

November 20, 2008

Ms. Patty VanGerpen, Executive Director
South Dakota PUC
500 E Capitol
Pierre, SD 57501

Re: Northwestern Energy Incident – March 8, 2007
Mitchell, South Dakota

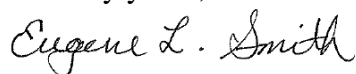
A length of 2-3/8" O.D. steel pipe removed from a Northwestern Energy gas main that leaked at a pressure of 18 psig in Mitchell, South Dakota was sent to Stork Twin Cities Testing for visual examination and laboratory testing. The examination and laboratory testing was performed at Stork on January 16 and 17, 2008 under the direction of Dr. John Kiefner of Kiefner & Associates, Inc. Dr. Kiefner was retained at the request of the South Dakota Public Utility Commission (SDPUC). The testing was performed in accordance with a test protocol prepared by Dr. Kiefner that was agreed to by parties witnessing the testing. A list of the attendees is shown in Table 1. EN Engineering's Eugene L. Smith participated in the examination and laboratory testing.

The following were determined during visual examination of the length of steel pipe:

- the ends were identified as A and B, respectively and the length of the pipe measured 51 inches, no girth welds were found;
- the leak was at a circumferential crack located 28 inches from the A end, the crack was 5-3/4- inches long across the bottom of the pipe (as positioned in the ground); the maximum crack opening was approximately, 3 mm (0.118-in.); 1-3/4" of the circumference across the top was not cracked; a band of external coating, approximately 2-1/4 to 3-inches wide surrounding the crack was missing;
- there were three locations (of varying lengths and distances from the A end) where the pipe external coating was damaged/missing and white deposits formed on the steel; the deposits were checked with an acid resulting in gas evolution indicating they are calcareous deposits (calcium carbonate and bicarbonate) resulting from exposure of the steel to cathodic protection; samples taken from the white deposits were examined by EDS during SEM examination and found to contain large amounts of Calcium further indicating these are calcareous deposits; calcareous deposits form when coating is damaged and steel is exposed to the cathodic protection;

- the pipe was deflected (bent) downward at the crack 28 inches from the A end with a maximum deflection of 11 mm (0.44 inches) in a span of 19-1/2 to 48 inches from the A end;
- based on examination of the ID surface of the pipe and metallographic examination of a ring cut from the B end of the pipe in the unetched and etched conditions it appears the pipe is furnace butt-welded;
- based on a chemical analysis performed on the pipe near the B end, the pipe appears to be butt welded, class II per API 5L, dated Mar, 1955;
- results of a tensile test obtained 34-3/4 inches from the A end indicates the pipe is butt welded, class II per API Specification 5L, dated March, 1955;
- the wall thickness measured (0.162") on the tensile test specimen indicates the pipe is standard wall with a nominal thickness of 0.154"
- circumferential gouges are present along mid length of the fracture, a 1-9/16 inch long gouge is present along the A edge of the fracture and a gouge approximately 2 inches long is present along the B edge of the fracture;
- there were no indications of any pipe steel defects during microscopic examination of the two metallographic specimens taken across the fracture;
- based on the downward deflection in the pipe across the crack, the instances of external coating damage along the pipe, the circumferential gouges at and along the fracture and the absence of any pipe steel defects at the fracture it is concluded the damage to the pipe and the fracture were caused by third party damage.

Sincerely yours,



Eugene L. Smith, P.E.
Chief Metallurgist
EN Engineering

Table 1

List of Attendees

<u>Name</u>	<u>Company / Firm</u>	<u>Dates Present</u>
Kara Semmler, Staff Attorney	South Dakota Public Utilities Commission	January 16, 2008
Nathan Solem, Utility Analyst	South Dakota Public Utilities Commission	January 16, 2008
Daris Ormesher	South Dakota Public Utilities Commission	January 16, 2008
Dr. John F. Kiefner, P.E., Advisor	Kiefner & Associates Inc	January 16-17, 2008
Eugene Smith, P.E., Engineer	EN Engineering	January 16-17, 2008
David J. Kramer, P.E., Engineer	Crane Engineering	January 16, 2008
S. N. Bhatt, P. E., Engineer	MEM Engineering	January 16, 2008
Larry D. Hanke, P.E., Engineer	Materials Evaluation and Engineering Inc	January 16, 2008
Richard Kielty, P.E., Engineer	Stork Twin City Testing	January 16-17, 2008
Lawrence "Bud" Eastman, CFI	Fire Check Inc	January 16, 2008
Roy Wise	Richardson Law Firm	January 16, 2008
Paul Linde	Shaffer Law Office	January 16, 2008
Jeffrey M. Baill, Attorney	Yost & Baill LLP	January 16, 2008