Why Are Pipelines And Utility Companies Conducting Facility Assessments Now?

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EN Engineering has been conducting facility assessments with team members who are experts in mechanical, civil, structural, process, electrical, automation, codes, and corrosion.

Why conduct facility assessments? In today's regulatory environment, pipeline and utility companies must be more diligent, efficient and safety-minded than ever. Operators are under constant scrutiny from the regulators, the media, the general public, and their own management to do all that they can to ensure that their assets operate as intended in a timely, safe and efficient manner.

In many cases, these criteria must be met with limited and sometimes less experienced staff, combined with budgetary constraints. In order to accomplish these objectives, pipeline and utility operators are increasingly turning to third-party engineering and operations consultants to provide additional knowledge and expertise for the tasks at hand, while maintaining the highest degree of confidentiality and integrity.

Why conduct facility assessments now? As pipeline companies look at the remaining working life of their most critical assets, they are turning to third-party consultants to get a good read on where they stand in relation to the pipeline industry as a whole. By what measures will they be judged? What are the latest technologies and equipment that are available? How do government-mandated rules affect them? New rules issued recently in response to the Pipeline Safety Improvement Act of 2002 mandate integrity management programs for companies operating natural gas transmission systems.

The programs require baseline integrity assessments for areas of pipelines designated as high consequence areas (HCAs) and are targeted toward the underground pipeline network, not above ground compressor, measurement and peak-shaving facilities. These facilities, however, are also a critical link in the overall gas transmission and distribution networks and should be as reliable, safe, and secure as the underground pipeline network.

In addition, as pipeline ownership has changed hands over the last decade and engineering and operating staffs have been downsized, many new owners are concerned about the integrity of the assets they have purchased. A due diligence review at the time of purchase does not put the various pipeline assets under a "microscope" and a more detailed facility assessment by subject matter experts provides a clearer picture of areas that may require additional maintenance, upgrade or replacement.

EN Engineering has been conducting facility assessments during the past two years at natural gas compressor stations, LNG plants, propane air plants and measurement and regulating facilities. ENE's assessment teams will consist of experts in mechanical, civil, structural, process, electrical, automation, codes and corrosion. Based on the client's work scope, they visit each site and spend the necessary time to interview site engineering and operating personnel as well as conduct independent on-site assessments.

Digital photographs can be taken or tagging can be performed to illustrate all areas of concern for inclusion in a detailed final report. Typically, P&ID, electrical one-line schematics, hazardous area classification and station layout drawings will also be as built to reflect the latest facilities and operating parameters. The assessment report formats are tailored to fit the client's needs and generally are divided into the following four sections:

1. Mechanical and Civil Review

- Review of buildings, compressed air systems, coolers, dehydration facilities, gas compression units and auxiliaries, heat exchangers, gas and auxiliary piping systems, heating and ventilation, liquid-handling facilities and measurement and regulation stations
- Review of vibration, emission and noise issues
- Review of station operational and maintenance philosophies and recommend opportunities to improve reliability and efficiency

2. Electrical and Instrumentation Review

- Evaluate power company service history
- Inspect wiring, conduit and cable trays
- Examine power-switching equipment
- Inspect emergency-generating equipment
- Evaluate motor control center and related equipment
- Examine building, yard and emergency lighting
- Investigate instrumentation and control equipment
- Examine hazardous area classifications
- Evaluate and conduct functional tests of automation software

3. Codes and Safety Review

- Confirm station MAOPs (design, test and highest actual operating pressure) and MAOP breaks
- Check set pressures on regulators and OPP devices and review design calculations
- Review leak/accident history
- Review ESD limits, trapped gas, methods of activation and overall ESD philosophy
- Review site safety, signage & labeling, and security

4. Corrosion Review

- Review cathodic protection system documentation, design process, testing procedures and maintenance procedures
- Review internal corrosion program
- Review atmospheric corrosion program
- Spot check facility for atmospheric corrosion issues

The following examples reflect actual reviews involving three transmission companies and two distribution companies:

Client #1

Type: "Engineering and Operational Review"

Facilities: a) Compressor Stations – 25 (production, transmission and storage); b) Measurement Stations – 36 (orifice and turbine meters).

Scope: The engineering and operational reviews were conducted by a five-person team for the compressor reviews and a three-person team for the measurement reviews. The five-person compressor review team consisted of mechanical, electrical, codes and corrosion engineers and one designer; the three-person measurement review team consisted of a mechanical engineer, measurement subject matter expert and one designer. The work scope and report format were developed by the client and followed closely by the review team to meet the needs of the client. The final report included a prioritized summary of all recommendations for use by the client during the annual budget process.

Client #2

Type: "Risk Assessment Inspections"

Facilities: a) Compressor Stations – 93 (gathering, transmission and storage) b) LNG Plants – 2.

Scope: The risk-assessment inspections were completed by five four-person teams deployed to each operating region to visit each compressor station and both LNG plants over a 10-week period. Each team consisted of mechanical and electrical engineers and subject matter experts. The work scope, facility checklist and report format were developed by the client with input from ENE. Issues requiring action were tagged by the team and observations for facility operational improvements were included in each individual report.

Client #3

Type: “Field Operational Reviews”

Facilities: a) Compressor Stations – 2 (transmission); b) Measurement Stations – 7 (ultrasonic meters).

Scope: The compressor reviews were performed by a single two-person team at each compressor facility consisting of a mechanical engineer and a turbine maintenance subject matter expert. The measurement reviews were conducted by a measurement subject matter expert. The final report includes observations on turbine-compressor maintenance practices and measurement maintenance and calibration procedures.

Client #4

Type: “Plant Inspections”

Facilities: a) LNG Plants — 3; b) Propane Air Plants — 2.

Scope: The peak-shaving plant reviews were conducted by a three-person team consisting of mechanical and electrical engineers and a software engineer.

The follow-up action items that resulted from the plant reviews were developed jointly with the client and will be used as the basis for completing the automation program at each of the plants and for scheduling and budgeting plant improvements.

Client #5

Type: “Material Condition Assessments”

Facilities: a) LNG Plants – 1; b) Propane Air Plants – 1; c) Distribution Gate Stations – 10.

Scope: The material condition assessments reviews were conducted by a four-person team consisting of mechanical, electrical, metallurgical, and process engineers. The detailed plant review checklists were developed with input from the client and the final report format was developed by the client.

In summary, the assessment reports are a joint effort between the client’s engineering and operating personnel and our team. As noted, these on-site reviews and assessment reports are used to:

- Demonstrate code compliance (DOT Part 192 & 193, NFPA 37, 59 & 59A, NEC)
- Develop and prioritize short- and long-term budgets
- Establish maintenance requirements and optimize maintenance programs
- Demonstrate compliance with internal procedures
- Benchmark against other companies with similar operations
- Become familiar with best practices within the gas industry
- Improve throughput capabilities and eliminate bottlenecks
- Improve plant efficiency
- Increase facility security including cyber-security
- Reduce fuel and power consumption
- Develop corrosion control programs for internal, external and atmospheric corrosion
- Evaluate and test Distributed Control System functionality and provide procedures and documentation

Regardless of how a client decides to utilize the information that is provided as a result of the assessments, ENE and its clients believe the costs that are incurred are monies well spent.

Steve Allen, Director, Northern Natural Gas’ Risk Management and Security, said he was especially pleased with the way in which the risk assessments were conducted. “Northern personnel at all levels consistently seek additional opportunities to enhance safety and reliability. During the project I received an e-mail from L.D. Stephens, Regional Director, Northern Natural Gas, indicating that he had never personally been involved with a more effective inspection to enhance safety and integrity. He also believed it was one of the best programs we have undertaken to identify and mitigate potential risks. The combination of our talented personnel with the experience, education, and personalities of your staff resulted in a successful initiative.”

Resources

Author: *Mike Miller is a Senior Project Manager with ENE. Prior to joining ENE in 2002, he was the Director of Engineering Design at ANR Pipeline where he spent the first 27 years of his career.*

EN Engineering's professionals provide comprehensive and dependable engineering, consulting, design, integrity management, corrosion protection, environmental, and automation services to pipeline companies, utilities, and industrial customers with *excellence from start to finish.*

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