

CATHODIC PROTECTION REQUIREMENTS: INTERFERENCE CURRENTS HIGH LEVEL EXPLANATION

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Interference Currents

192 Code: Interference=Stray

- NACE: Current through paths other than the intended circuit
- In other words, current from an outside source flowing on to and off a pipeline

Caveat: Interference Currents

- *Note: We are not discussing electrical effects such as ground faults from power lines, lightning or induced AC currents
- That is a subject for another day which can cause personal safety and corrosion issues

Sources of Stray Current

- CP Systems – pipelines, tank farms
- Grounded electrical systems
- Railway Transit Systems
- Welding Operations
- Elevators
- Reversed Polarity on Rectifiers
- Insulators

Subcategories of Stray current:

- Static – foreign pipelines or other impressed current sources; any grounded electrical circuit
- Dynamic - transit railways

49 CFR 192

- **192.473 External Corrosion Control: Interference Currents**
- (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.

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SINCE 1828

GAMES & QUIZZES

THESAURUS


WORD OF THE DAY



program

Dictionary

Thesaurus

program noun

 Save Word

pro·gram | \ 'prō-gram , -grəm  \

Definition of *program* (Entry 1 of 2)

- 1 [Late Latin *programma*, from Greek] : a public notice
- 2
 - a : a brief usually printed outline of the order to be followed, of the order to be presented, and the persons participating (as in a public performance)
 - b : the performance of a program
especially : a performance broadcast on radio or television
- 3 : a plan or system under which action may be taken toward a goal

A plan where action may be taken...

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Helpful Hint

- Corrosion Control Regulations in Hazardous Liquids (49 CFR 195, subpart H) are generally not as vague as the Gas Regulations
- § 195.577 What must I do to alleviate interference currents?

Helpful Hint

- § 195.577 What must I do to alleviate interference currents?
- For pipelines exposed to stray currents, you must have a program to identify, test for, and minimize the detrimental effects of such currents.



Program should have provisions to:

- Identify (detection or symptoms)
- Test for (perform field work)
- Minimize detrimental effects

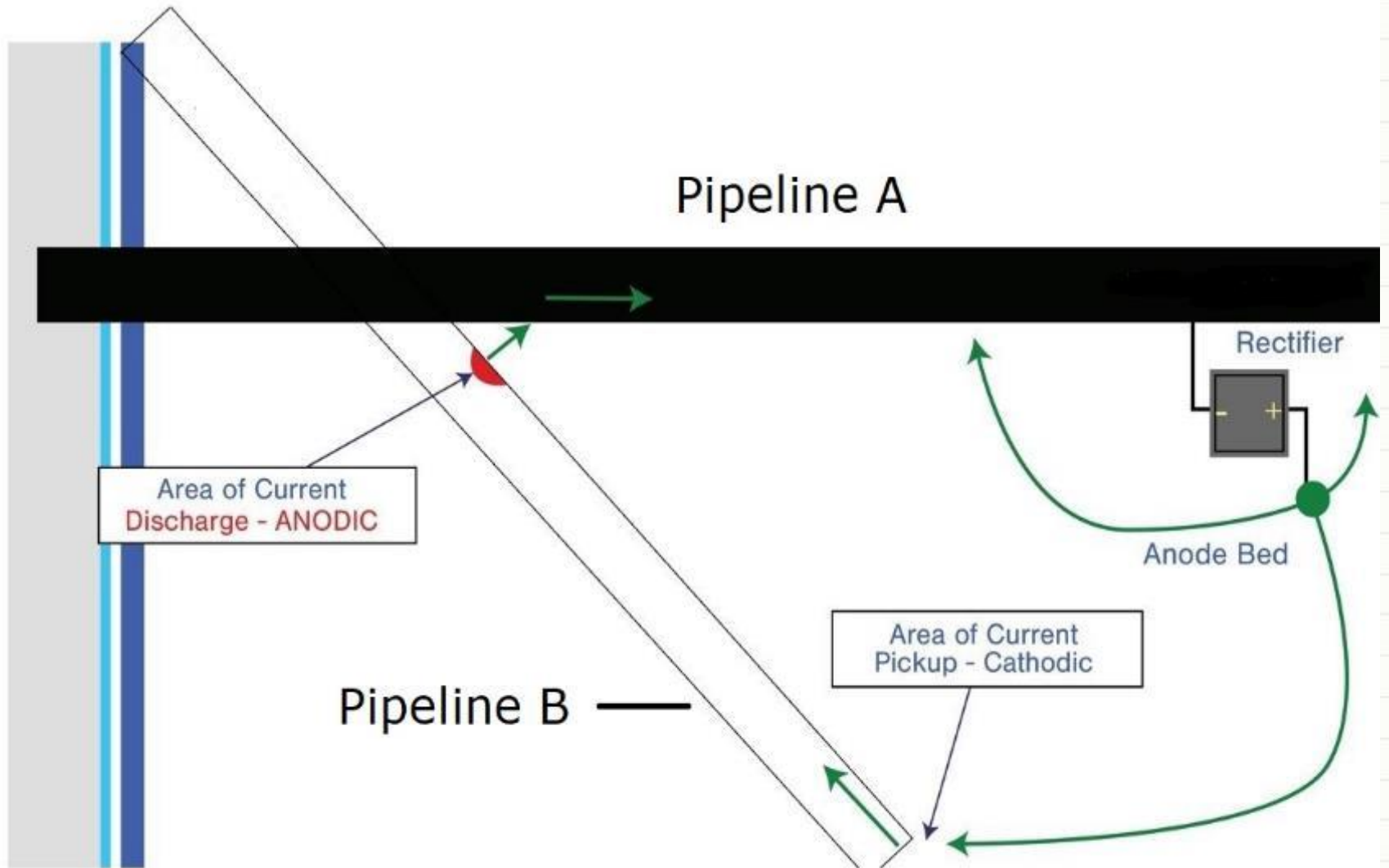
Identify

- Depressed potentials on the pipeline
- Stray on pipe - excessive current flow measured between points on the pipeline
- Fluctuating potentials when measured
- Coordinating Committees exchange info, schedule testing, get report
- Seeing & investigation of potential electrical systems
- Extremely localized corrosion

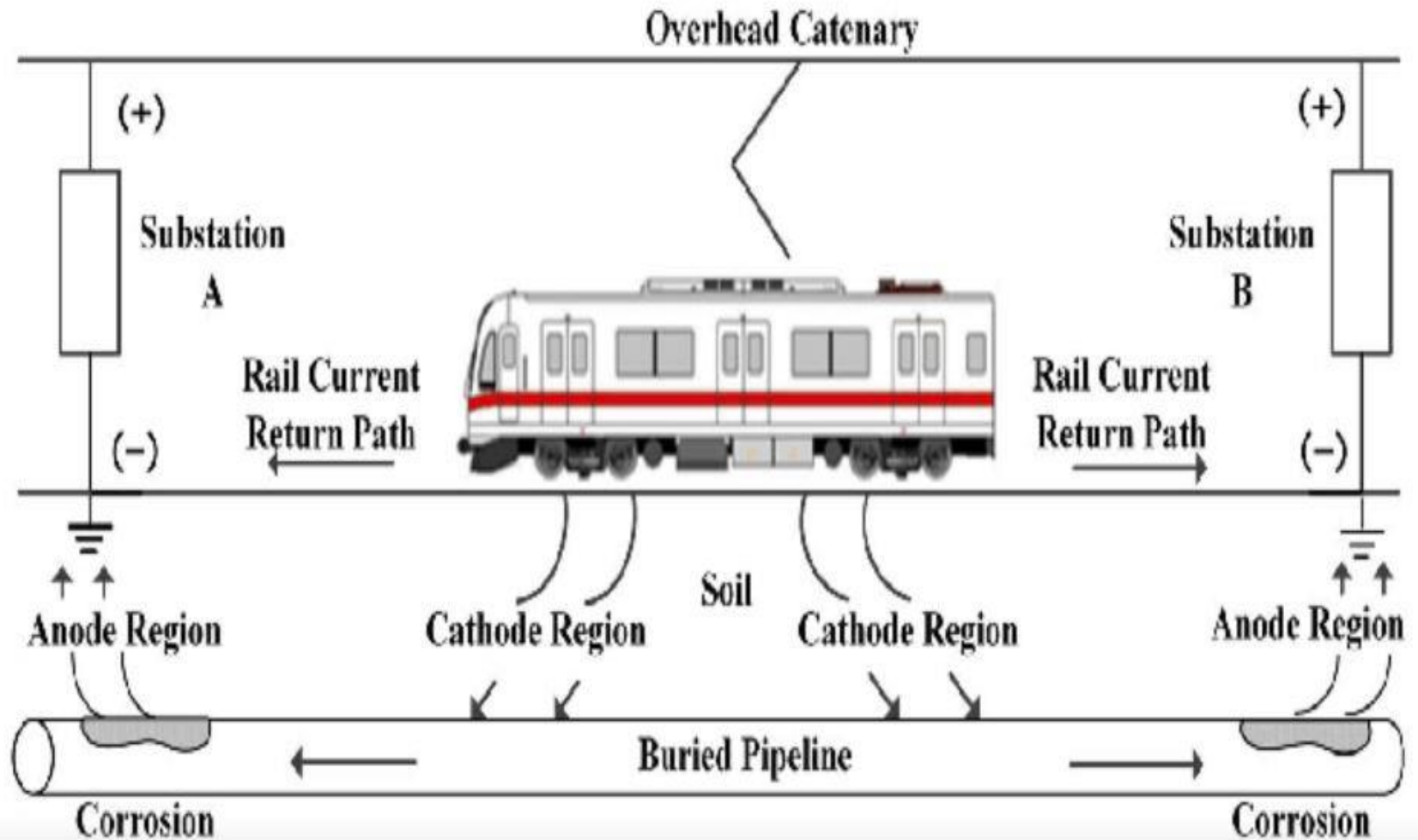
Commonalities

- Areas of pickup (flow on to pipeline)
- Areas of discharge (flow off pipeline)
- Pickup = cathodic = higher potentials
- Discharge = anodic = depressed potentials; metal loss

Foreign Pipeline Crossing



Railway Transit



Test for

- Close interval surveys - localized
- Pipeline current tests
- Earth current tests
- Dataloggers – PS potentials over time periods – do when wet
- Pinpoint maximum exposure point (beta curve)
- Wave form instruments

Detrimental Effects

- Definition: Accelerated Corrosion Caused by Flow of Stray Current
- Key word: Accelerated
- An interference pit often has a width-to-depth ratio of less than 3 and sometimes as low as 0.5

Detrimental Effects



Detrimental Effects



Detrimental Effects

Time-Varying Stray Current Discharged From Structure To Earth, 30% Duty Cycle	STEEL PIPE
	1 Square Inch Having 0.25-Inch Wall Thickness, Complete Perforation
1 Ampere	4.3 Days
0.1 Ampere	43 Days
0.01 Ampere	1.2 Years
0.001 Ampere	12 Years
0.0001 Ampere	120 Years

Minimize the Detrimental Effects

- Stop the current flow off the pipeline itself!
- Bonds – electrical path back to the source
- Magnesium anode – current flows off the anodes
- Coating or re-coating pipelines
- High resistance backfill
- Installing Insulators
- Potential controlled rectifiers

Also (b)

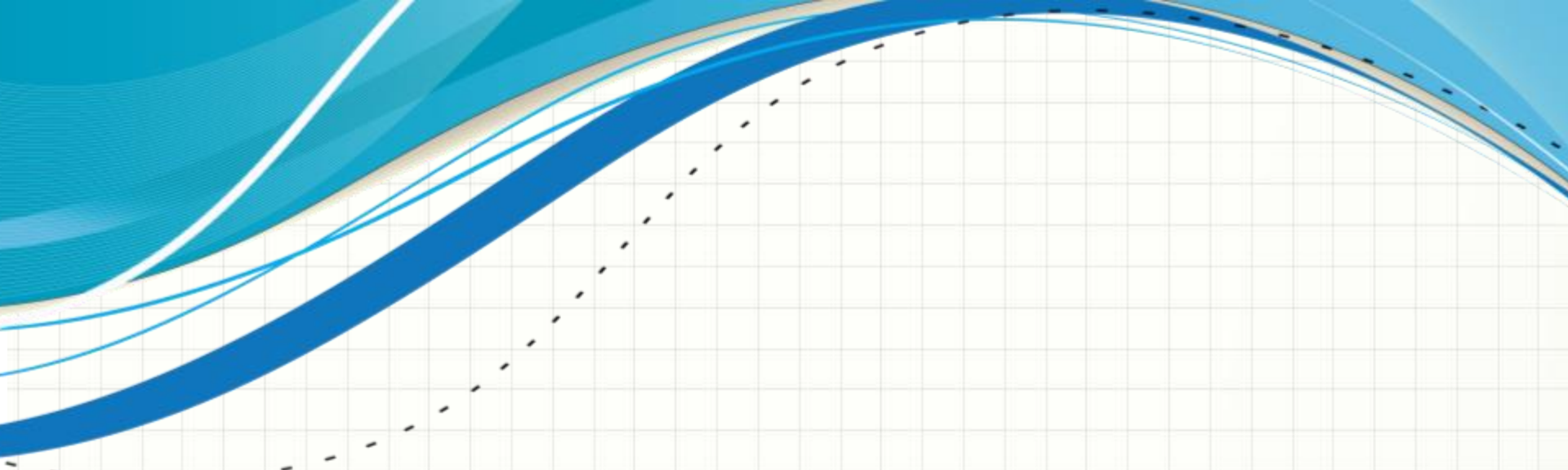
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In closing, the program must

- Have or reference specific procedures for identifying and detecting stray currents
- Have or reference specific for testing for stray currents
- Have or reference specific procedures for mitigating stray current corrosion

Amended 192.473 addresses:

- (c) For onshore gas transmission pipelines...
- Required Interference surveys including AC
- Required Analysis of the results
- Required development of a remedial action plan when equal to 100 Amps per meter squared (64.5 mA/sq in)
- Application for any necessary permits within 6 months of completing the interference survey



**THANK YOU FOR
YOUR ATTENTION!!!!**