

Section 192.473

This guide material is under review following Amendment 192-132.

1 REFERENCE INTRODUCTION

A reference is NACE SP0169, Section 9.

- (a) Stray current is electric current flowing through paths other than the intended circuit and can be static or dynamic in nature. Typical sources of stray current can be alternating current (AC), direct current (DC), and telluric current (naturally occurring geomagnetic earth currents).
- (b) Stray current interference is any detectable electrical disturbance on a structure. Detrimental levels of interference are those which limit the effectiveness of existing CP systems.
- (c) Operators should consider developing procedures to define §192.473 compliance expectations, interference current corrosion mechanisms, and methods to minimize detrimental effects.
- (c) Operators must develop Subpart I Corrosion Control procedures, if applicable, to provide safety during maintenance and operations (§192.605(b)(2)), and have in effect a continuing that demonstrate the program requirements for to minimizing the detrimental effects of stray currents (§192.473(a)). Operators of transmission pipelines must also meet the expectations of §192.473(c) (see 4 below).
- (d) See 5 below for a list of NACE reference documents which address stray current issues.

2 INSTALLATION CONSIDERATIONS

- (a) Attention should be given to a new pipeline's physical location, particularly if the location ~~may~~ might subject the pipeline to stray electrical currents from other facilities, such as the following.
 - ~~(1) Other pipelines or utilities with associated cathodic protection (CP) systems.~~
 - ~~(2) Rail transit systems.~~
 - ~~(3) Mining or welding operations.~~
 - ~~(4) Induced currents from electrical transmission lines.~~
 - (1) AC sources.
 - (i) Induced currents from electrical lines.
 - (ii) AC rail transit systems.
 - (iii) Mining operations.
 - (2) DC sources.
 - (i) Other pipelines or utilities with associated cathodic protection (CP) systems.
 - (ii) Mining or welding operations.
 - (iii) DC rail transit systems.
 - (iv) DC power sources.
 - (v) Energized, buried phone lines (some might be abandoned).
- (b) To the extent possible, the operator should identify and plan for the mitigation and control of anticipated stray electrical currents prior to construction. As soon as practicable after construction of the pipeline or facility to be protected is completed, the operator should implement monitoring, testing, and mitigation plans to control the effects of stray electrical currents. The rate of corrosion caused by stray electrical current can be higher than the rate of corrosion resulting from galvanic action.

3 EXTERNAL CORROSION CONTROL EFFECTIVENESS

Once the interference control methods have been established, periodic tests and inspections should be conducted to ensure their continued effectiveness.

4 ONSHORE GAS TRANSMISSION PIPELINES

- (a) Operators must conduct transmission pipeline surveys to detect the presence and level of any electrical stray current and when monitoring indicates a significant increase in stray current, or when new potential stray current sources are introduced (§192.473(c)(1)).
 - (1) Operators should develop procedures define methods to detect the presence and establish allowable defined thresholds of electric stray current on transmission pipelines.
 - (2) Opportunities to take these voltage readings include annual detect stray current might occur when performing pipe-to-soil readings, investigations of deficient annual readings, or when performing on/off reading analysis.
 - (3) Operators should consider developing means to obtain electric load change information for power lines co-located with transmission pipelines, new structures, additional generation, voltage upgrades, reconductoring, electric system upgrades, other new potential sources of current (e.g., rail transit), or new pipelines.
- (b) Operators must complete analysis of analyze the survey results of the survey to determine the cause of the interference and whether the level could cause significant corrosion, impede safe operation, or adversely affect the environment or public (§192.473(c)(2)).
 - (1) Operators should use internal or external SMEs along with industry standards (see 5 below) to determine interference causes, and potential adverse impacts, and appropriate remedial action.
 - (2) Operators should consider consulting with operators of adjacent metallic structures when investigating the source of the interference.
- (c) Operators must develop a remedial action plan to correct interference currents greater than or equal to 100 amps per meter squared (AC), or that impede the safe operation of a pipeline, or that may cause a condition that would adversely impact the environment or public (§192.473(c)(3)).
Operators should use internal or external SMEs along with industry standards (see 5 below) to determine appropriate remedial action. The operator should consider the following conditions that:
 - (1) Conditions that impede the safe pipeline operation, which might include the following.
 - (i) Ineffective CP.
 - (ii) Anode performance degradation.
 - (iii) Unsafe AC or DC levels for those working on or near pipeline facilities.
 - (2) Conditions that would adversely impact the environment or public might include the following.
 - (i) Impact the environment through the creation of Voltage that creates an ignition source near the pipeline.
 - (ii) Cause Unsafe AC or DC levels in areas that are accessible to the public.
 - (3) Operators must complete survey analysis and implement remedial actions to meet the timing requirements in §192.473(c)(4).

5 REFERENCES

- (a) NACE SP0169, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems."
- (b) NACE SP0177, "Mitigation of Alternating Current and Lightning Effects on Metallic Structures and Corrosion Control Systems."
- (c) NACE SP21424, "Alternating Current Corrosion on Cathodically Protected Pipelines: Risk Assessment, Mitigation, and Monitoring."

1.9 CORROSION RELATED		
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NACE SP0169	Control of External Corrosion on Underground or Submerged Metallic Piping Systems	§192.453 §192.455 §192.461 §192.463 §192.473 §192.620 App. D
NACE SP0177	Mitigation of Alternating Current and Lightning Effects on Metallic Structures and Corrosion Control Systems	§192.467 <u>§192.473</u>
...	...	...
<u>NACE SP21424</u>	<u>Alternating Current Corrosion on Cathodically Protected Pipelines: Risk Assessment, Mitigation, and Monitoring</u>	<u>§192.473</u>
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