



**Pressure
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Incorporated**

3315 Meadow Wood Drive
Richardson, TX 75082-3787
Telephone: 972-480-8680
Facsimile: 972-480-8682
www.press-sci.com

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Our Twentieth Year

Nathan Solem

Utility Analyst/Acting Pipeline Safety Program Manager
South Dakota Public Utilities Commission
500 E. Capitol Avenue
Pierre, SD 57501-5070
By email

Re: Opinion Regarding Probable Cause of Failure in Piping System

Dear Mr. Solem:

Several weeks ago, you contacted me and asked me to provide an opinion as to the reason(s) for the failure of a gasket, leading to a fire in your Pierre MDU Regulator Station. You sent me a number of photos of the failed components, some notes on interviews, flange standards, a piping schematic, and two videos showing a pigging operation.

It is apparent that the pigging operation is highly energetic. On the system on which the video was taken, it caused the safety relief valve to release and probably overwhelmed the relief valve, creating high pressure upstream.

The photos of the gasket at the Pierre MDU Regulator Station show that it was blown out by high pressure. I'm also suspicious that the flange holding the gasket may have not been tightened sufficiently. Rust and debris particles are only residue; they did not themselves contribute to the failure. The damage to the filter at the MDU Station appears to be buckling under high axial loading; providing additional evidence of high transient pressure probably caused by pigging.

At the Pierre MDU Station, it appears that the high transient pressure blew out the gasket and was the probable cause of the failure. The failure may have been abetted by an insufficiently tightened flange.

Very truly yours,
Pressure Sciences Incorporated

Allen Selz, Ph.D., P.E.
President