

July 14, 2011

SE Ref No.: 11-1057-B

Pengrowth Energy Corporation
2100, 222 - 3rd Avenue SW
Calgary, Alberta T2P 0B4
Canada

Re: **Assessment of Fire Damage of Stainless Steel Surface Piping And Valves**
Location: 08-35-063-11W5M – Judy Creek

Attention: Shane Tiessen, Team Lead Integrity

1.0 BACKGROUND

On June 26, 2011 a failure occurred on a STAR™ Aliphatic Amine Line Pipe (STAR pipe) at the Judy Creek header system located at 08-35-063-11W5M, owned by Pengrowth Energy Corporation (Pengrowth). The failure resulted in a spill and a fire. Nobody was hurt by the incident. Figures 1 and 2 show the fire on the site.

Skystone Engineering (Skystone) was requested to assist Pengrowth in selecting the equipment which could be re-used after the fire.



Figure 1 – Fire On Site



Figure 2 – Fire On Site: Overview

2.0 EXAMINATION

2.1 Visual Examination

Visual examination of the field photographs of the fire, submitted by Pengrowth, including Figures 1 and 2 in this letter, showed that:

- The fire was localized around two 8 inch vertical risers.
- Each riser contained a stainless steel pipe on top, which was flange-connected to STAR™ Aliphatic Amine pups (STAR pups).
- The upper part of the STAR pups were exposed to the fire.
- The visual examination of the surface of the STAR pups after the fire (see Figure 3) showed that they did not burn, and exhibited a minimal amount of charring on the surface exposed to the fire.
- This indicates that the heat input from the fire was not significant.

Figure 2 shows that the surface piping located to the left of the red line corresponding to the downstream end of the 16 inch valve potentially could be affected by fire and the piping to the right was likely not affected. Figure 4 shows a closer view of the 16 inch Newco 300 steel valve.

Visual examination of the 16 inch Newco 300 steel valve and all the valves and surface piping located to on the right side of the valve (see Figures 4 through 7) showed that their surfaces were in good, like-new condition and had no visible indication of heat tinting, charring or fire exposure.

2.2 Hardness Testing

Hardness testing was performed by Bakos (NDT) Inspection (1989) Ltd. using an ultrasonic technique at 14 different locations to the right of the downstream end of the 16 inch Newco 300 steel valve. Appendix 1 shows the original hardness results and Figures 5 through 7 show several locations of harness testing. Hardness results varied from 202 HB (Brinell hardness) to 132 HB. No indications of hard spots or significant softening were found.

3.0 CONCLUSIONS

Based on the results of visual inspections and hardness testing, all valves and surface piping located to the right of the downstream end of the 16 inch Newco 300 steel valve (see the red line in Figure 2) were not affected by the fire.

It is recommended to change all gaskets and service all the valves which are left in service at the 08-35-063-11W5M site, as polymer parts could be heated to inappropriate temperatures for polymers.

If you have any questions or require further assistance, please feel free to call or email me at atatarov@skystone.ca.

Respectfully,



Alex Tatarov, Ph.D., P. Eng.
Skystone Engineering
(403) 221-0240

c.c. F.S. Gareau, P. Eng.



Figure 3 – 08-35 Site At Time Of Visual Examination

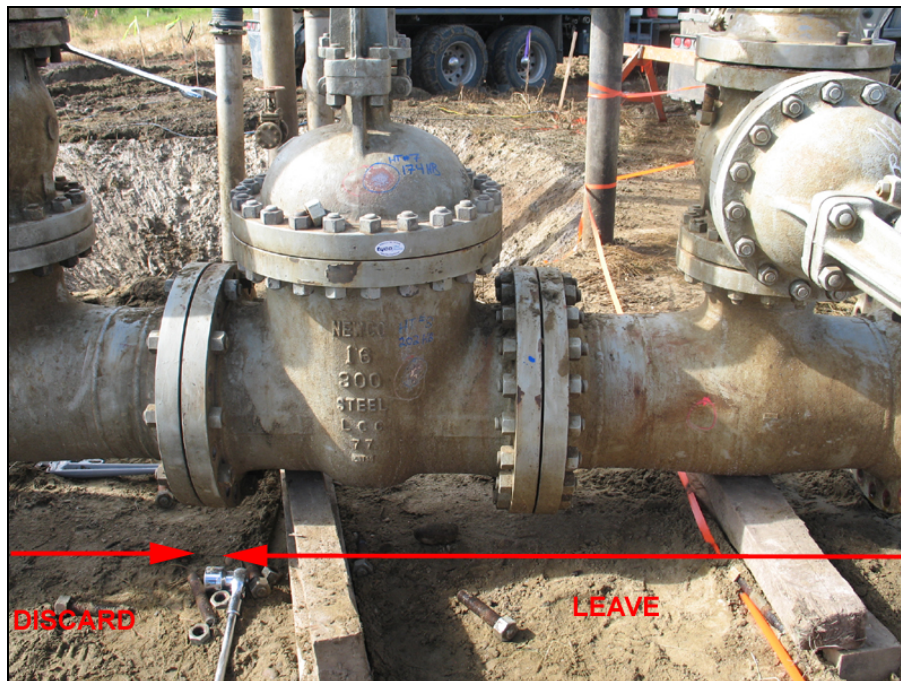


Figure 4 – 16 Inch Newco 300 Steel Valve: All Equipment To The Left Is To Be Discarded



Figure 5 – External Surface Of 8 Inch Stainless Steel Bend And Flanges.
No Visual Indication Of Fire Damage Or High-Temperature Exposure



Figure 6 – External Surface Of 8 Inch Stainless Steel Pipe.
No Visual Indication Of Fire Damage Or High-Temperature Exposure



Figure 7 – External Surface Of 8 Inch Stainless Steel Bend And Pipe.
No Visual Indication Of Fire Damage Or High-Temperature Exposure.

Appendix 1

Results of UT Hardness Testing

BAKOS (NDT) INSPECTION (1989) LTD.

WHITECOURT-Box 906, Whitecourt, Alberta T7S 1N9 Phone: (780) 778-5575 Fax:(780) 778-3817

HARDNESS TESTING REPORT

Customer: PENGROWTH CORP. Rpt. No.: HT-24301
 Location: JUDY CREEK Job #:
 Examination of: PIPING AT 08-35-65-11W&M Date: JUNE 29, 2011
 Part/Serial Number: P.O.:
 Acceptance Standard: PENGROWTH CORP. Page: 1 of 1
 Examination Standard: BAKOS NDT HT.
 Part/Serial #: CAL BLOCK # 1011049 (26.5HRC) Heat #: CAL BLOCK BEADING → 24.7 HRC

Test Equipment:

Instrument: PHASE II Model: MET-UIA Serial#: 101213 Cal Date: 2/11/2011
 Scale: ☒ BRINELL ☐ ROCKWELL D ☐ ROCKWELL C ☐ VIKERS OTHER:
 HARDNESS RESULTS: ☐ SEE ATTACHED DRAWINGS ☐ SEE SKETCH(ES) ☐ SUPPLEMENTAL ☒ N/A

TEST#	ITEM	BAR #	WELDERS #	PM	HAZ	VM	HAZ	PM	COMMENTS
HT# 1	8", 40S								167 HB
2	↓								190 HB
3	↓								154 HB
4	↓								185 HB
5	↓								164 HB
6	↓								144 HB
7	16" VALVE								174 HB
8	16" VALVE								202 HB
9	8", 40S								158 HB
10	↓								132 HB
11	↓								158 HB
12	↓								149 HB
13	↓								193 HB
14	16" TEE								191 HB

Technicians:

Print: TIM COADY RT/MT/PT CGSBA/ASNT Level: II Reg. #: 12780 Sign: Ti C
 Ass't: SHAWN BAKOS CGSBA/ASNT Level: NIA Reg. #: NIA Sign: NIA.

THE ABOVE REPRESENTATION IS A PROFESSIONAL OPINION, FINAL INTERPRETATION IS THE RESPONSIBILITY OF THE CUSTOMER. I HAVE REVIEWED AND AM IN FULL AGREEMENT WITH THIS REPORT.

Customer representative: ShellyDate: June 29/11