



# PENGROWTH

PENGROWTH ENERGY CORPORATION

Box 390, Swan Hills, Alberta T0G 2C0

Tel 780-333-71000 • Fax 780-333-7115 • website: [www.pengrowth.com](http://www.pengrowth.com)

July 27, 2011

Energy Resources Conservation Board  
Calgary Office, Suite 1000  
5 Street SW  
Calgary, Alberta T2P 0R4

**Attn: Brian Temple, Incident Investigator**

**RE: Pipeline Failure Investigation**  
**Location: 08-35-063-11 w5m**  
**FIS#: 20111314**

---

This correspondence is in response to your letter dated July 7<sup>th</sup>, 2011 relating to Pengrowth's pipeline failure on the above line. Pengrowth hereby provides the following detailed response to the ERCB as requested:

## **1. Executive Summary**

On June 26, 2011 at approximately 16:00 a failure occurred on an 8" STAR Aliphatic Amine group line at a header system located at 08-35-63-11 w5m in Judy Creek (see figure 1 for spill location and spill control points). The failure resulted in a spill and fire. No injuries occurred as a result of the incident. Operations immediately responded to the incident and had the site isolated by 17:06. Appendix 1 details the sequence of events relating to the incident.

The environmental impact of the incident was a release of approximately 100 m3 of sweet oil emulsion with a 95% produced water cut (~50, 000 ppm Cl-). The released fluid was mostly contained on lease however, some fluid did travel across the road into a mixed forest area with a small volume travelling along the ditch line entering Judy Creek.

Initial containment efforts implemented by Pengrowth personnel minimized the fluid that reached the creek. Water samples were taken immediately following the event with a maximum concentration of 254 ppm Cl- recorded on June 26 at 21:00. As of 3:00 pm June 29, 2011 all chloride screens have been 0 ppm. Appendix 2 provides additional detail regarding spill containment, clean-up and monitoring activities.



Figure 1. Failure location, spill path to creek and control points.

## 2. Background to incident

- a) **Operator History in the area:** Imperial Oil was the operator in the area until Pengrowth Corporation acquired the field in April of 1998. The line under discussion was constructed by Pengrowth in 2007.
- b) **Details of previous incidents within last 5 years:** There have been no failures of similar root cause recorded on Pengrowth's fiberglass pipeline system.
- c) **Detailed description of pipeline design and construction, including dates of construction if different projects:** The 8 inch oil effluent pipeline under discussion (license 4218-117) is 1.49 km long and is part of the Judy Creek oil system that transports oil effluent from Judy Creek oil field to the Judy Creek production complex for processing. The pipeline runs from 08-35-63-11 w5m header to a header located at 13-36-63-11 w5m. The pipeline is constructed of STAR Aliphatic Amine Line Pipe (STAR pipe) grade 1250. The OD and wall thickness are 214.4mm and 8.9mm, respectively. The maximum operating pressure of the line is 3450 kpa. The line was constructed January 2007 (see Appendix 3 – Skystone Engineering third party failure analysis for more detailed construction information).
- d) **Summary and assessment of conditions and events immediately preceding the incident:** See Appendix 3 Skystone Engineering third party failure analysis report.
- e) **Copy of emergency response plan and comments on how well it worked:** The emergency actions and procedures that were implemented by Pengrowth as a result of the pipeline break were in alignment with the company's Corporate Emergency Response Plan (ERP). Pengrowth staff knew and understood the contents of the ERP and as such, the response was coordinated in a way that protected personnel, public, the environment and company property. A copy of the Corporate ERP can be found in Appendix 4.

## 3. Recommendations

### **Actions to improve existing operations**

As a result of the 08-35-63-11 w5m pipeline failure Pengrowth completed the following actions.

- Replaced risers and stainless steel piping associated with both 8" group lines from 8-35-63-11 to 13-36-63-11. Completed hydrotest to 1.4X MOP on both lines.
- 8" line from 08-33-63-11 - completed an engineering assessment of stainless steel to determine if it was fit for service (see attached Skystone report Appendix 5)
- 8" line from 08-26-63-11 satellite – replaced fiberglass riser. Completed engineering assessment on stainless steel piping. Completed hydrotest to 1.4 X MOP.
- 4" pipeline from 08-35-63-11 satellite – replaced riser and associated stainless steel piping and completed hydrotest to 1.4 X MOP.
- Developed and implemented operational procedure for well start-up after power failure (see Appendix 6)



#### ***Actions to prevent future instances***

- Pengrowth will be completing inspection of 4 additional FRP risers built during same construction period (2007). Inspections will be conducted utilizing the checklist located in Appendix 7. Inspections will be completed by October 31, 2011.
- Pengrowth has initiated the Management of Change process to assess and potentially alter the automation logic associated with well start-ups. A decision on a path forward will be made by September 30, 2011.

#### ***Actions to inform affected public of outcomes***

- Pengrowth has toured interested parties and has provided information when requested.

#### **4. Description of the incident**

a. ***Summary of the event*** – A pipeline failure and subsequent surface fire occurred at the header located at 08-35-63-11 w5m on June 26, 2011 at approximately 16:00. Below is the main sequence of events leading up to the failure;

- 11:30 – power outage: 06-35 Atco substation voltage regulator failed – Judy Creek South A and B pool operations as well as the Judy Creek production complex lost power.
- 11:35 – Field crews mobilize to deal with outage – some equipment required manual shutdown. Wells did not see the shutdown command that was sent by the control room operator because the power was down prior to the command being received.
- 11:40 – Production complex blocked in the inlets to manage high level alarms in process vessels.
- 11:45 – Production complex shuts down on low instrument air
- 11:45 to 14:30 – Power remains down
- 14:30 – Atco Power is restored
- 14:30 to 16:00 – Production complex operators are working to bring the complex back on-line.
- 16:00 – Production complex operators are opening the main inlets when smoke is observed. Field operations are dispatched immediately to investigate
- 16:15 – Fire at 08-35-63-11 header is confirmed by operations
- 16:15 to 17:15 – Operations isolate and de-pressure 08-35-63-11 header
- 17:15 – The leak was completely isolated and de-pressured
- 17:45 – Final spot fires were extinguished by Swan Hills Fire Department

b) ***Details of internal and external notification*** – Pengrowth classified the pipeline failure as a Level 1 emergency and as such, internal and external notifications were completed accordingly. Internally, off-site management was notified. Externally, no members of the public reside within the EPZ and as such, notification was not required. The ERCB was initially notified of the release through AEMA (Alberta Emergency Management Agency).

c) ***Response and control measures*** – The emergency actions and procedures that were implemented as a result of the pipeline break were consistent with the Corporate Emergency Response Plan (ERP). Below is the main sequence of response events immediately following the incident;

- 16:15 – Operations confirm spill and fire and begin isolation and de-pressuring
- 16:17 – Track hoe and sand bags are deployed to contain release from water body
- 16:25 – Road blocks are set up to control site access
- 16:35 – Swan Hills fire department are on route
- 17:15 – Leak is isolated and de-pressured
- 17:35 – Additional sandbags are set up to contain spill
- 17:40 – First containment boom is set in Judy Creek at culvert near PC
- 17:40 – First samples are taken at main culvert near PC to determine extent of spill (no impact detected)
- 17:45 – Boom installed 70 yards downstream of spill to contain hydrocarbon
- 17:45 – hydrovacs arrive on site and focus on ditch lines towards Judy Creek
- 20:45 – Pengrowth staff take helicopter flight to further determine extent of incident. Extent does not go past 6-36-63-11 lease road.
- 21:05 – Additional booms are placed at 6-36-63-11 and 8-36-63-11 lease roads
- 22:50 – Additional spill supplies arrive from Edmonton
- 23:15 – Clean harbors are contacted for third party assistance with spill clean-up

**d) Details of monitoring programs (air, water, soils) including their results –**  
See Appendix 2

**e) Use of contractors including specific areas of responsibility –** SWAT consulting was contracted to develop and manage the containment and recovery strategies (see Appendix 2). Worley Parsons in conjunction with Pengrowth's Environmental department developed the environmental monitoring program.

**f) Communications program and media involvement, including an assessment of their effectiveness –** The media was notified through an ERCB press release on June 27, 2011. Pengrowth's communications program and media involvement were deemed to be effective and adhered to the company's ERP.

**g) Actual or suspected root cause –** The 8 inch STAR Alphatic Amine line pipe schedule 1250 failed in the connection of the riser elbow to the pipeline. Both static and dynamic stresses contributed to the failure (see third party failure analysis for more information).

- Ground settling resulted in high static bending stress of the last section of the pipeline connected to the riser elbow supported by the anchor.
- The failure was in the last connection of the pipeline. Static tie-in stresses could have contributed to the failure
- Dynamic stresses contributed to the failure. The failure happened soon after the power outage, when numerous wells restarted, and several fluid surges may have occurred

- The combination of the static and dynamic stresses resulted in the failure.

***h) How repair/reconstruction activities were/are planned and performed –***

As a result of the 08-35-63-11 w5m pipeline failure Pengrowth completed the following repairs;

- Replaced risers and stainless steel piping associated with both 8" group lines from 8-35-63-11 to 13-36-63-11 (license 4218/lines 117,116). Completed hydrotest to 1.4X MOP.
- 8" line from 08-33-63-11 (license 4218-114) - completed an engineering assessment of stainless steel to determine if it was fit for service (see attached Skystone report)
- 8" line from 08-26-63-11 satellite (license 4218-127) – replaced fiberglass riser. Completed engineering assessment on stainless steel piping. Completed hydrotest to 1.4 X MOP.
- 4" pipeline from 08-35-63-11 satellite (license 9526-22) – replaced riser and associated stainless steel piping and completed hydrotest to 1.4 X MOP.

**5. Description of all potential impacts and steps taken during the incident to monitor and minimize the effects on:**

- b. Public** – road blocks were installed to protect the public during the incident. No members of the public reside within the EPZ and as such notification was not required.
- c. Workers** – All workers on site during the incident were trained and deemed competent in Pengrowth's Environmental and Safety procedures. No injuries occurred as a result of the incident or subsequent construction activities.
- d. Environment** – As described above, 100 m3 of sweet oil effluent was spilled to ground with a small volume entering Judy Creek. The environmental plan in Appendix 2 details steps taken for containment, clean-up and monitoring.
- e. Animals, domestic and Wildlife** – Animals were not impacted by the incident.

**6. A copy of or sufficient detail respecting appropriate maintenance and operating programs related to the pipeline (e.g. SCADA systems, pipeline corrosion program, ESD valve operating conditions, maintenance programs, facility restart procedures following shut downs and employee certifications)**

Prior to the June 26, 2011 pipeline failure producing wells were programmed to automatically re-start following a power outage. Post incident Pengrowth has initiated a management of change process to review the impact of altering the automation logic associated with a power failure. An immediate automation change has not been implemented so that a complete system risk assessment can be conducted.

An interim operational process has been developed and is being implemented operationally to deal with well start-up after a power outage. The procedure has been incorporated into the pipeline operations and maintenance manual. Operations personnel have reviewed the procedure and are trained to execute the required steps in the event of a power failure.

7. **All third-party analyses and any engineering reports of any pipeline or equipment failures (eg metallurgical reports, weld failures), if applicable. A copy of the report determining failure cause and/or mechanism from the lab analysis.**

Please see Appendix 3 which contains a copy of the third party failure analysis report completed by Skystone Engineering.

8. **Address how confirmation of long-term integrity on the failed subject pipeline will be achieved and include a copy of any engineering reports or assessments. In addition, consider other pipelines within the system to ensure the long term integrity will be achieved.**

a) **Long-term integrity of the failed pipeline will be achieved and maintained through the following action**

- Completed an engineering assessment of any materials being re-used post incident at 08-35-63-11 header (see Appendix 5)
- Replaced 1250 STAR risers with 3000 STAR
- Implement operational procedure for well start-up following a power outage
- Complete MOC for well start-up automation logic

b) **How will integrity be maintained on other pipelines within the system**

- Pengrowth will inspect four fiberglass pipeline risers that were installed during the same construction period (2007). The inspections will be completed using the checklist in Appendix 7. The inspections will be completed by October 31, 2011.

9. **Copy of personnel statements, if available**

See Appendix 8

10. **Digital Pictures of the failure site and the failed pipeline**

Please refer to the images of the failed pipeline and site in the attached third party failure analysis (Appendix 3).

11. **Conclusions respecting the incident with emphasis placed on**

b) **How the knowledge gained from this incident will be shared within other operations** – Pengrowth is committed to the safe and reliable operation of our pipelines and assets, and will be incorporating the learning's from this incident to further refine and improve our risk management strategies.

Furthermore, we will be planning on establishing an integrity user group for other producers within the Swan Hills area; to share and learn from each other's challenges and successes with the intent of improving not only Pengrowth's, but the area's pipeline integrity performance.

- c) **Timeline to implement actions, including measurement points that will be used to ensure that actions are followed up, resulting in lasting improvement.**

<b>Description of action</b>	<b>Target Date</b>	<b>Status</b>
Complete construction activities at 8-35-63-11 as outlined in section 3(h) of this letter	July 1 <sup>st</sup> , 2011	Complete
Develop and implement operational procedure for "Well start-up after a power outage"	July 5 <sup>th</sup> , 2011	Complete
Determine direction forward through MOC for automation logic associated with well re-starts	September 30, 2011	
Complete inspection of 4 fiberglass pipeline risers constructed during 2007.	October 31, 2011	
Establish Swan Hills producer pipeline integrity group	December 31, 2011	

Pengrowth is committed to pro-actively meeting regulatory requirements and strives to achieve excellence within all of its operations. I trust that the above information completes the requirements laid out in the ERCB's investigation letter.

If you require additional information or have any questions regarding this matter, please feel free to contact me at 780-333-7150 (office) or 780-706-5153 (cell) or via e-mail at [shelley.macleane@pengrowth.com](mailto:shelley.macleane@pengrowth.com)

Sincerely,  
**PENGROWTH CORPORATION**



Shelley MacLean  
Integrity Coordinator, Swan Hills Trend

Cc: Kevin Matieshin, Health Safety and Environmental Director, Pengrowth Corporation  
Randy Steele, Swan Hills Trend General Manager, Pengrowth Corporation  
Dale Babiak, Manager of Production and Operations Swan Hills Trend, Pengrowth  
Matt Lema, Manager of Technical Services Swan Hills Trend, Pengrowth Corporation  
Shane Tiessen, Team Lead Asset Integrity, Pengrowth Corporation  
Paul Bothwell, Senior Regulatory Coordinator, Pengrowth Corporation  
Carolyn Thomas, Environmental Coordinator Swan Hills Trend, Pengrowth Corporation



## **APPENDICES**

# **APPENDIX 1**

## **Sequence of events**

## **APPENDIX 2**

### **Environmental Plan: Containment and Recovery Strategies**

## **APPENDIX 3**

### **Skystone Engineering third party failure analysis report**



## **APPENDIX 4**

### **Pengrowth Corporate emergency response plan**

## **APPENDIX 5**

**Skystone Engineering assessment of fire damage of  
stainless steel piping and valves at 08-35-63-11 w5m**

## **APPENDIX 6**

**Pengrowth operational procedure for well-start up following  
a power outage**

## **APPENDIX 7**

### **Fiberglass riser inspection checklist**



## **APPENDIX 8**

### **Witness statements**