OPERATOR ADVISORY

ELECTRICAL RELATED RELEASE ADVISORY

OVERVIEW

The petroleum pipeline industry has undertaken a voluntary performance tracking initiative, recording detailed information about spills and releases with their causes and consequences. Industry members of the American Petroleum Institute and the Association of Oil Pipe Lines believe that tracking and learning from spills will improve performance, thus demonstrating the industry's firm commitment to safety and environmental protection. The advisory bulletin utilizes information collected by PHMSA's accident report form to analyze the leading causes of electrical related releases and provide recommendations for industry operators. This advisory is intended to provide operators with key findings related to electrical incidents and guidance on prevention of future incidents on pipeline systems.

KEY FINDINGS:

The frequency of electrical related incidents has increased significantly since 2010.

The most frequent causes of electrical related incidents appear to be stray current corrosion and lightning strikes.

The average cost of electrical related incidents is nearly double the overall average cost of all incident types.

energy API

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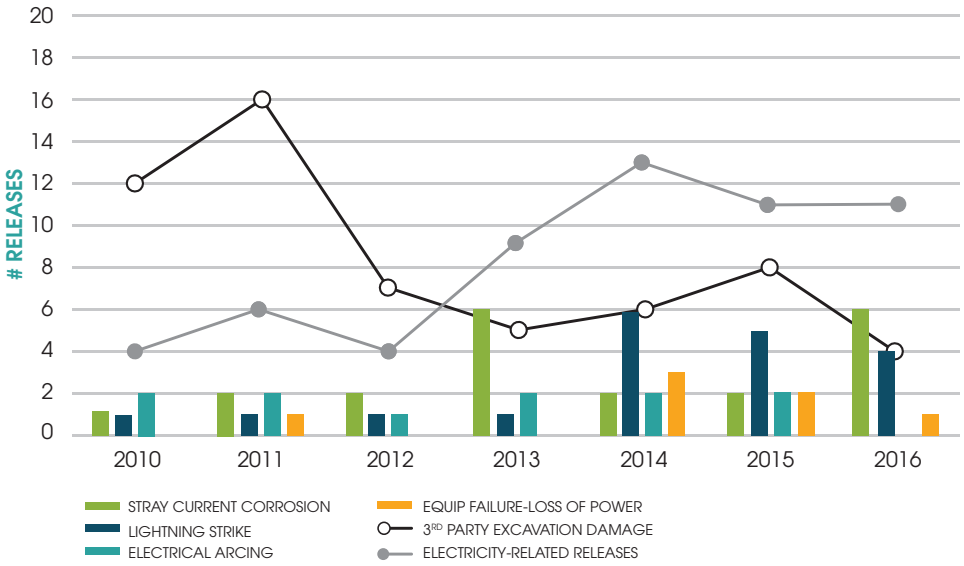
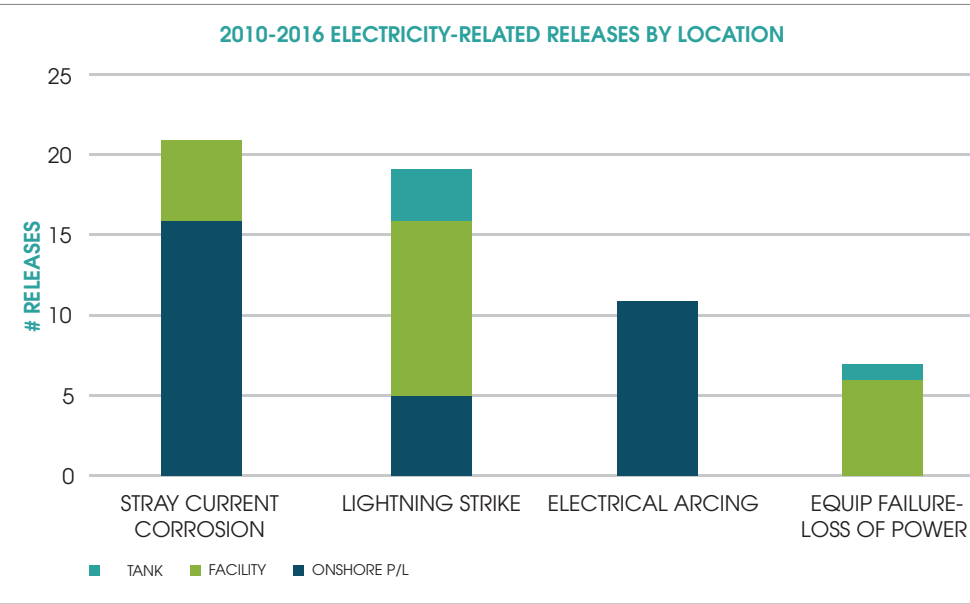
Understanding Electrical Related Releases

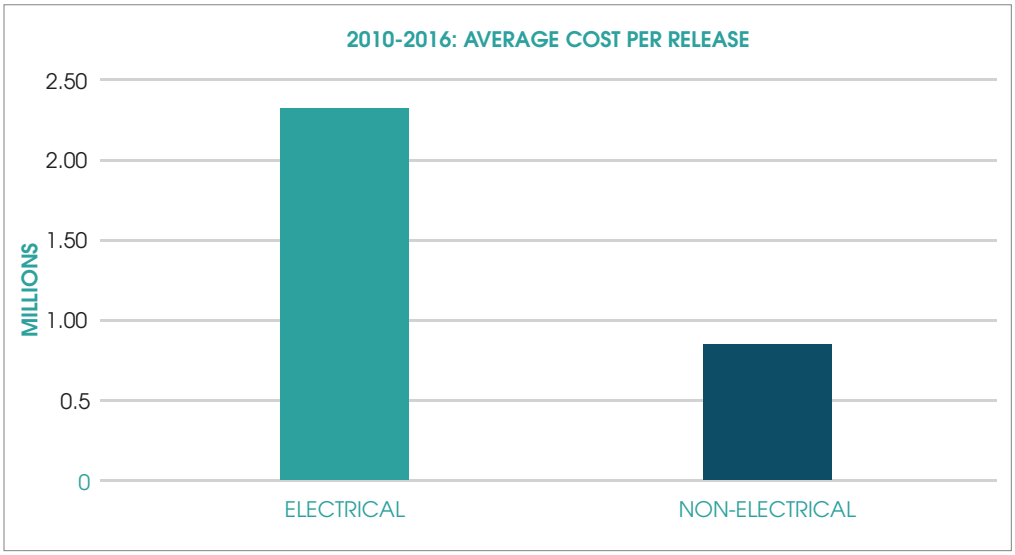
A review of PHMSA hazardous liquid release data indicates that the frequency of electrical related incidents affecting onshore pipelines has increased significantly from 2010 through 2016. These electrical related categories come from the choices provided by the PHMSA liquid accident report.



The leading causes of electrical related releases are stray current corrosion and lighting strikes, which affect onshore pipelines and facilities most frequently.



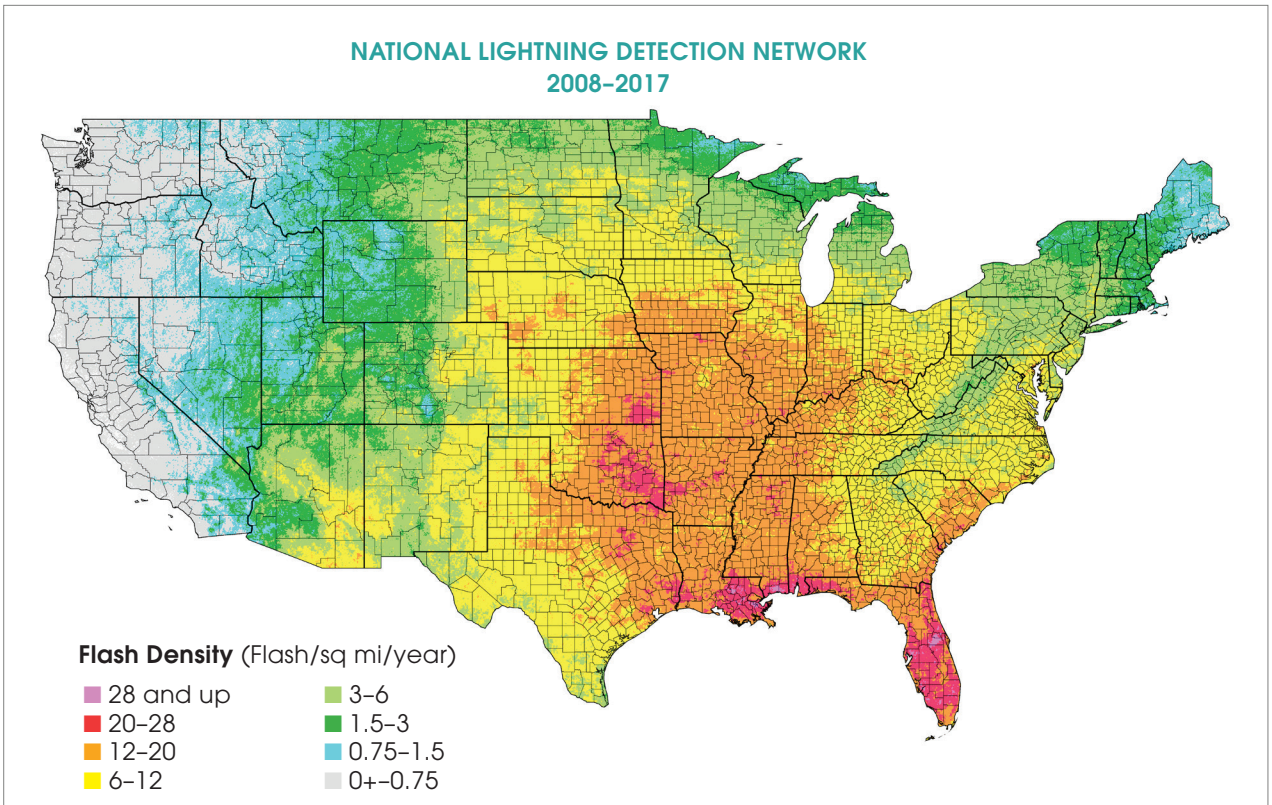
Electrical related incidents are more expensive, on average, than non-electrical related incidents as shown below.



Operator Considerations

Suggested best practices for prevention

- Identification of static and dynamic stray currents and mitigation.
  - Identify any DC transit, or foreign cathodic protection systems in proximity to pipelines that may cause DC interference. Identify any pipelines that parallel high voltage AC power lines.
  - Consider mitigation options in potential stray current areas
    - DC Transit
    - Foreign CP Systems
    - AC Interference
- Lightning mitigation
  - Consider installation of grounding with decouplers to protect the pipeline in areas prone to lightning strikes.
  - Ensure aboveground storage tanks have lightning protection. Refer to API RP's 545 and 2003.



- Continual Evaluation
  - Use of data integration, engineering critical analysis, electrical surveys, etc. to identify changing conditions requiring reevaluation
    - ILI
      - Monitor for changes in reported corrosion levels in areas prone to interference.
    - Annual Surveys
      - Unusual increases or decreases in cathodic protection levels may be an indication of DC interference.Consider measuring AC voltage on a pipeline as part of annual surveys.
    - CIS, DCVG, ACVG
      - CIS: Identify unusual cathodic protection levels or AC voltage on a pipeline.Consider performing a native survey following construction of a new pipeline to identify areas affected by stray current.
      - DCVG/ACVG: Consider performing ACVG or DCVG to identify areas of coating faults that may be more prone to damage from interference.

- Foreign Line Crossings
    - Monitor for changes in cathodic protection levels near foreign line crossings.
- Corrosion Committees
    - Participate in local or regional corrosion committees to communicate installation of or changes to cathodic protection systems or transit system operation that could affect stray currents.
- A/C Corridor Data
    - AC interference may be more likely where a pipeline parallels high voltage AC lines, and is more likely where voltage is higher and the distance where the lines run parallel is greater. Entry and exit points from an AC power line corridor may show higher levels of corrosion from interference than areas running parallel to the power lines.
    - Evaluate the installation of new AC power lines, and changes in operations of existing power lines.

Operations Involvement with Integrity Management

- Monitor developments of substations or other electrical infrastructure (new substations, additional transmission lines, windfarms, solar farms, etc.) near pipelines Tower legs or grounding systems in an AC corridor may be too close to the pipeline. This could cause arcing to the pipeline during an arc fault event or a lightning strike.
- Patrol and communicate downed power lines near assets
- Consider establishing communications with operators of power lines or DC transit systems operating near pipelines.

Find this and other advisories drawn from the hazardous liquid industry's Pipeline Performance Tracking System at www.api.org/ppts

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