>
Examples of a Violation	<p>No pipe-to-soil survey in the calendar year or the interval between two consecutive surveys exceeded 15 months. In case of separately protected short sections of mains or transmission lines, not in excess of 100 feet or separately protected service lines, the pipelines are not surveyed on sampling basis.</p> <p>No procedural requirement or records indicating that at least 10% of the protected pipeline sections are being or have been surveyed in any given year.</p>
Evidence Guidance	Operator's maintenance records, verification of coating damage by bell hole inspection, photographs.
Other Special Notifications	None

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005			
Code Reference Number	192.465	Corrosion Control Procedure Rewrite Committee			
Heading	§192.465(b) External corrosion control: Monitoring				
Existing Code Language:	Each cathodic protection rectifier or other impressed current power source must be inspected six times each calendar year, but with intervals not exceeding 2 ½ months, to insure that it is operating.				
Origin of Code	NGPLSA 1968				
Last FR Amendment	[Amdt. 192-85 , 63 FR 37500, July 13, 1998]				
Enforcement Language	<p>A violation of § 192.465 (b) exists if:</p> <p>Each cathodic protection rectifier or other impressed current power source is not inspected six times each calendar year or is inspected at periods exceeding 2 ½ months.</p> <p>Documentation showing pipeline is not inspected at required intervals, including operator's records of inspection required under § 192.491.</p>				
Pending NPRM	None				
Interpretation 1 Excerpts	Oct 20, 70 Jul 16, 76 Jan 24, 74 May 19, 89	Oct 1, 71 Jun 27, 97 Feb 26, 76 Apr 3, 91	Feb 8, 72 May 9, 72 Oct 17, 97 Nov 7, 91	Feb 24, 72 May 9, 73 Mar 3, 76 Jul 31, 98	Mar 3, 72 Sep 26, 73 Oct 18, 85
Other Ref. Material & Source	Industry Standards, Glossary				
Guidance Material	The inspector needs to determine the total number of cathodic protection rectifiers or other impressed current power sources in the gas pipeline system and if they are inspected at least 6 times each calendar year and not exceeding 21/2 months interval. Based on the periodic inspection of the impressed current system, the inspector has to ascertain that required trouble shooting and prompt remedial actions are being taken.				
Examples of a Violation	The rectifiers or other impressed current power sources are not inspected six times each calendar year or is inspected at intervals exceeding 21/2 months. The operator did not follow its own procedure.				
Evidence Guidance	Operator's O & M manual, maintenance records.				
Other Special Notifications	None				

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005			
Code Reference Number	192.465	Corrosion Control Procedure Rewrite Committee			
Heading	§192.465(c) External corrosion control: Monitoring				
Existing Code Language:	Each reverse current switch, each diode, and each interference bond whose failure would jeopardize structure protection must be electrically checked for proper performance six times each calendar year, but with intervals not exceeding 2 ½ months. Each other interference bond must be checked at least once each calendar year, but with intervals not exceeding 15 months.				
Origin of Code	NGPLSA 1968				
Last FR Amendment	[Amdt. 192-85 , 63 FR 37500, July 13, 1998]				
Enforcement Language	<p>A violation of § 192.465 (c) exists if:</p> <ol style="list-style-type: none"> 1. Each reverse current switch, each diode, and each interference bond whose failure would jeopardize structure protection is not electrically checked six times each calendar year or inspected at periods exceeding 2 ½ months. 2. Each interference bond whose failure would not jeopardize structure protection is not checked at least once every calendar year or is checked at intervals exceeding 15 months. <p>Evidence of violation - § 192.465(c)</p> <ol style="list-style-type: none"> 1. a. Documentation showing pipeline is not inspected at required intervals, including operator's records of inspection required under § 192.491; and 2. b. If violation relates to an interference bond, documentation that failure of the bond would jeopardize structure protection, including operator's records kept pursuant to § 192.491. 				
Pending NPRM	None				
Interpretation 1 Excerpts	Oct 20, 70 Jul 16, 76 Jan 24, 74 May 19, 89	Oct 1, 71 Jun 27, 97 Feb 26, 76 Apr 3, 91	Feb 8, 72 May 9, 72 Oct 17, 97 Nov 7, 91	Feb 24, 72 May 9, 73 Mar 3, 76 Jul 31, 98	Mar 3, 72 Sep 26, 73 Oct 18, 85
Other Ref. Material & Source	Industry Standards, Glossary				
Guidance Material	<p>The inspector should first determine whether the operator has any reverse current switches, diodes, or interference bonds on its system. The operator should have developed procedures for determining whether or not structure protection would be jeopardized if one of these devices fails and should be able to identify which of these devices present on its system are considered critical and which are not. The operator's procedures should also delineate how these devices are to be checked and require the checks at the appropriate intervals.</p> <p>Reverse current switches and diodes are sometimes utilized to protect from lightning strikes or to mitigate the effects of large DC current sources such as transit systems or mining operations. If used for these applications, then the devices are likely to be critical and require checking at the more frequent intervals.</p>				

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	<p>The most common type of these devices the inspector will have to be aware of is the interference bond. A sized resistor is frequently used to limit the flow of current through a bond. If used, the operator's procedures should delineate how the resistor will be sized.</p> <p>In general, if cathodic protection current is flowing through the bond back off of the operator's pipeline to a foreign structure, then the bond is likely to be critical. Some operator's may consider the bond critical only if the pipe-to-soil potential on its pipeline drops below one of the accepted criteria if the bond fails, even though the current may be flowing off the pipeline through the bond. In this case, the bond would require the more frequent checks.</p> <p>If cathodic protection current is returning to the operator's pipeline from the foreign structure, then the bond is probably not a critical one and will only require annual monitoring. Be aware, however, that if the foreign structure is another pipeline, the bond may be considered critical to the operator of that pipeline.</p> <p>The inspector should be aware that critical bonds may also exist between portions of the operator's own system, i.e. between the mainline and a compressor station facility. In many cases, these bonds may be present to simplify the application of cathodic protection and are not considered critical. In some cases, however, significant interference may occur to one of the pipeline systems should the bond fail. In this case, it may need to be considered a critical bond.</p>
Examples of a Violation	<p>The reverse current switches, diodes and each interference bond (critical bond) whose failure would jeopardize structure protection is not electrically checked six times each calendar year or inspected at intervals exceeding 2 1/2 months. The interference bond whose failure would not jeopardize structure protection is not checked at least once each calendar year or is checked at intervals exceeding 15 months.</p>
Evidence Guidance	<p>Operator's O & M manual, maintenance records.</p>
Other Special Notifications	<p>None</p>

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.465	Corrosion Control Procedure Rewrite Committee
Heading	§192.465(d) External corrosion control: Monitoring	
Existing Code Language:	Each operator shall take prompt remedial action to correct any deficiencies indicated by the monitoring.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt. 192-85 , 63 FR 37500, July 13, 1998]	
Enforcement Language	<p>A violation of § 192.465(d) exists if:</p> <p>Prompt remedial action is not taken to correct a deficiency indicated by monitoring.</p> <p>Inspection guidelines for §192.465 (d)</p> <p>The definition of "prompt" will vary with the circumstances. Enforcement should be sought only when the investigator is convinced that corrective action was unreasonably delayed. Inspector must state why he determined the delay to be unreasonable.</p> <p>The operator should be required to have procedures (per 192.453) for responding to deficiencies found by the required monitoring. Those procedures should include as a minimum:</p> <ol style="list-style-type: none"> 1. A time frame for evaluating data and determining a course of action. 2. A time frame for any new installation to be operational and Cathodic Protection to be in the adequate range. <p>These time frames should give consideration to the population density and environmental concerns of the area that could potentially be affected by released gas. They may also consider climatic conditions, availability of material, work loads, and an estimate of a relative rate of detrimental corrosion. As a rule of thumb, the OPS would expect that, under normal conditions, the operator should have the evaluations and decisions made and action started within a few months, proportionally less where required monitoring 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. If the operator has no procedure for promptly responding and deficiencies exist, it is a violation of 192.465(d). If you can demonstrate that the operator's established time frame for action is inadequate, you may cite him for a violation or proceed with a notice of amendment or both.</p> <p>Evidence of violation - § 192.465 (d):</p> <ol style="list-style-type: none"> 1. a. Documentation showing that deficiency was discovered, including operator's records of monitoring performed and the operator's written 	

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	<p>procedures per § 192.605; and</p> <p>2. b. Documentation showing that corrective action has not been taken; including:</p> <p style="padding-left: 40px;">i. Statement of absence of action by operator or investigator; or</p> <p style="padding-left: 40px;">ii. Documentation showing that corrective action was not taken promptly, including operator's record of date of discovery and date of corrective action.</p>																				
Pending NPRM	None																				
Interpretation 1 Excerpts	<table border="0"> <tr> <td>Oct 20, 70</td> <td>Oct 1, 71</td> <td>Feb 8, 72</td> <td>Feb 24, 72</td> <td>Mar 3, 72</td> </tr> <tr> <td>Jul 16, 76</td> <td>Jun 27, 97</td> <td>May 9, 72</td> <td>May 9, 73</td> <td>Sep 26, 73</td> </tr> <tr> <td>Jan 24, 74</td> <td>Feb 26, 76</td> <td>Oct 17, 97</td> <td>Mar 3, 76</td> <td>Oct 18, 85</td> </tr> <tr> <td>May 19, 89</td> <td>Apr 3, 91</td> <td>Nov 7, 91</td> <td>Jul 31, 98</td> <td></td> </tr> </table>	Oct 20, 70	Oct 1, 71	Feb 8, 72	Feb 24, 72	Mar 3, 72	Jul 16, 76	Jun 27, 97	May 9, 72	May 9, 73	Sep 26, 73	Jan 24, 74	Feb 26, 76	Oct 17, 97	Mar 3, 76	Oct 18, 85	May 19, 89	Apr 3, 91	Nov 7, 91	Jul 31, 98	
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May 19, 89	Apr 3, 91	Nov 7, 91	Jul 31, 98																		
Other Ref. Material & Source	Industry Standards, Glossary																				
Guidance Material	The inspector should review operator's procedure on how the prompt remedial action is defined and then review its maintenance records to assure proper compliance.																				
Examples of a Violation	If the pipe-to-soil potentials falls below the acceptable criteria in accordance with Appendix D, Part 192 and the corrective action is unreasonably delayed																				
Evidence Guidance	Pipe-to-soil readings of last two consecutive years, remedial action records.																				
Other Special Notifications	None																				

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005			
Code Reference Number	192.465	Corrosion Control Procedure Rewrite Committee			
Heading	§192.465(e) External corrosion control: Monitoring				
Existing Code Language:	<p>After the initial evaluation required by §§192.455(b) and (c) and 192.457(b), each operator must, not less than every 3 years at intervals not exceeding 39 months, reevaluate its unprotected pipelines and cathodically protect them in accordance with this subpart in areas in which active corrosion is found. The operator must determine the areas of active corrosion by electrical survey. However, on distribution lines and where an electrical survey is impractical on transmission lines, areas of active corrosion may be determined by other means that include review and analysis of leak repair and inspection records, corrosion monitoring records, exposed pipe inspection records, and the pipeline environment. In this section:</p> <p>(1) Active corrosion means continuing corrosion which, unless controlled, could result in a condition that is detrimental to public safety.</p> <p>(2) Electrical survey means a series of closely spaced pipe-to-soil readings over a pipeline that are subsequently analyzed to identify locations where a corrosive current is leaving the pipeline.</p> <p>(3) Pipeline environment includes soil resistivity (high or low), soil moisture (wet or dry), soil contaminants that may promote corrosive activity, and other known conditions that could affect the probability of active corrosion.</p>				
Origin of Code	NGPLSA 1968				
Last FR Amendment	[Amdt. 192-85 , 63 FR 37500, July 13, 1998; Amdt. 93, 68 FR 53895, Sept. 15, 2003]				
Enforcement Language	Evidence of violation-Section 192.465(e):				
Pending NPRM	None				
Interpretation 1 Excerpts	Oct 20, 70	Oct 1, 71	Feb 8, 72	Feb 24, 72	Mar 3, 72
	Jul 16, 76	Jun 27, 97	May 9, 72	May 9, 73	Sep 26, 73
	Jan 24, 74	Feb 26, 76	Oct 17, 97	Mar 3, 76	Oct 18, 85
	May 19, 89	Apr 3, 91	Nov 7, 91	Jul 31, 98	
Other Ref. Material & Source	Industry Standards, Glossary				
Guidance Material	<p>I. In order to achieve uniform enforcement policy, all regions should consider continuing corrosion occurring in the following areas to be detrimental to public safety, i.e. "active corrosion":</p> <p>1. Urban areas</p> <p>(a) Most areas within the boundary limits of any incorporated or unincorporated city, town, or village. Corrosion on pipelines should not be considered active if the pipeline is located in a Class 1 or 2 location and the pipeline is not within 100 yards of a building intended for human occupancy.</p> <p>(b) Any residential or commercial area, such as a subdivision, business or shopping center, or community development</p> <p>(c) Areas in which the pipeline closely parallels or crosses underground</p>				

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sewers or other utility lines.

2. In an area where the pipeline lies within 100 yards of the following:

(a) A building that is intended for human occupancy.

(b) A small well-defined outside area that is occupied by 20 or more persons during normal use, such as a playground, recreation area, outdoor theater, or other place of public assembly.

3. At highway and railroad crossings.

4. All underground piping at compressor stations and regulator stations

NOTE: When citing an operator for an "active corrosion violation," the inspector must always state the reason and the area where the corrosion violation exists.

II. For distribution system operators.

i.. Paragraph 465(e) requires that distribution operators re-evaluate their unprotected pipelines, which were initially evaluated as required by § 192.455(b) and (c) and 192.457(b) at intervals not exceeding 3 years. An electrical survey should, as a first choice, be used by distribution operators to determine areas of active corrosion on these unprotected lines. However, operators need not use electrical survey if it is impractical for their system. Operators need not prove that it is physically impossible to run an electrical survey. A distribution operator should not be cited for not having run electrical surveys over its unprotected bare and ineffectively coated piping system located in wall-to-wall pavement areas, areas where their pipe is in a common trench with other metallic structures, areas where stray currents predominate, or in areas where the pipe is continually going in and out of paved areas (roads, sidewalks, parking lots, etc.).

ii. Operators who do not run electrical surveys over their unprotected metallic pipelines must have developed a separate program to effectively monitor unprotected coated and bare (ineffectively coated) pipelines. The operators must demonstrate that they are effectively using their leak history records, leak detection surveys, study of corrosion, and environmental studies to monitor these pipelines. Based on the results of this monitoring, operators must take action to either cathodically protect areas of active corrosion on their system or replace that portion of piping.

III. For transmission line operators.

Paragraph (e) requires that transmission line operators re-evaluate their unprotected pipelines, which were initially evaluated as required by §192.455(b) and (c) and §192.457(b), at intervals not exceeding 3 years. Transmission line operators as a first choice should use an electrical survey for the re-evaluation. If transmission line operator chooses not to run an electrical survey to meet the requirements of paragraph (e):

i. The operator must demonstrate why it is "impractical." The operator need

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	<p>not prove physical impossibility.</p> <p>ii. Operator must prove to the OPS inspector that it has a separate program of leak detection studies, corrosion history studies, and leak history records which are effectively monitoring the pipeline. The overall effectiveness of the program should be judged on the ability of an operator to show a significant drop in their corrosion leakage rate or a stabilized minimal corrosion leakage rate.</p> <p>Note: An “electrical survey” defined by 465(e)(2) refers to a close-interval potential survey when it specifies “a series of closely spaced pipe-to-soil potential readings over a pipeline.” However, there are other surveys an operator might use to detect corrosion on a bare or ineffectively coated pipeline, such as a “hot-spot” survey using current reversals and side-drain readings to locate likely corrosive areas.</p>
Examples of a Violation	<p>a. Documentation that pipeline was initially evaluated pursuant to Section 192.455(b) and (c) or Section 192.457(b), and documentation showing pipeline is not inspected at required intervals. Include operator's records of inspection under Section 192.491 and any statements by the operator which admit to exceeding interval; or</p> <p>b. Documentation that the operator has not set up a separate program to reevaluate these unprotected lines. Include any statements of the operator.</p> <p>c. Obtain corrosion leak history on unprotected pipeline. A re-evaluation of an unprotected pipeline is not done at least every three years and the said pipeline is initially evaluated pursuant to sections 192.455(b) or (c) and 192.457(b).</p>
Evidence Guidance	Operator’s O & M manual, maintenance records, statements of operator’s personnel.
Other Special Notifications	None

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005			
Code Reference Number	192.467	Corrosion Control Procedure Rewrite Committee			
Heading	§192.467(a) External corrosion control: Electrical isolation.				
Existing Code Language:	Each buried or submerged pipeline must be electrically isolated from other underground metallic structures, unless the pipeline and the other structures are electrically interconnected and cathodically protected as a single unit.				
Origin of Code	NGLPSA 1968				
Last FR Amendment	[Amdt.192-33, 43 FR 39389, Sept. 5, 1978]				
Enforcement Language	<p>A violation of section 192.467(a) exists if: A buried or submerged transmission pipeline or a distribution pipeline is not electrically isolated from other underground metallic structures, unless the pipeline and the other structures are electrically interconnected and cathodically protected as a single unit.</p> <p>Evidence of violation: Documentation and dates of pipe-to-soil potential surveys on transmission and distribution pipelines and adjacent metallic structures. The operator failed to take any remedial action if electrical isolation is not found between the transmission or distribution pipelines and the adjacent metallic structures.</p>				
Pending NPRM	None				
Interpretation 1 Excerpts	Dec 15, 71 Aug 16, 77 Nov 10, 98	Feb 8, 72 Mar 18, 74	Jul 14, 72 Apr 30, 75	Jan 17, 74 Jul 24, 86	Feb 2, 74 Aug 19, 93
Other Ref. Material & Source	Industry Standards, Glossary				
Guidance Material	<p>Enforcement Criteria 192.467(a) Electrically continuous pipelines may be protected as a single unit. Therefore, unintentional shorts to other metallic structures must be cleared. To facilitate current distribution, pipelines may be divided into segments or isolated from compressor station piping by isolating devices.</p> <p>An operator does not necessarily need to take P/S potentials on non-jurisdictional metallic structures (water, electrical, or grounding systems) that are part of the cathodically protected system at a compressor station. As long as the operator's annual survey on their pipeline meets applicable CP criterion, they are in compliance with 192.467(a).</p>				
Examples of a Violation	<p>The operator did not isolate its transmission or distribution pipelines from adjacent metallic structures unless the pipelines and the other structures are electrically interconnected and cathodically protected as a single unit.</p> <p>The operator has no procedure for checking insulators.</p> <p>Operator has no records documenting his checks of insulators.</p>				

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Evidence Guidance	Operator's O & M manual, maintenance records, photographs.
Other Special Notifications	None

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005			
Code Reference Number	192.467	Corrosion Control Procedure Rewrite Committee			
Heading	§192.467 (b) External corrosion control: Electrical isolation.				
Existing Code Language:	One or more insulating devices must be installed where electrical isolation of a portion of a pipeline is necessary to facilitate the application of corrosion control.				
Origin of Code	NGLPSA 1968				
Last FR Amendment	[Amdt.192-33, 43 FR 39389, Sept. 5, 1978]				
Enforcement Language	A violation exists if: Operator cannot produce records of evaluations performed to determine need of insulators. The operator does not have documentation the needed insulators have been installed.				
Pending NPRM	None				
Interpretation 1 Excerpts	Dec 15, 71 Aug 16, 77 Nov 10, 98	Feb 8, 72 Mar 18, 74	Jul 14, 72 Apr 30, 75	Jan 17, 74 Jul 24, 86	Feb 2, 74 Aug 19, 93
Other Ref. Material & Source	Industry Standards, Glossary				
Guidance Material	<p>Enforcement Criteria 192.467(b): Electrical isolation may be accomplished by using: Insulating flange kits, unions, or insulating joints. As a precaution some operators install polarization cells, grounding cells to bleed off foreign or stray currents.</p> <p>The inspector should determine: how many areas in the operator's pipeline system needs to be electrically isolated and if proper insulating devices are installed at those locations, if the operator is checking all its insulating devices periodically to evaluate the application of corrosion control.</p>				
Examples of a Violation	No insulating devices installed at a section where electrical isolation is necessary.				
Evidence Guidance	Operator's O & M manual, maintenance records, photographs.				
Other Special Notifications	None				

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005			
Code Reference Number	192.467	Corrosion Control Procedure Rewrite Committee			
Heading	§192.467 (c) External corrosion control: Electrical isolation.				
Existing Code Language:	Except for unprotected copper inserted in a ferrous pipe, each pipeline must be electrically isolated from metallic casings that are a part of the underground system. However, if isolation is not achieved because it is impractical, other measures must be taken to minimize corrosion of the pipeline inside the casing.				
Origin of Code	NGLPSA 1968				
Last FR Amendment	[Amdt.192-33, 43 FR 39389, Sept. 5, 1978]				
Enforcement Language	<p>A Violation of Section 192.467(c) exists if:</p> <p>1. An operator has knowledge of potentially electrically shorted casing for more than six months and has not initiated corrective action or instituted a monitoring program.</p> <p>2. Evidence of violation - Section 192.467(c):</p> <p>a. Documentation and dates of pipe-to-soil potential surveys made pursuant to Section 192.465 that show pipe-to-soil and adjacent casing-to-soil potentials to be essentially the same, indicating a possible electrical short between casing and pipe.</p> <p>Notes: A zero resistant short, as in (a) prevents cathodic protection from reaching the pipeline inside the casing, and thus prevents the operator from complying with Sections 192.455(a)(2) and 192.457(a) for those pipe sections.</p> <p>b. Operator records:</p> <p>Pipe-to-soil and casing-to-soil potential measurements should be retained by the operator in accordance with Section 192.491(b)).</p> <p>c. Operator's O&M Plan:</p> <p>To comply with the requirements of Sections 192.467(c), 192.453, and 192.605, the operator's O&M Plan must incorporate procedures to be used for correcting or negating the adverse effects of shorted casings. Then, consistent with Section 192.13(c), the operator is to follow the procedures that It has established.</p> <p>Note: For additional information, see advisory bulletin on shorted casings.</p>				
Pending NPRM	None				
Interpretation 1 Excerpts	Dec 15, 71 Aug 16, 77	Feb 8, 72 Mar 18, 74	Jul 14, 72 Apr 30, 75	Jan 17, 74 Jul 24, 86	Feb 2, 74 Aug 19, 93

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	Nov 10, 98
Other Ref. Material & Source	Industry Standards, Glossary, advisory bulletin on shorted casings
Guidance Material	<p>Casings are electrically isolated from carrier pipeline because usually they are uncoated and will rob the current away from the carrier pipeline.</p> <p>To avoid this loss of current from the carrier pipeline, casings are electrically isolated from the pipeline. However, sometime this isolation cannot be maintained. This failure may be classified as either direct or electrolytic shorts.</p> <p>Direct shorts occur when the carrier pipe and the casing are in metallic contact. The electrical resistance between the carrier pipe and the casing would be zero ohms. If it is not practical to clear the short, the operator should consider introducing a high dielectric into the annulus. If the operator considers introducing a high dielectric impractical, the operator must physically monitor a shorted casing with a leak detection instrument or using internal inspection monitoring tool on a periodic basis.</p> <p>Electrolytic shorts occur when the casing is filled with an electrolyte. This type of short may or may not be low resistance. The rule of thumb is that the carrier pipe is protected when there is an electrolytic short and therefore corrosion engineers do not see this short as an operational concern. This is because when a casing has an electrolyte in the annulus, the protective current will discharge from the casing to pipe which protects the carrier pipe.</p> <p>The operator's Operation and Maintenance (O&M) Plan should also be investigated to:</p> <ol style="list-style-type: none"> a. Determine that the operator has a written procedure to react to shorted casings per Section 192.605, and: b. Determine that the operator follows that procedure per Section 192.13(c).
Examples of a Violation	A metallic short is discovered between pipeline and casing and the operator did not take any remedial action to clear the short or implement monitoring.
Evidence Guidance	Operator's procedure on shorted casings, Annual pipe-to-soil & casing-to-soil readings. photographs.
Other Special Notifications	None

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005			
Code Reference Number	192.467	Corrosion Control Procedure Rewrite Committee			
Heading	§192.467 (d) External corrosion control: Electrical isolation.				
Existing Code Language:	Inspection and electrical tests must be made to assure that electrical isolation is adequate.				
Origin of Code	NGLPSA 1968				
Last FR Amendment	[Amdt.192-33, 43 FR 39389, Sept. 5, 1978]				
Enforcement Language	A violation of section 192.467(d) exists if: The operator does not have records to show that testing has been performed and, if tests were performed indications that the electrical isolation is effective.				
Pending NPRM	None				
Interpretation 1 Excerpts	Dec 15, 71 Aug 16, 77 Nov 10, 98	Feb 8, 72 Mar 18, 74	Jul 14, 72 Apr 30, 75	Jan 17, 74 Jul 24, 86	Feb 2, 74 Aug 19, 93
Other Ref. Material & Source	Industry Standards, Glossary				
Guidance Material	Enforcement Criteria 192.467(d): Operator must demonstrate through inspection & electrical tests, that electrical isolation is adequate. The tests being performed must be adequate to demonstrate that electrical isolation is, or is not, effective.				
Examples of a Violation	No electrical test has been performed to assure that the isolation is effective. These test should be performed on a periodic basis as determined by the operator.				
Evidence Guidance	Operator's O & M manual, maintenance records.				
Other Special Notifications	None				

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005			
Code Reference Number	192.467	Corrosion Control Procedure Rewrite Committee			
Heading	§192.467 (e) External corrosion control: Electrical isolation.				
Existing Code Language:	An insulating device may not be installed in an area where a combustible atmosphere is anticipated unless precautions are taken to prevent arcing.				
Origin of Code	NGLPSA 1968				
Last FR Amendment	[Amdt.192-33, 43 FR 39389, Sept. 5, 1978]				
Enforcement Language	<p>A violation of section §192.467(e) exists if:</p> <p>Insulating devices are installed in areas of combustibility so as to allow for the potential of electrical arcing.</p> <p>Evidence of violation - §192.467(e)</p> <p>Lack of documentation verifying that insulating devices have been designed and installed properly to prevent arcing or that appropriate protective measures have been identified and implemented.</p>				
Pending NPRM	None				
Interpretation 1 Excerpts	Dec 15, 71 Aug 16, 77 Nov 10, 98	Feb 8, 72 Mar 18, 74	Jul 14, 72 Apr 30, 75	Jan 17, 74 Jul 24, 86	Feb 2, 74 Aug 19, 93
Other Ref. Material & Source	Industry Standards, Glossary National Electrical Code (ANSI/NFPA 70-1996 or latest incorporated revision)				
Guidance Material	<p>Enforcement Criteria 192.467(e):</p> <p>Electrical isolation devices should not be installed in areas where gas can collect and ignite. Examples of such areas are: Vaults, buildings, other enclosed areas, etc</p> <p>Usually these situations would be found during the field inspection or after accidents. The O & M standard engineering drawing of vaults, buildings, and other enclosed areas, etc. should have cautionary notes regarding the installation of electrical devices in these areas. Some precautionary measures might include the installation of grounding cells or polarization cells.</p>				
Examples of a Violation	An insulating device is installed in a area where a combustible atmosphere is anticipated and no precautions are taken.				
Evidence Guidance	Operator's procedure on insulating devices, maintenance records, photographs.				
Other Special Notifications	None				

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005			
Code Reference Number	192.467	Corrosion Control Procedure Rewrite Committee			
Heading	§192.467 (f) External corrosion control: Electrical isolation.				
Existing Code Language:	Where a pipeline is located in close proximity to electrical transmission tower footings, ground cables or counterpoise, or in other areas where fault currents or unusual risk of lightning may be anticipated, it must be provided with protection against damage due to fault currents or lightning, and protective measures must also be taken at insulating devices.				
Origin of Code	NGLPSA 1968				
Last FR Amendment	[Amdt.192-33, 43 FR 39389, Sept. 5, 1978]				
Enforcement Language	A violation of section 192.467(f) exists if: An engineering analysis has not been performed to determine the effects of fault currents and lightning.				
Pending NPRM	None				
Interpretation 1 Excerpts	Dec 15, 71 Aug 16, 77 Nov 10, 98	Feb 8, 72 Mar 18, 74	Jul 14, 72 Apr 30, 75	Jan 17, 74 Jul 24, 86	Feb 2, 74 Aug 19, 93
Other Ref. Material & Source	Industry Standards, Glossary				
Guidance Material	Enforcement Criteria 192.467(f): Inspector should inquire if there are high voltage electrical transmission lines or substations adjacent to their pipeline and how often they determine the effect of fault current. Ask the operator what are the mitigating steps taken to protect the pipeline from fault currents and lightning. Note: No formal study is required to determine the effect of fault current. The operator should follow its procedure on frequency of determining the effect of fault current.				
Examples of a Violation	No protection has been provided against damage due to fault currents or lightning.				
Evidence Guidance	Field checks, maintenance records.				
Other Special Notifications	None				

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.469	Corrosion Control Procedure Rewrite Committee
Heading	§192.469 External corrosion control: Test stations.	
Existing Code Language:	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.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt. 192-4, 36 FR 12297, June 30, 1971, as amended by Amdt. 192-27, 41 FR 34606, Aug. 16, 1976]	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	Feb 24, 72 Sep 24, 85 Jul 16, 76	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	<p>192.469 The operator must have sufficient test stations where data is collected to demonstrate that their entire pipeline is cathodically protected. Common industry practice is to install test stations at convenient locations along the ROW.</p> <p>Has the operator performed a close-interval-survey (CIS) on the pipeline? After performing a CIS, the operator may have found areas of low P/S potentials between test stations where they need to take remedial action. This may include adding additional galvanic anodes, new rectifier and ground bed, and increasing the output of the rectifiers on either side of the area of low readings.</p> <p>If the inspector expects that there are insufficient test stations, he may require the operator to reel out wire from the existing test stations to check potentials in between. Also, leak history should be reviewed and if corrosion leak occurs, the number of test stations may be insufficient to ensure the adequacy of cathodic protection.</p> <p>Close interval surveys not only confirm P/S readings at the established test stations but also gives cathodic protection's effectiveness between the two test stations.</p> <p>Inspector Note: <u>Some factors to consider:</u> Pipe coating-(Coating Quality Surveys, e.g. C- Scan) Age of pipe - (pipe coating may deteriorate with age) Increasing current requirements over time * increasing current output from rectifiers over time River crossings - current measuring test stations on either side of the crossing. A comparison of the magnitude of current pick up from each side of the river will allow one to calculate current pick up in the river.</p>	

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	<p>Enforcement Criteria: A review should be made of the operator’s standards for making test lead connections to ensure proper application and continuity.</p> <p>Inspector Note: The inspector must be cognizant of test station readings. If the line is cathodically protected and the reading is <0.5 mV, you may have a problem with the test lead, e.g. a short. Additional investigation is needed to determine whether the operator is reading the unattached copper lead to ground or if the lead is shorted .</p> <p>1 INSTALLATION METHODS Some acceptable methods include the following.</p> <p>1.1 Thermit welding. (a) Steel. Attachment of electrical leads directly to steel pipe by the thermit welding process using copper oxide and aluminum powder. The thermit welding charge should be limited to a 15-gram cartridge.</p> <p>1.2 Solder connections. Attachment of electrical leads directly to steel pipe with the use of soft solders or other materials which do not involve temperatures exceeding those for soft solders.</p> <p>1.4 Mechanical connections. Mechanical connections should remain secure and electrically conductive.</p> <p>2 OTHER CONSIDERATIONS For convenience, conductors may be coded or permanently identified. Wire should be installed with slack. Damage to insulation should be avoided. Repairs should be made if damage occurs. Test leads should not be exposed to excessive heat or excessive sunlight.</p>
Examples of a Violation	<p>A violation exists if:</p> <ul style="list-style-type: none"> • 195.567(a) The P/S measurements at or between two adjacent test stations does not meet the operator’s criteria for cathodic protection or the operator has had a corrosion leak or if between two subsequent smart pig surveys, new corrosion is discovered. If new corrosion is occurring on a line, the operator does not have adequate cathodic protection and by default may not have an adequate number of test stations to effectively evaluate the system or an isolated shielding problem. • The test lead is not connected to the pipe. • The test lead is not mechanically secure. • The test lead is not electrically conductive. • The operator has not repaired or replaced required test leads when found. • The thermit welding charge is greater than a 15-gram cartridge. The connection is not coated.

Evidence Guidance	Graphical representation of P/S readings vs distance along a pipeline segment showing insufficient number of test stations &/or readings that do not meet the operator's documented criteria for cathodic protection. Maps showing locations of test stations.
Other Special Notifications	Inspector Note: The operator should indicate the test points used to show adequacy of cathodic protection. Measurements should be taken at these test stations while conducting the annual survey. Operators may install additional wires on their pipe to perform special tests on the cathodic protection system. Potentials at these locations are not required during annual CP surveys.

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.471	Corrosion Control Procedure Rewrite Committee
Heading	§192.471(a) External corrosion control: Test leads.	
Existing Code Language:	Each test lead wire must be connected to the pipeline so as to remain mechanically secure and electrically conductive.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	None	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	Jul 16, 76	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	<p>1 INSTALLATION METHODS Some acceptable methods include the following.</p> <p>1.1 Thermit welding. (a) Steel. Attachment of electrical leads directly to steel pipe by the thermit welding process using copper oxide and aluminum powder. The thermit welding charge should be limited to a 15-gram cartridge.</p> <p>1.2 Solder connections. Attachment of electrical leads directly to steel pipe with the use of soft solders or other materials which do not involve temperatures exceeding those for soft solders.</p> <p>1.4 Mechanical connections. Mechanical connections should remain secure and electrically conductive.</p> <p>2 OTHER CONSIDERATIONS For convenience, conductors may be coded or permanently identified. Wire should be installed with slack. Damage to insulation should be avoided. Repairs should be made if damage occurs. Test leads should not be exposed to excessive heat or excessive sunlight.</p>	
Examples of a Violation	<p>A violation of 192.471(a) exists if: The test lead is not connected to the pipe. The test lead is not mechanically secure. The test lead is not electrically conductive.</p>	
Evidence Guidance	Pictures, maintenance records, O&M Manual, operator's personnel statements	
Other Special Notifications	Inspector Note: The inspector must be cognizant of test station readings. Additional investigation may be needed to determine whether the operator is reading the unattached copper lead to ground or if the lead is shorted.	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.471	Corrosion Control Procedure Rewrite Committee
Heading	§192.471 (b) External corrosion control: Test leads.	
Existing Code Language:	Each test lead wire must be attached to the pipeline so as to minimize stress concentration on the pipe.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	None	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	Jul 16, 76	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	None	
Examples of a Violation	A violation of 192.471(b) exists if: The thermite welding charge is greater than a 15-gram cartridge.	
Evidence Guidance	Pictures, maintenance records, O&M Manual, operator's personnel statements.	
Other Special Notifications	None.	

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Code Reference Number	192.471	Corrosion Control Procedure Rewrite Committee
Heading	§192.471 (c) External corrosion control: Test leads.	
Existing Code Language:	Each bared test lead wire and bared metallic area at point of connection to the pipeline must be coated with an electrical insulating material compatible with the pipe coating and the insulation on the wire.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	None	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	Jul 16, 76	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	None	
Examples of a Violation	A violation of 192.471(c) exists if: The connection is not coated.	
Evidence Guidance	Pictures, maintenance records, O&M Manual, operator's personnel statements	
Other Special Notifications	None.	

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Code Reference Number	192.473	Corrosion Control Procedure Rewrite Committee
Heading	§192.473 (a) External corrosion control: Interference currents.	
Existing Code Language:	(a) Each operator whose pipeline system is subjected to stray currents shall have in effect a continuing program to minimize the detrimental effects of such currents. (b) Each impressed current type cathodic protection system or galvanic anode system must be designed and installed so as to minimize any adverse effects on existing adjacent underground metallic structures.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt. 192-4, 36 FR 12297, June 30, 1971, as amended by Amdt. 192-33, 43 FR 39389, Sept. 5, 1978]	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	Feb 24, 72	
Other Ref. Material & Source	Industry Standards, Glossary RP01-69-96 Appendix A	
Guidance Material	<p>The inspector should ask the operator if there are any foreign pipeline crossings or other structures that might subject the pipeline system to stray currents. Other potential stray current sources include direct current (DC) transit systems, DC mining operations, DC welding operations, and high voltage electric transmission systems.</p> <p>If so, then the operator must have a written plan to identify, test for, and minimize the detrimental effects of such currents.</p> <p>Annual test station surveys are generally insufficient to determine whether stray currents are present on the pipeline. An operator, particularly of a pipeline in a congested area with a lot of other cathodically protected structures, will generally need to perform close-interval surveys or turn suspected foreign rectifiers on and off to obtain sufficient information to determine whether stray currents are present on the pipeline. The operator must then take action to mitigate the detrimental effects of the stray current. Mitigative actions may include the installation of an interference bond between the structures, the addition of magnesium anodes to bleed away the stray current, recoating selected portions of one or both of the structures, reverse current switches, etc.</p>	
Examples of a Violation	<p>A violation exists if:</p> <p>The operator does not have a written procedure to identify and test for stray current. If there are potential sources of interference the operator should have records that show results of tests performed and what mitigating action was performed, if necessary</p> <p>Lack of documentation regarding stray current identification and periodic testing.</p>	

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	Leak record indicating interference as a cause.
Evidence Guidance	O & M manual, maintenance records.
Other Special Notifications	None.

Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.473	Corrosion Control Procedure Rewrite Committee
Heading	§192.473 (b) External corrosion control: Interference currents.	
Existing Code Language:	Each impressed current type cathodic protection system or galvanic anode system must be designed and installed so as to minimize any adverse effect on existing adjacent underground metallic structures.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt. 192-4, 36 FR 12297, June 30, 1971, as amended by Amdt. 192-33, 43 FR 39389, Sept. 5, 1978]	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	Feb 24, 72	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	<p>Note that this is a design requirement. When designing and installing a cathodic protection system, the operator should evaluate the potential for causing adverse effects on existing nearby structures. The operator's documentation should indicate that some effort was made to identify such structures and to perform testing, if necessary, after the installation to demonstrate that stray currents from the system are not adversely affecting any existing adjacent structures. If found to be, then the operator should cooperate with the owner of the foreign structure as necessary to mitigate the adverse effects. Mitigation measures may include galvanic anodes, bonds, coating, polarization cell, relocating pipeline or CP facilities.</p> <p>Evidence of violation Lack of documentation regarding stray current identification and periodic post-installation testing. Leak record indicating interference as the cause.</p>	
Examples of a Violation	<p>The operator did not design and install its impressed current type cathodic protection system or galvanic anode system to minimize the detrimental effects of stray currents.</p> <p>The operator did not perform any post-installation testing, particularly if requested by the owner of the existing structure.</p>	
Evidence Guidance	Design documents and installation records. Cathodic protection records.	
Other Special	None	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.475	Corrosion Control Procedure Rewrite Committee
Heading	§192.475 (a) Internal corrosion control: General.	
Existing Code Language:	Corrosive gas may not be transported by pipeline, unless the corrosive effect of the gas on the pipeline has been investigated and steps have been taken to minimize internal corrosion.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt. 192-85 , 63 FR 37500, July 13, 1998]	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	Jul 21, 83 Nov 19, 98	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	<p>Are there any indications that point out internal corrosion could be a problem? List some of the indications.</p> <p>Most transported gas is quality controlled by either a tariff or by contract. A record of the constituents in the gas can be obtained from the operator. Usually, the record will be a gas chromatograph. Operators are required to keep this record.</p> <p>1. The operator should have a procedure to determine if the gas is corrosive. The procedure for identifying the factors that influence the formation of internal corrosion, including gas quality and operating parameters, in particular gas velocity and temperature. Special attention should be given to pipeline alignment features such as changes in elevation, low points, sharp bends that may contribute to internal corrosion by allowing condensates to settle out of the gas stream. Free water inside a pipeline can combine with carbon dioxide and hydrogen sulfide to form acids that cause serious damage to the internal surfaces of pipelines and their associated appurtenances. Micro biologically influenced corrosion (MIC) can also cause serious internal corrosion problems in pipelines that contain condensates. Bacterial colonies can form deposits on metal surfaces and produce organic acids that accelerate corrosion and cause localized pitting.</p> <p>2. Review procedures for testing to determine the existence or severity of internal corrosion associated with the pipelines. Some methods for monitoring internal corrosion are weight loss coupons, radiography, water chemistry tests, in-line inspection tools, and electrical, galvanic, resistance and hydrogen probes. Special attention should be given to specific conditions, including flow characteristics, pipeline location (especially drips, deadlegs, and sags,) which are on-line segments that are not cleaned by pigging or other methods.</p>	

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	<p>Internal corrosion is influenced by flow regime, pipeline location, operating temperature and pressure, water content, carbon dioxide and hydrogen sulfide content, oxygen, bacteria and sediment deposits.</p> <p>3. Review conditions in pipeline segments downstream of gas production and storage fields.</p> <p>4. Review maintenance history records, not just leak history.</p> <p>5. Review conditions in pipeline segments with low spots, sharp bends, sudden diameter changes and fittings that restrict flow or velocity of the gas stream contribute to internal corrosion by allowing the condensates to settle.</p> <p>6. Identify locations from where periodic testing of liquids should be performed. Some locations are pipeline drips, deadhead locations, low points and downstream of dehydration facilities, compressor stations, and metering and regulating stations.</p> <p>7. Review operator’s procedure on the design of drips and pipeline geometry in the pipe associated with storage fields. For instance, in the case of horizontal barrel type drips using ERW pipe, the seam should preferably be located on the top side of the drip. This should help in preventing the accelerated corrosion along the seam due to the retention of condensates. The pipeline geometry can also be improved by getting rid of older stabbed-in-connections, making use of gradually curved fittings and installing flat bottomed reducers.</p> <p>8. Review procedures on maintenance programs and inventories for drips. If drips are flushed by blowing, obtain procedures on determining the frequency of these blow-downs.</p> <p>9. If the operator prefers the use of cleaning pigs and in-line inspection (ILI) tools, the pipeline geometry should be constant and all direction changes should be accomplished using fitting to allow for smooth movement of the pigs. If liquids and solids are removed during the cleaning pigging operation they should be tested for corrosive properties.</p> <p>10. The gas stream should be tested for oxygen, carbon dioxide, hydrogen sulfide and water content. The liquid sample should be tested for pH levels, iron, chlorides,-and bacteria.</p> <p>Violation exists if:</p> <ol style="list-style-type: none"> 1. The corrosive potential of the gas is not determined by appropriate test. 2. Suitable monitoring methods are not used to determine the effectiveness of steps taken to minimize internal corrosion.
Examples of a Violation	<p>The operator did not investigate the corrosive effect of the gas on the pipeline.</p> <p>If corrosive gas has been identified, the operator did not take steps to minimize internal corrosion.</p>
Evidence Guidance	Operator’s O & M procedure, tariff, contract.

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Other Special Notifications	None
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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.475	Corrosion Control Procedure Rewrite Committee
Heading	§192.475 (b) Internal corrosion control: General.	
Existing Code Language:	Whenever any pipe is removed from a pipeline for any reason, the internal surface must be inspected for evidence of corrosion. If internal corrosion is found: (1) The adjacent pipe must be investigated to determine the extent of internal corrosion: (2) Replacement must be made to the extent required by the applicable paragraphs of §§192.485, 192.487, or 192,489; and, (3) Steps must be taken to minimize the internal corrosion..	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt. 192-85 , 63 FR 37500, July 13, 1998]	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	Jul 21, 83 Nov 19, 98	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	<p>Enforcement Criteria for 192 475(b): Any time a pipe section is removed or cut an inspection for corrosion inside the pipe must be performed. If corrosion is found to be occurring on the inside surface of the adjacent pipeline then remaining wall strength calculations should be performed and the line segment derated, replaced or repaired according to the extent of internal corrosion found. If internal corrosion is found, the operator must have a program for mitigation.</p> <p>Violation of 192 475(b) exists if: The operator does not have records to show that an internal inspection of a removed section of pipe occurred.</p> <p>Internal corrosion was found by inspection of a removed section of pipe and the operator failed to determine the extent and determine if additional pipe must be removed, cause of corrosion and take steps to correct the problem.</p> <p>If internal corrosion is found, and the operator does not have a program for mitigation.</p>	
Examples of a Violation	No internal inspection of the removed segment of the pipeline has been conducted. If internal corrosion is detected, and the operator did not take any remedial actions to mitigate it.	
Evidence Guidance	O & M manual, maintenance records, photographs.	
Other Special	None	

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Enforcement Manual, Code Compliance Guidelines		Date:11/17/2005
SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Revised: 11/17/2005
Code Reference Number	192.475	Corrosion Control Procedure Rewrite Committee
Heading	§192.475 (c) Internal corrosion control: General.	
Existing Code Language:	Gas containing more than 0.25 grain of hydrogen sulfide per 100 standard cubic feet (5.8 milligrams/m ³) at standard conditions (4 parts per million) may not be stored in pipe-type or bottle-type holders.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt. 192-85 , 63 FR 37500, July 13, 1998]	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	Jul 21, 83 Nov 19, 98	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	<p>Enforcement Criteria 192 475(c): Pipe type and bottle type holders are not often encountered on pipelines or distribution systems. If they are found the regulations restrict the H₂S content of the gas to 0.25 grain or less per 100 cubic feet.</p> <p>Violation of 192 475(c) exists if: Gas held in a pipe or bottle type holder contains more than 0.25 grain of H₂S per 100 cubic feet.</p>	
Examples of a Violation	The gas containing more than 0.25 grain of hydrogen sulfide per 100 cubic feet at standard conditions is stored in pipe-type or bottle-type holders.	
Evidence Guidance	O & M procedure, gas sampling analysis, tariff, contract.	
Other Special Notifications	None	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.477	Corrosion Control Procedure Rewrite Committee
Heading	§192.477 Internal corrosion control: Monitoring.	
Existing Code Language:	If corrosive gas is being transported, coupons or other suitable means must be used to determine the effectiveness of the steps taken to minimize internal corrosion. Each coupon or other means of monitoring internal corrosion must be checked two times each calendar year, but with interval not exceeding 7 ½ months.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt. 192-4, 36 FR 12297, June 30, 1971, as amended by Amdt. 192-33, 43 FR 39389, Sept. 5, 1978]	
Enforcement Language	<p>A violation exists if:</p> <p>1. Corrosive gas is being transported and coupons or other suitable means are not used to determine effectiveness of internal corrosion control.</p> <p>2. Method of monitoring internal corrosion is not checked two times each calendar year or at periods exceeding 7 ½ months.</p> <p>Evidence of violation:</p> <p>1. a. Documentation showing the transported gas is corrosive, including laboratory analysis of gas sample showing that it is corrosive, for example, that it contains hydrogen sulfide, and/or operator's records showing leaks caused by internal corrosion.</p> <p>b. Documentation showing that coupons or other suitable means are not being used. Investigator's or operator's statement indicating coupons or other means are not used.</p> <p>2. Same as 1b for §192.465.</p>	
Pending NPRM	None	
Interpretation 1 Excerpts	Jul 21, 83 Nov 19, 98	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	None	
Examples of a Violation	<p>A violation exists if:</p> <p>1. Corrosive gas is being transported and coupons or other suitable means are not used to determine the effectiveness of internal corrosion control.</p> <p>2. Method of monitoring internal corrosion is not performed two times each calendar year or at periods exceeding 7 ½ months.</p>	
Evidence Guidance	<p>1. a. Documentation showing the transported gas is corrosive, including laboratory analysis of gas sample showing that it is corrosive, for example, that it contains hydrogen sulfide, or operator's records showing leaks caused by internal corrosion.</p> <p>b. Documentation showing that coupons or other suitable means are not being used. Investigator's or operator's statement indicating coupons or other means</p>	

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	are not used. 2. The internal corrosion monitoring program does not have all analytical and operational data to evaluate such program.
Other Special Notifications	None

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.479	Corrosion Control Procedure Rewrite Committee
Heading	§192.479(a) Atmospheric corrosion control; General.	
Existing Code Language:	Each operator must clean and coat each pipeline or portion of pipeline that is exposed to the atmosphere, except pipelines under paragraph (c) of this section.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt. 192-4, 36 FR 12297, June 30, 1971, as amended by Amdt. 192-33, 43 FR 39389, Sept. 5, 1978; Amdt. 192-93, 68 53895, Sept. 15, 2003]	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	May 25, 91 Aug 16, 77	
Other Ref. Material & Source	Industry Standards (NACE RP-01-69); Glossary	
Guidance Material	<p>Enforcement Criteria:</p> <p>A pipeline exposed to the atmosphere is a pipeline that is not buried or submerged in an electrolyte such as soil or seawater.</p> <p>Atmospheric Corrosion is an area of metal loss due to extensive general corrosion, localized corrosion pitting, or peeling scale on the steel surface that has damaged the pipe. Surface oxide is corrosion and if allowed to continue may affect the safe operation of the pipeline at some point in the future. Oxidation (or "light surface oxide") can be defined as the slow rusting of pipe which is not yet considered to be atmospheric corrosion because there is no evidence of metal loss at this time.</p>	
Examples of a Violation	<p>A Violation exists if:</p> <ol style="list-style-type: none"> 1. The operator did not determine areas of atmospheric corrosion. 2. The operator did not take remedial actions once atmospheric corrosion is found. 3. The operator has no procedures for locating and remediating areas of atmospheric corrosion. 	
Evidence Guidance	Pictures, operator's personnel statements, maintenance records, pit depth measurement, documented evidence of pipe wall loss.	
Other Special Notifications	None	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.479	Corrosion Control Procedure Rewrite Committee
Heading	§192.479(a) Atmospheric corrosion control; General.	
Existing Code Language:	Each operator must clean and coat each pipeline or portion of pipeline that is exposed to the atmosphere, except pipelines under paragraph (c) of this section.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt. 192-4, 36 FR 12297, June 30, 1971, as amended by Amdt. 192-33, 43 FR 39389, Sept. 5, 1978; Amdt. 192-93, 68 53895, Sept. 15, 2003]	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	May 25, 91 Aug 16, 77	
Other Ref. Material & Source	Industry Standards (NACE RP-01-69); Glossary	
Guidance Material	<p>A pipeline exposed to the atmosphere is a pipeline that is not buried or submerged in an electrolyte such as soil or seawater.</p> <p>Atmospheric Corrosion is an area of metal loss due to extensive general corrosion, localized corrosion pitting, or peeling scale on the steel surface that has damaged the pipe. Surface oxide is corrosion and if allowed to continue may affect the safe operation of the pipeline at some point in the future. Oxidation (or "light surface oxide") can be defined as the slow rusting of pipe which is not yet considered to be atmospheric corrosion because there is no evidence of metal loss at this time.</p>	
Examples of a Violation	<p>A Violation exists if:</p> <ol style="list-style-type: none"> 1. The operator did not determine areas of atmospheric corrosion on the pipelines installed before August 1, 1971 2. The operator did not take remedial actions once atmospheric corrosion is found 3. The operator has no procedures for locating and remediating areas of atmospheric corrosion. 	
Evidence Guidance	Pictures, operator's personnel statements, maintenance records, pit depth measurement, documented evidence of pipe wall loss.	
Other Special Notifications	None	

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Code Reference Number	192.479	Full Committee	Corrosion Control Procedure Rewrite Committee
Heading	§192.479(b) Atmospheric corrosion control; General.		
Existing Code Language:	Coating material must be suitable for the prevention of atmospheric corrosion.		
Origin of Code	NGPLSA 1968		
Last FR Amendment	[Amdt. 192-4, 36 FR 12297, June 30, 1971, as amended by Amdt. 192-33, 43 FR 39389, Sept. 5, 1978; Amdt. 192-93, 68 53895, Sept. 15, 2003]		
Enforcement Language	None		
Pending NPRM	None		
Interpretation 1 Excerpts	May 25, 91 Aug 16, 77		
Other Ref. Material & Source	Industry Standards (NACE RP 01-69), Glossary		
Guidance Material	<p>Enforcement Criteria: Typical coating materials are non-conductive paints, coatings, or jackets which will isolate the metal from the atmosphere. In order to prevent atmospheric corrosion, the coating material's physical, chemical and electrical characteristics must be evaluated before its application.</p>		
Examples of a Violation	<p>A Violation exists if:</p> <ol style="list-style-type: none"> 1. The operator did not coat areas of aboveground pipe with a suitable material. 2. The coating material is found unsuitable for the prevention of atmospheric corrosion. 3.. The operator did not take remedial actions if the paint or coating is in poor condition and atmospheric corrosion is occurring. 4. The operator has no purchase orders or specifications for coating materials. 		
Evidence Guidance	Pictures, operator's personnel statements, purchase orders, specifications.		
Other Special Notations	None		
Rule Change Recommendations	None		

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Code Reference Number	192.479	Full Committee	Corrosion Control Procedure Rewrite Committee
Heading	§192.479(c) Atmospheric corrosion control; General.		
Existing Code Language:	<p>Except portions of pipelines in offshore splash zones or soil-to-air interfaces, the operator need not protect from atmospheric corrosion any pipeline for which the operator demonstrates by test, investigation, or experience appropriate to the environment of the pipeline that corrosion will-</p> <p style="padding-left: 40px;">(1) Only be a light surface oxide; or</p> <p style="padding-left: 40px;">(2) Not affect the safe operation of the pipeline before the next scheduled inspection.</p>		
Origin of Code	NGPLSA 1968		
Last FR Amendment	[Amdt. 192-4, 36 FR 12297, June 30, 1971, as amended by Amdt. 192-33, 43 FR 39389, Sept. 5, 1978; Amdt. 192-93, 68 53895, Sept. 15, 2003]		
Enforcement Language	None		
Pending NPRM	None		
Interpretation 1 Excerpts	May 25, 91 Aug 16, 77		
Other Ref. Material & Source	Industry Standards (NACE RP 01-69), Glossary		
Guidance Material	<p>“Light surface oxide” is general oxidation of the metal where there is no associated loss of metal. Some corrosion experts consider a light surface oxide to be protective to the metal surface.</p> <p>The exceptions do not include offshore splash zones (where tides and wave actions intermittently impact the pipe) and soil-to-air interfaces (where the pipe first leaves the soil and is exposed to the atmosphere. These areas are critical because of the transient conditions and must be protected from atmospheric corrosion. Protection is typically accomplished by ensuring that the pipe is coated and painted several inches (or feet, in the offshore case) above and below these interfaces.</p>		
Examples of a Violation	<p>A Violation exists if:</p> <p>1. The operator has no tests, investigations, or demonstrated experience that unprotected pipe exposed to the atmosphere does not require coating or painting.</p> <p>2. The operator did not provide protection to offshore splash zones and/or soil-to-air interfaces, as appropriate.</p>		
Evidence Guidance	Pictures, operator’s personnel statements, records, documented evidence of pipe wall loss at interfaces.		
Other Special Notations	None		
Rule Change Recommendations	None		

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005		
Code Reference Number	192.481	Corrosion Control Procedure Rewrite Committee		
Heading	§192.481(a) Atmospheric corrosion control: Monitoring			
Existing Code Language:	Each operator must inspect each pipeline or portion of pipeline that is exposed to the atmosphere for evidence of atmospheric corrosion, as follows: <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>If the pipeline is located:</p> <p style="padding-left: 40px;">Onshore</p> <p style="padding-left: 40px;">Offshore</p> </td> <td style="width: 50%; vertical-align: top;"> <p>Then the frequency of inspection is:</p> <p style="padding-left: 40px;">At least once every 3 calendar years, but with intervals not exceeding 39 months</p> <p style="padding-left: 40px;">At least once each calendar year, but with intervals not exceeding 15 months</p> </td> </tr> </table>		<p>If the pipeline is located:</p> <p style="padding-left: 40px;">Onshore</p> <p style="padding-left: 40px;">Offshore</p>	<p>Then the frequency of inspection is:</p> <p style="padding-left: 40px;">At least once every 3 calendar years, but with intervals not exceeding 39 months</p> <p style="padding-left: 40px;">At least once each calendar year, but with intervals not exceeding 15 months</p>
<p>If the pipeline is located:</p> <p style="padding-left: 40px;">Onshore</p> <p style="padding-left: 40px;">Offshore</p>	<p>Then the frequency of inspection is:</p> <p style="padding-left: 40px;">At least once every 3 calendar years, but with intervals not exceeding 39 months</p> <p style="padding-left: 40px;">At least once each calendar year, but with intervals not exceeding 15 months</p>			
Origin of Code	NGPLSA 1968			
Last FR Amendment	[Amdt. 192-33, 43 FR 39389, Sept. 5, 1978; Amdt. 192-93, 68 FR 53895, Sept. 15, 2003]			
Enforcement Language	None			
Pending NPRM	None			
Interpretation 1 Excerpts	May 23, 91 Jul 15, 93			
Other Ref. Material & Source	Industry Standards, Glossary			
Guidance Material	The operator must have procedures specifying the required time intervals for inspecting all aboveground piping facilities, and subsequent inspection and maintenance records meeting the stated intervals.			
Examples of a Violation	A Violation exists if: The operator has no monitoring procedures or dated maintenance records which meet the required inspection intervals.			
Evidence Guidance	Pictures, maintenance records, pit measurements, pipe wall measurements, O&M Manual, operator's personnel statements.			
Other Special Notifications	None			

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.481	Corrosion Control Procedure Rewrite Committee
Heading	§192.481(b) Atmospheric corrosion control: Monitoring	
Existing Code Language:	During inspections the operator must give particular attention to pipe at soil-to-air interfaces, under thermal insulation, under disbonded coatings, at pipe supports, in splash zones, at deck penetrations, and in spans over water.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt. 192-33, 43 FR 39389, Sept. 5, 1978; Amdt. 192-93, 68 FR 53895, Sept. 15, 2003]]	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	May 23, 91 Jul 15, 93	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	<p>Enforcement Criteria: For onshore pipelines, particular attention shall be given to corrosion at soil-to-air interfaces, under thermal insulation, under disbonded coatings, and at pipe supports. For offshore pipelines, particular attention shall be given to corrosion under disbonded coatings, in splash zones, at pipe supports, and at wall and deck penetrations. All spans over water shall be inspected.</p> <p>Operators shall specify these locations in O&M procedures and inspection records. The most difficult areas to inspect may be under pipe supports and under thermal insulation.</p>	
Examples of a Violation	<p>A Violation exists if:</p> <p>The operator did not provide for these specific areas in their procedures or include these areas when performing inspections of aboveground facilities.</p> <p>Atmospheric corrosion is found at one or more of the specified areas.</p>	
Evidence Guidance	Pictures, maintenance records, pit measurements, pipe wall measurements, O&M Procedures Manual, operator's personnel statements.	
Other Special Notifications	None	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.481	Corrosion Control Procedure Rewrite Committee
Heading	§192.481(c) Atmospheric corrosion control: Monitoring	
Existing Code Language:	If atmospheric corrosion is found during an inspection, the operator must provide protection against the corrosion as required by Sec.192.479.	
Origin of Code	NGPLS968	
Last FR Amendment	[Amdt. 192-4, 36 FR 12297, June 30, 1971, as amended by Amdt. 192-27, 41 FR 34598, Aug. 16, 1976; Amdt. 192-33, 43 FR 39389, Sept. 5, 1978]	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	May 23, 91 Jul 15, 93	
Other Ref. Material & Source	Industry Standards	
Guidance Material	Enforcement Criteria: If the operator identified areas of atmospheric corrosion during an inspection, those areas must be protected before the next scheduled inspection. However, if the corrosion is severe, remediation or replacement of the pipe or components may be necessary before coating or jacketing is performed.	
Examples of a Violation	A Violation exists if: The operator did not correct areas of atmospheric corrosion found during an inspection. If necessary, the operator did not replace corroded pipe or components before protecting for atmospheric corrosion.	
Evidence Guidance	Pictures, maintenance records, O&M Procedures Manual, operator's personnel statements.	
Other Special Notifications	None	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.483	Corrosion Control Procedure Rewrite Committee
Heading	§192.483(a) Remedial measures: General.	
Existing Code Language:	Each segment of metallic pipe that replaces pipe removed from a buried or submerged pipeline because of external corrosion must have a properly prepared surface and must be provided with an external protective coating that meets the requirements of §192.461.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	None	
Enforcement Language	When a metallic segment of a pipeline is installed the replaced segment must have a properly prepared surface with an external protective coating that meets the requirements of 192.461.	
Pending NPRM	None	
Interpretation 1 Excerpts	Feb 8, 72 Oct 28, 96 Jul 16, 76	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	All the replaced pipeline segments must be provided with an external protective coating according to the operator's material specifications	
Examples of a Violation	<p>A Violation exists if: The operator did not correct areas of atmospheric corrosion found during an inspection.</p> <p>If necessary, the operator did not replace corroded pipe or components before protecting for atmospheric corrosion.</p>	
Evidence Guidance	<p>A violation of 192.483(a) exists if: A segment of buried or submerged metallic pipe that replaces pipe because of external corrosion is not effectively coated in accordance with 192.461.</p>	
Other Special Notifications	None	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date: 11/17/2005 Revised: 11/17/2005
Code Reference Number	192.483	Corrosion Control Procedure Rewrite Committee
Heading	§192.483 (b) Remedial measures: General.	
Existing Code Language:	Each segment of metallic pipe that replaces pipe removed from a buried or submerged pipeline because of external corrosion must be cathodically protected in accordance with this subpart.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	None	
Enforcement Language	<p>A violation of § 192.483(b) exists if:</p> <p>1. A segment of buried or submerged pipeline,, that replaces pipe removed because of external corrosion is not cathodically protected pursuant to subpart I.</p> <p>Evidence of violation:</p> <p>A segment of buried or submerged metallic pipe that replaces pipe removed because of external corrosion is not cathodically protected in accordance with 192.463 (a).</p>	
Pending NPRM	None	
Interpretation 1 Excerpts	Feb 8, 72 Oct 28, 96 Jul 16, 76	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	The replaced segments must have a satisfactory level of cathodic protection (see 192.463 for cathodic protection criteria) and monitored in accordance with 192.465(a).	
Examples of a Violation	A segment of buried or submerged pipe that replaced a segment of pipe because of external corrosion is not cathodically protected in accordance with subpart I.	
Evidence Guidance	O&M Manual, Maintenance records showing lack of proper coating and cathodic protection. Pictures, operator's personnel statements	
Other Special Notifications	None	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.483	Corrosion Control Procedure Rewrite Committee
Heading	§192.483 (c) Remedial measures: General.	
Existing Code Language:	Except for cast iron or ductile iron pipe, each segment of buried or submerged pipe that is required to be repaired because of external corrosion must be cathodically protected in accordance with this subpart.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	None	
Enforcement Language	A violation of § 192.483(c) exists if: 1. A segment of buried or submerged pipeline, other than cast iron or ductile iron pipe, that was required to be repaired because of external corrosion is not cathodically protected pursuant to subpart I.	
Pending NPRM	None	
Interpretation 1 Excerpts	Feb 8, 72 Oct 28, 96 Jul 16, 76	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	The replaced segments must have a satisfactory level of cathodic protection (see 192.463 for cathodic protection criteria).	
Examples of a Violation	A violation of 192.483(c) exists if: A segment of buried or submerged pipe, other than cast iron or ductile iron pipe, that is repaired because of external corrosion is not cathodically protected in accordance with subpart I.	
Evidence Guidance	O&M Manual, Maintenance records showing lack of proper coating and cathodic protection. Pictures, operator's personnel statements	
Other Special Notifications	None	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005			
Code Reference Number	192.485	Corrosion Control Procedure Rewrite Committee			
Heading	§192.485(a) Remedial measures: Transmission lines.				
Existing Code Language:	General corrosion. Each segment of transmission line with general corrosion and with a remaining wall thickness less than that required for the MAOP of the pipeline must be replaced or the operating pressure reduced commensurate with the strength of the pipe based on actual remaining wall thickness. However, corroded pipe may be repaired by a method that reliable engineering tests and analyses show can permanently restore the serviceability of the pipe. Corrosion pitting so closely grouped as to affect the overall strength of the pipe is considered general corrosion for the purpose of this paragraph.				
Origin of Code	NGPLSA 1968				
Last FR Amendment	[Amdt 192-88, 64 FR 69660, Dec 14, 1999]				
Enforcement Language	None				
Pending NPRM	None				
Interpretation 1 Excerpts	Oct 28, 96 May 16, 96 Aug 21, 97	Jun 29, 95 May 16, 96 Apr 24, 98	Sep 8, 95 Jun 21, 96 Apr 24, 98	Sep 8, 95 Sep 26, 96 Apr 20, 99	Jan 22, 96 Nov 22, 96
Other Ref. Material & Source	Industry Standards, Glossary				
Guidance Material	<p>a. Review all segments of the transmission line with a continued history of internal or external corrosion and with a remaining wall thickness less than that required for the maximum allowable operating pressure of the pipeline. The operator should have all the records on the replaced segments, repairs and appropriately reduced pressures.</p> <p>b. The operator should have a procedure on the strength of the pipeline based on actual remaining wall thickness and it may be determined by ASME/ANSI B31G or PR 3-805 (RSTRENG disk).</p>				
Examples of a Violation	A Violation of 192.485(a) exists if: The operator did not repair or replace a generally corroded segment of pipe.				
Evidence Guidance	As-builts, operator repair records, internal inspection survey reports, exposed pipe inspection reports, or pictures				
Other Special Notifications	<p>Inspector Note: If an operator has generally corroded pipe that is stated to be effectively coated and cathodically protected under subpart I, the inspector should question the effectiveness of the cathodic protection.</p> <p>a) Reference 192.463(a) for CP criterion used</p> <p>b) Compare leak records to CP records (location).</p> <p>c) How does operator comply with 192.613 for continuing surveillance?</p> <p>d) Does the operator consider IR Drop?</p>				

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Enforcement Manual, Code Compliance Guidelines					Date:11/17/2005
SUBPART I: REQUIREMENTS FOR CORROSION CONTROL					Revised: 11/17/2005
Code Reference Number	192.485	Corrosion Control Procedure Rewrite Committee			
Heading	§192.485 (b) Remedial measures: Transmission lines.				
Existing Code Language:	Localized corrosion pitting. Each segment of transmission line pipe with localized corrosion pitting to a degree where leakage might result must be replaced or repaired, or the operating pressure must be reduced commensurate with the strength of the pipe, based on the actual remaining wall thickness in the pits.				
Origin of Code	NGPLSA 1968				
Last FR Amendment	[Amdt 192-88, 64 FR 69660, Dec 14, 1999]				
Enforcement Language	None				
Pending NPRM	None				
Interpretation 1 Excerpts	Oct 28, 96	Jun 29, 95	Sep 8, 95	Sep 8, 95	Jan 22, 96
	May 16, 96	May 16, 96	Jun 21, 96	Sep 26, 96	Nov 22, 96
	Aug 21, 97	Apr 24, 98	Apr 24, 98	Apr 20, 99	
Other Ref. Material & Source	Industry Standards, Glossary				
Guidance Material	Review areas of localized corrosion pitting in terms of replacement or reduction in pressure.				
Examples of a Violation	A Violation of 192.485(b) exists if: No reduction in the pressure based on localized corrosion pitting due to which leakage might result based on the actual remaining wall thickness in the pits.				
Evidence Guidance	As-builts, operator repair records, internal inspection survey reports, exposed pipe inspection reports, or pictures				
Other Special Notifications	None				

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Enforcement Manual, Code Compliance Guidelines					Date: 11/17/2005
SUBPART I: REQUIREMENTS FOR CORROSION CONTROL					Revised: 11/17/2005
Code Reference Number	192.485	Corrosion Control Procedure Rewrite Committee			
Heading	§192.485 (c) Remedial measures: Transmission lines.				
Existing Code Language:	Under paragraphs (a) and (b) of this section, the strength of pipe based on actual remaining wall thickness may be determined by the procedure in ASME/ANSI B31G or the procedure in AGA Pipeline Research Committee Project PR 3-805 (with RSTRENG disk). Both procedures apply to corroded regions that do not penetrate the pipe wall, subject to the limitations prescribed in the procedures.				
Origin of Code	NGPLSA 1968				
Last FR Amendment	[Amdt 192-88, 64 FR 69660, Dec 14, 1999]				
Enforcement Language	None				
Pending NPRM	None				
Interpretation 1 Excerpts	Oct 28, 96	Jun 29, 95	Sep 8, 95	Sep 8, 95	Jan 22, 96
	May 16, 96	May 16, 96	Jun 21, 96	Sep 26, 96	Nov 22, 96
	Aug 21, 97	Apr 24, 98	Apr 24, 98	Apr 20, 99	
Other Ref. Material & Source	Industry Standards, Glossary				
Guidance Material	The operator should have a procedure on the strength of the pipeline based on actual remaining wall thickness and it may be determined by ASME/ANSI B31G, PR 3-805 (RSTRENG disk), or other approved methods.				
Examples of a Violation	A Violation of 192.485(c) exists if: The remaining strength of the pipe segment is not computed based on actual remaining wall thickness.				
Evidence Guidance	As-builts, operator repair records, internal inspection survey reports, exposed pipe inspection reports, or pictures				
Other Special Notifications	None				

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Enforcement Manual, Code Compliance Guidelines		Date:11/17/2005
SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Revised: 11/17/2005
Code Reference Number	192.487	Corrosion Control Procedure Rewrite Committee
Heading	§192.487(a) Remedial measures: Distribution lines other than cast iron or ductile iron lines.	
Existing Code Language:	General corrosion. Except for cast iron or ductile iron pipe, each segment of generally corroded distribution line pipe with a remaining wall thickness less than that required for the MAOP of the pipeline, or a remaining wall thickness less than 30 percent of the nominal wall thickness, must be replaced. However, corroded pipe may be repaired by a method that reliable engineering tests and analyses show can permanently restore the serviceability of the pipe. Corrosion pitting so closely grouped as to affect the overall strength of the pipe is considered general corrosion for the purpose of this paragraph.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt 192-88, 64 FR 69660, Dec14, 1999]	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	Sep 26, 96 Apr 24, 98	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	Review all segments of the distribution system with a continued history of internal or external corrosion. The operator should have all the records on the replaced segments and repairs.	
Examples of a Violation	A Violation of 192.487(a) exists if: The operator did not repair or replace a generally corroded segment of pipe.	
Evidence Guidance	Operator repair records, internal inspection survey report, pipe exposure reports, pictures.	
Other Special Notifications	Inspector Note: Lines which are operating over 20% SMYS are transmission lines and not distribution lines.	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.487	Corrosion Control Procedure Rewrite Committee
Heading	§192.487 (b) Remedial measures: Distribution lines other than cast iron or ductile iron lines.	
Existing Code Language:	Localized corrosion pitting. Except for cast iron or ductile iron pipe, each segment of distribution line pipe with localized corrosion pitting to a degree where leakage might result must be replaced or repaired.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt 192-88, 64 FR 69660, Dec14, 1999]	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	Sep 26, 96 Apr 24, 98	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	Review areas of localized corrosion pitting in terms of repair or replacement.	
Examples of a Violation	A Violation of 192.487(b) exists if: The operator did not repair or replace a segment of pipe with localized corrosion pitting.	
Evidence Guidance	Operator repair records, internal inspection survey report, pipe exposure reports, pictures.	
Other Special Notifications	None	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.489	Corrosion Control Procedure Rewrite Committee
Heading	§192.489(a) Remedial measures: Cast iron and ductile iron pipelines.	
Existing Code Language:	General graphitization. Each segment of cast iron or ductile iron pipe on which general graphitization is found to a degree where a fracture or any leakage might result, must be replaced.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	None	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	Aug 19, 71, Alert Notices (1991 & 1992)	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	Cast iron pipe is likely to fail under mechanical stress (Heavy vehicles passing over the buried structure or open adjacent trenches). Cast iron pipe, when graphitized, is relatively brittle which allows far more dramatic failure modes such as rapid crack propagation and circumferential breaks. Such failures are potentially much more severe than more ductile failure modes commonly seen in today's pipe materials. Smaller diameter cast iron pipes have reportedly been more prone to failure. There is also statistical evidence that cast iron installed after 1949 (18 ft segments) experiences a higher frequency of breaks than does pre-1949 (12 ft segments).	
Examples of a Violation	A Violation of 192.489(a) exists if: The operator did not repair or replace the section of pipe where a fracture or leakage might result when graphitization is found.	
Evidence Guidance	Pipe exposure reports, repair records, pictures	
Other Special Notifications	Inspector Note: Many large older cities have cast iron pipe in their distribution systems. Most have a replacement program.	

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Enforcement Manual, Code Compliance Guidelines		Date:11/17/2005
SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Revised: 11/17/2005
Code Reference Number	192.489	Corrosion Control Procedure Rewrite Committee
Heading	§192.489 (b) Remedial measures: Cast iron and ductile iron pipelines.	
Existing Code Language:	Localized graphitization. Each segment of cast iron or ductile iron pipe on which localized graphitization is found to a degree where any leakage might result, must be replaced or repaired, or sealed by internal sealing methods adequate to prevent or arrest any leakage.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	None	
Enforcement Language	None	
Pending NPRM	None	
Interpretation 1 Excerpts	Aug 19, 71, Alert Notices (1991 & 1992)	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	If localized graphitization is detected on cast iron or ductile iron pipe, appropriate measures must be taken to prevent or arrest any leakage.	
Examples of a Violation	A Violation of 192.489(b) exists if: The operator did not repair or replace or seal by internal sealing methods adequate to prevent or arrest any leakage, those pipeline segments where localized graphitization is found to a degree where any leakage might result.	
Evidence Guidance	pipe exposure reports, repair records, pictures	
Other Special Notifications	None.	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.491	Corrosion Control Procedure Rewrite Committee
Heading	§192.491(a) Corrosion control records.	
Existing Code Language:	Each operator shall maintain records or maps to show the location of cathodically protected piping, cathodic protection facilities, galvanic anodes, and neighboring structures bonded to the cathodic protection system. Records or maps showing a stated number of anodes, installed in a stated manner or spacing, need not show specific distances to each buried anode.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt 192-78, 61 FR 28770, June 6, 1996]]	
Enforcement Language	<p>A violation exists if:</p> <p>1. An operator has not retained records or maps showing location of cathodically protected piping, facilities, and neighboring structures bonded to the cathodic protection system.</p> <p>Evidence of violation:</p> <p>1. a. Documentation showing facility is cathodically protected b. Incomplete or missing record or maps of cathodically protected facilities,</p>	
Pending NPRM	None	
Interpretation 1 Excerpts	Oct 21, 75 Oct 28, 96 Aug 10, 76	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	192.491(a) The operator shall maintain a record/map of all its cathodically protected facilities including cathodically protected piping, cathodic protection facilities, galvanic anodes, and neighboring structures bonded to the cathodic protection system. The records may be kept in either electronic or hard copy format. These records must be retained as long as the pipelines remain in service.	
Examples of a Violation	A Violation of 192.491(a) exists if: An operator has not retained records or maps showing location of cathodically protected piping, facilities, and neighboring structures bonded to the cathodic protection system.	
Evidence Guidance	operator records and maps	
Other Special Notifications	Inspector Note: Inspectors are encouraged to seek out people knowledgeable in corrosion control in OPS to obtain guidance whenever there is a question concerning a specific operator's corrosion control practices.	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.491	Corrosion Control Procedure Rewrite Committee
Heading	§192.491 (b) Corrosion control records.	
Existing Code Language:	Each record or map required by paragraph (a) of this section must be retained for as long as the pipeline remains in service.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt 192-78, 61 FR 28770, June 6, 1996]]	
Enforcement Language	<p>A violation exists if:</p> <p>1. An operator has not retained records or maps showing location of cathodically protected piping, as long as the pipeline remains in service.</p> <p>Evidence of violation:</p> <p>1. a. Documentation showing facility is cathodically protected. b. Incomplete or missing record or maps of cathodically protected facilities</p>	
Pending NPRM	None	
Interpretation 1 Excerpts	Oct 21, 75 Oct 28, 96 Aug 10, 76	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	The operator shall maintain a record/map of all its cathodically protected facilities including cathodically protected piping, cathodic protection facilities, galvanic anodes, and neighboring structures bonded to the cathodic protection system.	
Examples of a Violation	<p>A Violation exists if:</p> <p>An operator has not retained records or maps showing location of cathodically protected piping, facilities, and neighboring structures bonded to the cathodic protection system for the life of the pipeline.</p>	
Evidence Guidance	operator records and maps	
Other Special Notifications	None	

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Enforcement Manual, Code Compliance Guidelines SUBPART I: REQUIREMENTS FOR CORROSION CONTROL		Date:11/17/2005 Revised: 11/17/2005
Code Reference Number	192.491	Corrosion Control Procedure Rewrite Committee
Heading	§192.491 (c) Corrosion control records.	
Existing Code Language:	Each operator shall maintain a record of each test, survey, or inspection required by this subpart in sufficient detail to demonstrate the adequacy of corrosion control measures or that a corrosive condition does not exist. These records must be retained for at least 5 years, except that records related to §§192.465(a) and (e) and 192.475(b) must be retained for as long as the pipeline remains in service.	
Origin of Code	NGPLSA 1968	
Last FR Amendment	[Amdt 192-78, 61 FR 28770, June 6, 1996]]	
Enforcement Language	<p>A violation exists if: An operator has not retained records of each test, survey, or inspection required by subpart I.</p> <p>Evidence of violation: Documentation showing test, survey, or inspection required under subpart I, was made, including operator's statement that test, survey, or inspection was made.</p>	
Pending NPRM	None	
Interpretation 1 Excerpts	Oct 21, 75 Oct 28, 96 Aug 10, 76	
Other Ref. Material & Source	Industry Standards, Glossary	
Guidance Material	The operator also shall maintain a record of each test, survey, and inspection in sufficient detail to demonstrate the adequacy of their corrosion control procedures. Sufficient detail is recognized to mean that the data is error free (See glossary (companion document to RP-01-69) for dissertation on errors in measurements), has been interpreted correctly, integrated with other appropriate data under 192.613, and demonstrate that the operator's corrosion control system for atmospheric, internal, and external corrosion is adequate.	
Examples of a Violation	<p>A Violation exists if:</p> <p>The operator has not maintained a record of each test, survey, and inspection in sufficient detail to demonstrate the adequacy of their corrosion control procedures or that a corrosive condition does not exist. These records must be retained for at least 5 years, except that records related to §§192.465(a) (pipe-to-soil monitoring surveys) and (e) (3 year unprotected pipe surveys) and 192.475(b)(removed pipe internal corrosion inspections) must be retained for as long as the pipeline remains in service.</p>	
Evidence Guidance	operator records and maps	
Other Special Notifications	None	

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