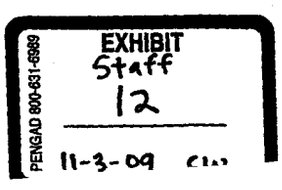
BEFORE THE
PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

KEYSTONE XL PROJECT
DOCKET HP09-001

PREFILED TESTIMONY OF DAVID SCHRAMM
ON BEHALF OF THE COMMISSION STAFF
SEPTEMBER 2009



BEFORE THE PUBLIC UTILITIES COMMISSION STATE OF SOUTH DAKOTA

PREFILED TESTIMONY OF DAVID SCHRAMM

Q. Please state your name and business address.

A. My name is David Schramm. My business address is 7135 Janes Avenue, Woodridge, Illinois 60517.

Q. By whom are you employed and in what capacity?

A. I am employed as a Vice-President and Senior Project Manager by EN Engineering, an engineering and consulting firm specializing in pipeline design and pipeline integrity and corrosion control technology services for the oil and gas industry.

Q. Please describe your educational background and professional experience.

A. I hold a B.S. degree from Iowa State University (Ames, Iowa) and am certified as a Cathodic Protection Specialist (#3178) and Corrosion Technologist (#3178) by the National Association of Corrosion Engineers, International (NACE). My professional experience consists of employment in the pipeline industry with EN Engineering, NICOR Technologies, NICOR Gas (Northern Illinois Gas), Corrpro Companies, Inc. and Harco Corporation.

My responsibilities in these positions includes nearly 30-years of extensive experience in the assessment and application of pipeline integrity and corrosion control programs including: corrosion control engineering, analysis and design, process control and measurement, internal "smart" tooling, cathodic protection design, installation and maintenance, computerized close interval potential survey, direct current voltage gradient survey, telluric current monitoring, measurement and investigation, stray DC and AC interference testing and mitigation, coating selection and inspection and material selection and purchasing.

I am currently responsible for the technical support of the Pipeline Integrity and Corrosion Control Technology (Technology) service offerings including: the technical oversight of project performance and standards, the development and maintenance of technical guidelines, standards and procedures, quality assurance (ISO 9001) for corrosion control, cathodic protection, field failure and integrity management projects and proposals, and the qualification and training of corrosion control field failure, and system integrity personnel.

Within the corrosion control and cathodic protection industry, I have served in a Chair position for NACE T-10-A-11: Gas Industry Corrosion Problems (1995 through 2001), NACE Certification Committee (2001 through 2005), and am currently serving as the Vice-Chair for the NACE Professional Activities Committee (PAC).

In addition, I am a certified Craft Instructor for the National Center for Construction Education (NCCER) as it relates to the American Petroleum Institute (API) Operator Qualification Program, a Veriforce Operator Qualification Evaluator, and served as a member of numerous NACE task or industry groups including the NACE Cathodic Protection Training and Certification Program task group, the Chicago Region Committee on Underground Corrosion (CRCUC) and the Michigan Electrolysis Committee (MEC).

My resume is attached to this document as Appendix A.

Q. On whose behalf was this testimony prepared?

A. This testimony is prepared on behalf of the Staff of the South Dakota Public Utilities Commission.

Q. Please state the purpose of your testimony in this proceeding.

A. The main objective of the Staff in this testimony is to ensure that TransCanada Keystone Pipeline, LP (Applicant) will meet the requirements of the Federal Pipeline Safety Regulations under 49 CFR 195, Transportation of Hazardous Liquids by Pipeline, with respect to the Keystone application for a permit (Permit) to construct and operate a crude oil pipeline (Keystone XL) in South Dakota. I studied the application and relevant discovery materials in my review.

In addition, to the requirements in the code, the Applicant states it will follow additional requirements currently placed on the Keystone pipeline currently under construction. The additional requirements are a condition of the special permit as granted by PHMSA. The special permit allows Keystone to operate the pipeline at a hoop stress level of 80% of the specified minimum yield strength (SMYS) of the pipe material. Keystone seeks to amend the April 30, 2007 PHMSA (Pipeline and Hazardous Materials Safety Administration) special permit issued for the Keystone Pipeline to include the Keystone XL pipeline project.

My testimony specifically addresses relevant portions of 49 CFR Part 195, Subpart H, Corrosion Control.

Q. How will your testimony be organized?

A. My testimony addresses relevant portions of the Federal Requirements under 49 CFR Part 195, Subpart H with respect to:

- Whether the applicant's proposed corrosion program meets the federal requirements to mitigate underground external corrosion from soils or waters?
- Whether the applicant's proposed corrosion program meets the federal requirements to mitigate internal corrosion?

- Whether the applicant's proposed corrosion program meets the federal requirements to mitigate atmospheric corrosion?

Q. **Does the applicant's proposed corrosion program meet the federal requirements to mitigate underground external corrosion from soils and waters?**

A. Yes it does.

External corrosion control must be a primary consideration during the design of a piping system. Coating selection is the first line of defense against external corrosion. Because perfect coatings are not feasible, cathodic protection (CP) must be used in conjunction with coatings for extended corrosion protection.

To this end, Subpart H requires each buried or submerged pipeline have an external coating for external corrosion control if installed after October 20, 1985. In addition, the buried or submerged coating must:

- Be designed to mitigate corrosion;
- Have sufficient adhesion to the metal surface to prevent under film migration of moisture;
- Be sufficiently ductile to resist cracking;
- Have enough strength to resist damage due to handling and soil stress;
- Support any supplemental cathodic protection; and
- If the coating is an insulating type, have low moisture absorption and provide a high electrical resistance.

Subpart H also contains requirements for the application of Cathodic Protection (CP) and additional measures that require the pipeline to be installed with an adequate number of

monitoring test point locations, it must be electrically isolated from foreign metallic structures, and should contain measures to alleviate interference currents.

As described in the documents reviewed, it is my professional opinion the Applicant proposes to take proactive and best practice approaches to coating selection and the protection of the coating from application to burial. In addition, it's suggested cathodic protection program meets or exceeds the requirements for design, application, and monitoring as required under Subpart H.

Q. Based on the soil types contained in the documents provided, is the applicant's proposed program to mitigate external corrosion adequate?

A. Yes it is.

Based on the data provided, my conclusions regarding corrosion control are on a macro-level scale. Using this macro-level approach, the soils from about milepost 282 to about 412 could generally be described as a fine sandy loam to a silty loam with loam and rock outcrops. Based on my professional expertise, this area would suggest soil resistivity values in the range of 10,000 to 100,000 ohm-cm. Soil resistivity values in this range are typically classified as having a degree of corrosivity which is considered mildly corrosive to having negligible corrosion.

Again using this approach, the soils from about milepost 412 to 595 could generally be described as clay to silty clay with some rock and fine silty loam outcrops. Based on my professional expertise, this area would suggest soil resistivity values in the range of 1,000 to 10,000 ohm-cm. Soil resistivity values in this range are typically classified as having a degree of corrosivity which is considered corrosive to mildly corrosive.

Regardless of the soil classification encountered along the pipeline, however, the cathodic protection design and plan as provided appears more than adequate to mitigate the effects of external corrosion due to soils – by use of a protective pipeline coating and the application of cathodic protection. In its proposed plan, the Applicant also includes actions to:

- Install and energize the cathodic protection systems along with pipeline installation;
- Ensure that a cathodic protection survey is completed within six (6) months of placing the respective CP system(s) in operation; and
- Perform a close-internal survey within two (2) years of the pipeline in-service date.

Q. Does the Applicant's proposed corrosion program meet the federal requirements to mitigate internal corrosion?

A. Yes it does.

Internal corrosion mitigation is focused on fluid movement, the use of protective treatments (where required), minimizing sediments and water, and conducting programs to monitor for the presence of internal corrosion. For transportation of hazardous liquids, adequate steps must be in place to mitigate any corrosive effect.

The internal corrosion monitoring program proposed by the Applicant is proactively targeted towards the mitigation of internal corrosion by design and operation and having increased requirements for product acceptance and for best practice internal inspection using "smart" in-line inspection tools. Examples of the Applicant's approach include:

- Pipeline design requirements which minimize horizontal dead legs and create a turbulent product flow;

- A 0.5% tariff requirement which limits sediment and water from all commodities transported and requirements for commodity sampling upon receipt and delivery for transport; and
- Maintenance and operations programs that will make use of internal cleaning tools and "smart" in-line inspections; and where required, include the use of chemical corrosion inhibitors, biocides, and corrosion coupons and/or probes.

Q. Does the applicant's proposed corrosion program meet the federal requirements to mitigate atmospheric corrosion?

A. Yes it does.

Subpart H requires the pipeline or portion of the pipeline to be cleaned and protectively coated if it is exposed to the atmosphere. Inspections and monitoring is focused at soil-to-air interfaces, under thermal insulation, under disbonded coatings, at pipe supports, at deck penetrations, and on spans over water.

As described, the Applicant addresses this requirement by taking actions to ensure:

- The soil-to-air interface is properly coated with a suitable protective coating (liquid epoxy) and over-coated with a corrosion resistant paint to a distance of 18-inches above grade;
- Protectively coating all piping above grade with a corrosion resistant paint; and
- Operation and maintenance programs that require a periodic visual inspection of the coating condition.

Q. As it relates to the federal requirements under CFR Part 195, Subpart H, Corrosion Control, does the Applicant's proposed corrosion program for the construction and operation of the Keystone XL Pipeline adequately meet the requirements of Subpart H

and act to minimize any adverse effects on the environment and the citizens of South Dakota?

A. Yes, based on my professional opinion, it does.

Q. Do you have anything else to add to this Testimony?

A. Not at this time

ENGineering

David A. Schramm

Vice President, Pipeline Integrity & Corrosion Services

Education

BS, Resource Management, Iowa State University, Ames, Iowa, 1978

Professional Certifications

National Association of Corrosion Engineers International (NACE) – Cathodic Protection Specialist #3178
National Association of Corrosion Engineers International (NACE) – Corrosion Technologist #3178
Clockspring Trainer/Installer Certified
National Center for Construction and Research (NCCER) Certified Craft Instructor
National Association of Corrosion Engineers
Veriforce Operator Qualification Evaluator
Operator Qualification ISNETWORLD #00425152
West Virginia University, Appalachian Underground Course – Advanced Corrosion Control

Summary of Experience

Mr. Schramm has over twenty-six years of extensive experience in the direct and practical application of pipeline integrity and corrosion control including corrosion engineering analysis and design, process control and measurement, internal "smart" tooling analysis, cathodic protection design, installation and maintenance, computerized close interval potential survey, direct current voltage current survey, telluric current monitoring, measurement and investigation, stray DC interference testing and mitigation, coating selection and inspection, and material selection and purchasing.

Responsible for the technical support of the Pipeline and Corrosion Control service offering including the development and maintenance of technical specifications and procedures, project oversight and quality assurance for corrosion control, cathodic protection, field failure and integrity management projects and proposals, and the qualification and training of corrosion control, field failure and system integrity personnel.

In addition to pipelines, has additional experience with underground storage tanks, above grade storage tanks, power plant structures, condenser/chiller equipment, water well casings, lead sheath cable, underground electric cable, and marine structures.

Project Experience

Corrosion Control Operations, Illinois

Managed and directed the Corrosion Control Service Group for Nicor Technologies and Nicor Gas providing corrosion control consulting services to distribution and transmission pipelines, municipal and utility organizations, and commercial and industrial customers. Responsible for the performance of all operating corrosion control programs (internal, external and atmospheric) on the Nicor Gas pipeline system including specification, performance and day-to-day operation. As a member of the Nicor Gas welding and joining, system integrity, and code committee operating task groups provided technical expertise in pipeline integrity, research and testing, corrosion control and cathodic protection issues. Having responsibility for the due diligence corrosion control and cathodic protection evaluations on acquisition projects in Argentina and Tennessee. Developed risk, quality, and integrity management programs related to corrosion control and cathodic protection operations.

Appendix A

ENEngineering

David A. Schramm
Vice President, Pipeline Integrity & Corrosion Services

Project Experience (cont'd)

Corrosion Control and Research Program Services, Illinois

Directed and coordinated the Nicor Gas corrosion control programs for distribution, transmission, and storage facilities. Directly supervision responsibility for the completion of annual corrosion control and corrosion control activities which include: annual reading programs, close interval survey, stray current interference, and impressed current rectifier system replacement. Managed and directed the research lab for Nicor Gas and was responsible for day-to-day operation, quality performance, testing, recommendation and approval, including the performance and analysis ASTM and ANSI test standards and methods. Directly responsible for the purge routine process for all large-diameter high- pressure pipelines. Conducted, analyzed and developed corrosion control action and recommendation for all wall loss and field failure events.

Lakehead Pipe Line Company, North Dakota, Minnesota, Wisconsin, Illinois, Michigan, and New York

Directed the completion of all annual cathodic protection reading programs, close interval survey, stray current interference, impressed current rectifier system replacement, and field failure investigations for the Lakehead Pipe Line Company over a six (6) year period on facilities that include pipeline, compression, substation, and storage facilities.

Portal Pipe Line Company, North Dakota

Supervised and completed the annual cathodic protection reading program for the Portal Pipe Line Company including pipeline, gathering and wellhead systems.

Alyeska Pipeline Service Company, Alaska

In-state direction, supervision and related to the process of conducting, analyzing and performing telluric based close interval surveys for the Trans-Alaska Pipeline System (TAPS) over a four (4) year period. Direct responsible for the performance, provision, data quality, data analysis and report recommendations.

Deseret Generation and Transmission Company, Utah

Supervised, conducted and performed the design and testing services for the Deseret Generation and Transmission Company. Planned and performed a wide variety of duties involving the evaluation, design, and installation of cathodic protection systems to inhibit corrosion on pipelines, tanks, and similar underground and submerged structures including electrical continuity and protection of concrete steel cylinder pipe.

Mobil Oil, Illinois

Conducted and analyzed all underground facilities for the potential application of cathodic protection for the Mobil-Joliet Refinery. Operational and performance responsibilities related to installation of new and existing cathodic protection systems: design, redesign, and installation of impressed current systems for tank bottoms.

David A. Schramm
Vice President, Pipeline Integrity & Corrosion Services

Project Experience (cont'd)

Montana Power, Montana

Conducted, analyzed and performed close interval and leak detection surveys on large diameter - high pressure – natural gas transmission pipelines owned and operated by Montana Power near Helena, Montana.

Northern Natural Gas, Michigan

Conducted, analyzed and performed close interval surveys on large diameter - high pressure – natural gas transmission pipelines owned and operated by Northern Natural Gas (NNG) in the Upper Peninsula of Michigan.

Mountain Bell Telephone, Wyoming

Supervised, conducted, analyzed and performed the corrosion control and cathodic protection analysis of the Mountain Bell Telephone lead sheath cable running between Evanston and Cheyenne, Wyoming.

Coffeen Power Plant, Illinois

Supervised, conducted, analyzed, designed and installed cathodic protection systems for the Coffeen Power Plant Facilities operated by the Central Illinois Light Company (CILCO).

LaGrange Hospital, Illinois

Designed, analyzed and supervised the installation of galvanic anode systems designed to protect the interior water box of condenser/chiller units operated by the LaGrange Hospital.

Union 76, Illinois, Kentucky, Indiana

Supervised, conducted and analyzed the cathodic protection systems installed on over 250 underground gasoline and waste oil storage tanks systems owned and operated by Union 76.

O'Hare Airport, Illinois

Designed and supervised the installation of galvanic anode protection systems for aviation fuel pipelines related to jet-way expansions. Responsible for the cathodic protection assessment, design, and mitigation on jet-way expansions of the G & H terminals as well as field supervision on the United Airlines terminal 1 construction project.

City of Viburnum, Missouri

Designed and supervised the installation of down-hole impressed current systems for the City of Viburnum including the protection of water well casing, column and bowls.