AC Interference & Mitigation Services

Pipelines installed in a right-of-way (ROW) common with high voltage overhead transmission lines (OHAC) present a higher safety risk from electrical shock and create conditions that could lead to corrosion from AC interference. AC interference creates capacitive, conductive, and inductive effects on a pipeline. EN Engineering provides upfront analysis during route planning and design to identify potential AC interference, reduce safety concerns, and mitigate corrosion risk. Our NACE Institute-certified professionals have extensive pipeline design and operating experience to ensure the safety and integrity of existing and newly-installed pipelines and to address the dynamic changes associated with OHAC systems. With over 30 years of combined experience, EN Engineering professionals have worked on several thousand miles of pipelines nationwide.

Considerations

- Are you installing a new pipeline “greenfield” or do you have existing pipelines operating under or near OHAC systems?
- Have you observed or been made aware of power line system upgrades or modifications to OHAC power systems adjacent to or crossing your pipeline system?
- Are the dynamic changes of OHAC power systems affecting your pipeline system?
- Are there AC voltage levels on your pipeline that are creating electrical safety hazards to operational personnel and the general public?
- Do you need an engineered assessment of OHAC and pipeline crossing conflicts or along areas of “collocation” with OHAC systems?
- Do you need to locate, risk rank, and mitigate AC corrosion threat?
- Do you need to directly assess the possibility of exterior wall loss due to AC corrosion on your pipeline structure?

Overview

- **Capacitive Coupling** occurs when the electric field associated with power conductors causes AC voltages to accumulate on inadequately grounded “above-grade” structures in the vicinity of the power system.
- **Conductive (Resistive) Coupling** results when AC current enters the pipe through an electrically conductive path, such as a ground fault. It can cause damage to pipeline coating and pipe wall depending on the line voltage, duration of fault, soil resistivity, fault-to-ground resistance, and coating condition.

- **Inductive Coupling** is an effect that occurs when the magnetic field in a power conductor induces current on an adjacent metallic structure such as a pipeline. Inductive coupling can lead to development of high voltage “peaks” along the pipeline. These voltage peaks are typically associated with a physical change in power line or pipeline orientation and/or at power system structures such as transpositions and substations. When AC current on the pipeline is “picked-up” from inductive coupling, it must leave the pipeline to “return-to-circuit.” This process can have a damaging effect on the pipeline in the form of wall loss due to AC corrosion.

AC Interference Effects and Solutions

Effects

- Shock hazard safety
- Damage from fault conditions
- Protection of electrical isolation from transient electrical spikes
- Mitigate the risk of AC-induced external corrosion

Solutions

- Predict the pipeline’s steady state induced voltage
- Minimize susceptibility to fault conditions
- Simulate the magnitude and locations of possible AC voltage peak and current discharge to ground
- Design of AC mitigation equipment and systems
- Design of monitoring equipment

Types of Services

- Historical data review (AC and DC)
- Field assessments and measurements
- AC threat assessment
- Monitoring designs/services
- Identification and follow-up contact with the power company for operating and fault current information
- AC modeling and engineering design
- AC interference remediation planning
- Construction oversight and inspection
- Equipment commissioning
- Project management services

Tools and Software

- SES Rights-of-Way Pro (RESAP, MALZ)
- Alternating Current Coupling Prediction (ACCP) V1.5 - Pipeline Research Council International (PRCI)
- Internally Developed Threat Assessment and Risk Analysis Programs

Modeling Capabilities

- Model the entire length of collocation(s)
- Unlimited number of power line circuits and substations
- Unlimited pipelines, railroads, and other conductors
- Variation of soil resistivity along collocation
- Complicated CP or AC grounding structures
- Multiple foreign bonds

Scenarios

- Phase unbalances between wires
- One phase wire out-of-service
- Short circuited phase wire - including single line to ground

Fault model outputs

- “Worst case” fault condition location
- Coating stress voltages
- Induced pipeline voltages