Pengrowth Energy Corporation
Pipeline Failure
Licence No. P4218, Line No. 117
June 26, 2011

ERCB Investigation Report

February 26, 2013

Energy Resources Conservation Board

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1 Incident Description

On June 26, 2011, at 6:05 p.m., the Energy Resources Conservation Board (ERCB) St. Albert Field Centre (SAFC) was notified by the Alberta Emergency Management Agency (AEMA) Provincial Operations Centre through the Coordination and Information Centre (CIC) of an explosion and fire at a pipeline field riser licensed to and operated by Pengrowth Energy Corporation (Pengrowth). At about 4:00 p.m., smoke was identified at the subject location by a nearby Alberta Sustainable Resource Development (SRD)[1] fire watch tower. Following protocol, the fire tower notified Swan Hills fire department who in turn notified AEMA. AEMA then notified the ERCB as well as Alberta Environment (AENV)[2] through the CIC. At approximately 6:30 p.m. the ERCB SAFC was contacted by AENV's Alberta Environment Support and Emergency Response Team looking for information regarding the release. The SAFC contacted Pengrowth at about 6:46 p.m. to confirm the information. The pipeline failure site, located at Legal Subdivision 08, Section 35, Township 063, Range 11, West of the 5th Meridian, is about 23 kilometres (km) southwest of the Swan Hills town site.

During initial discussions with SAFC staff, Pengrowth reported that the Swan Hills Fire Department had extinguished the fire and that the pipeline had released sweet oil/water effluent as a result of the incident.[3] Pengrowth estimated the release volume at about 100 cubic metres. Pengrowth also reported the release was contained mainly on-lease; however, some effluent travelled across the road into a mixed forest area. A small volume also travelled about 80 metres downgrade along the ditch line until it contacted the Judy Creek. It then travelled about 800 metres downstream until it was contained within a number of unoccupied beaver ponds. No wildlife was reported affected as a result of the release.

Using the ERCB Assessment Matrix for Classifying Incidents, SAFC staff designated this as a level-1 emergency.[4] Following release notification, the ERCB dispatched SAFC field inspectors and Field Incident Response Support Team members to the site.

At approximately 5:40 p.m., Pengrowth activated its corporate emergency response plan (ERP) and began placing booms in the waterway for containment purposes, commencing clean-up operations, and initiating a water monitoring program. At that time Pengrowth also took water samples post-event where the effluent entered the water body. The samples indicated a maximum concentration of 254 parts per million (ppm) of chlorides (Cl-) on June 26, 2011, at 9:00 p.m.[5] On June 27, 2011, hydrocarbon sheen was detected downstream of two beaver ponds within the water course, and Pengrowth placed additional booms at

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[*] This report is accompanied by numerous supporting documents. These documents are available from the webpage for this investigation report on the ERCB website, www.ercb.ca. For ease of reference, documents cited in the report have been given a number, which is provided in the footnote where the document is cited (e.g., DOC01, DOC02, etc.).

[1] Now Alberta Environment and Sustainable Resource Development.

[2] Now Alberta Environment and Sustainable Resource Development.

[3] According to the most recent well test results, the effluent released as a result of the incident consisted of 5 per cent oil and 95 per cent produced water.

[4] See ERCB *Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry*, appendix 4.

[5] The maximum short-term concentration short term exposure Canadian water quality guideline for chloride considered permissible for the protection of aquatic life is 640 mg/L, or equivalent of 640 ppm. (Source: *Canadian Environmental Quality Guidelines* [Canadian Council of Ministers of the Environment, 2011].)

control points (sampling and containment access points) further downstream. Visual inspection by helicopter was used to delineate the release site and potential impacts.

Pengrowth continued containment and clean-up operations, and on June 28, 2011, the incident was called down by the ERCB.[6] Pengrowth commenced pipeline repair activities on June 29, 2011, at which time the failed pipeline sections were removed for third-party engineering analysis. By 3:00 pm on June 29, 2011, all Cl- recordings were 0 ppm.

The incident occurred on rural, wooded crown land with no residences. The ERCB issued a press release and the incident received media attention.

Following the incident, the pipeline remained shut down until July 11, 2011. The ERCB permitted Pengrowth to resume pipeline operations after receiving confirmation that it had met the following requirements:

- Development, implementation, and communication to operations personnel of documented procedures for well start-up after power failures
- Completion of a management review of the company's Programmable Logic Control associated with automated well start-up
- Implementation of an inspection program of similar field risers constructed during the same period (2007) to identify potential ground settling issues

Since resumption on July 11, 2011, the pipeline has operated without further incident.

1.1 Pipeline Construction and Operation History

The failed pipeline segment is part of the Judy Creek oil/effluent gathering system operated by Pengrowth that transports oil well production from 17 well sites to a central processing facility also licensed to and operated by Pengrowth.

Initial pipeline construction occurred in January 2007 and was carried out by three contractors: a primary oilfield contractor, a secondary contractor who provided labour and equipment only, and a fibreglass pipe contractor who was responsible for the fibreglass pipe and fitting installation. The secondary contractor also acted as Pengrowth's site supervisor. The site supervisor had worked for the contractor since 1993 and had completed Pengrowth's site supervisor training as required.

The pipeline is comprised of 8" (214.4 millimetres [mm]) nominal fibreglass pipe and fittings. The pipeline is 1.49 km long and is part of the Judy Creek gathering system that transports production from the Judy Creek oil field to the Pengrowth Judy Creek production complex for processing. The pipeline is constructed of STAR Aliphatic Amine Line Pipe 1250 Series (STAR pipe) with a licensed maximum operating pressure of 3450 kpa.[7]

[6] To call down an incident means the emergency phase of the incident is over.
[7] Pipeline license information from the ERCB Field Inspection System, Release Detailed Record Report, Pipeline Specification.

2 Related Pengrowth Pipeline Activities

At approximately 11:30 a.m. on June 26, 2011, Pengrowth experienced a power outage at the Judy Creek South A and B pool operations and the Judy Creek production complex. The power was restored at about 2:30 p.m. the same day. Because they were automatically programmed to restart following a power outage, a number of producing wells restarted from then until about 4:00 p.m.

3 Pipeline Failure Root Cause Analysis

As outlined in more detail in section 4, the ERCB has determined that the Pengrowth pipeline failure was caused by a combination of the following:

- inadequate measures in place to control construction practices and quality,
- inadequate inspection of construction practices and quality to identify and remedy construction faults,
- an improperly pre-programmed pipeline automated control system that was programmed to automatically resume pumping at some of the wells by default,
- potential stresses on the failed pipeline segment resulting from the uncontrolled, unsupervised, and unstaged start-up of the pumping wells following a power outage and shutdown, and
- a lack of operational procedures to properly anticipate and make provision for the possibility that uncontrolled pumping at the wells might occur following certain shutdown scenarios.

4 Investigation Findings

Following the incident, Pengrowth commissioned Skystone Engineering Inc (Skystone) to review the incident and prepare a report of its findings and conclusions. Skystone prepared a report dated July 11, 2011, regarding the incident (Skystone report).[8] The Skystone report did not identify any material flaw or physical degradation issues that contributed to the pipeline failure. The Skystone report outlined concerns about construction and operational practices and construction quality. These concerns are detailed below.

4.1 Construction Practices and Quality

4.1.1 Pengrowth/Skystone Findings

The Skystone report indicated that the horizontal fibreglass pipe that threaded into the elbow was significantly deflected downwards a few metres past the elbow. This downward deflection caused significant shear stresses within the topside threads of the threaded pipe joint, which appeared to be the failure initiation point.

The Skystone report also indicated that a second pipe assembly, installed parallel to the failed pipe, exhibited similar downward deflection and some displacement of the second vertical

[8] Skystone Engineering, July 11, 2011, *Judy Creek: Failure Analysis of 8 Inch STAR Aliphatic Amine Line Pipe 1250 Series* (DOC01).

fibreglass riser from the perpendicular. This displacement of the second vertical fibreglass riser may have been influenced by the weight of the heavy stainless steel header piping located above ground and coupled to the fibreglass risers. A piling was used to support the overhead header, yet there was no evidence to indicate the piling offered sufficient support to offset compressive loading on the elbows from the weight of the overhead header.

Aside from sandbags, there was no evidence of any thrust restraint at the buried elbows. Though some pipeline or elbow movement may have occurred following the pipeline failure, it is also possible that fluid forces from surging liquids may have caused some previous movement if the elbows were not sufficiently restrained against thrust forces.

The Skystone report also indentified a number of contributing factors that may have imposed stresses on the failed fibreglass pipe joint, including

- inadequate support of the horizontal pipe within the few metres next to the elbow, due either to subsidence or over-excavation, followed by inadequate backfill practices;
- elbow movement or deflection due to loading from the overhead header;
- elbow movement due to thermal expansion or fluid flow loadings; and
- lack or inadequacy of thrust restraint.

4.1.2 ERCB Findings

The ERCB has concluded that each contributing factor identified in the Skystone report can be attributed to improper or inadequate construction practices and that all were preventable. The ERCB believes that inadequate construction can be further attributed to some combination of

- improper design of the pipeline support, restraint, or installation;
- faulty construction and installation work; and
- inadequate inspection(s) that failed to identify and remediate the faults.

As part of its investigation, the ERCB required Pengrowth to provide its Quality Control (QC) Manual (Pengrowth QC Manual) and QC folder to the ERCB for review. The Pengrowth QC Manual was general in nature and included no job-specific details. The QC folder included information concerning the construction of the overhead header, including isometric drawings, nondestructive testing reports, welder certifications, weld maps, material test reports, and pressure tests. It did not contain any detailed information about the design of the overhead header supports or specific procedures related to the use of fibreglass pipe for risers.

As part of its investigation, the ERCB also required Pengrowth to supply the engineering and construction drawings for the pipeline riser and overhead header assemblies. Two of the drawings were prepared by a surveying company and another was prepared by an engineering/surveying company. All were stamped “Issued for Construction.” The simple isometric pipeline construction drawings showed typical pipeline riser construction. Brief notations on the drawing identified

- the fibreglass materials used to construct the vertical risers,
- that the fibreglass elbows need support plates and sandbag restraint, and
- that the vertical risers were to be backfilled with sand support.

No further information was provided in the documentation supplied by Pengrowth about how this was to be accomplished or about excavation or ditch preparation.

The ERCB also reviewed the secondary contractor's job-specific QC manual and QC folder. The secondary contractor's QC folder included a large amount of safety-related documentation. It also identified a consultant who acted as Pengrowth's representative during construction and who signed off owner's acceptance of the completed work. There were no other indications of this person's role or authority to accept or reject any construction work. The secondary contractor's QC folder also included the fibreglass contractor's daily construction reports and construction photos. The photos showed riser installation, including sandbagging, and some photos were included that showed portions of fibreglass pipe that appeared to have surface damage. The QC folder provided by the secondary contractor did not contain any location information or information about indicating or evidencing any repairs of the damaged pipe shown in the photos.

The ERCB also reviewed Pengrowth's Site Supervisor Training Manual and Workbook dated February 2009 (Site Supervisor Manual). The Site Supervisor Manual describes the mandatory training processes that must be followed to be certified as a Pengrowth Site Supervisor. Most of the documents included in the Site Supervisor Manual were dated as 2009, 2010, or 2011. As such, the ERCB was unable to confirm which portions of the Site Supervisor Manual existed and were used by the secondary contractor at the time Pengrowth constructed the pipeline in 2007. The Site Supervisor Manual did not appear to contain substantive job-specific information or direction about pipeline construction and technical supervision of pipeline construction.

The construction records indicated that the fibreglass pipe contractor used by Pengrowth during pipeline construction was responsible for stringing, tie-ins, lowering, shading, and backfilling. The ERCB also reviewed the fibreglass pipe contactor's QC folder, which included a copy of the manufacturer's installation and application practices for the fibreglass pipe used in the pipeline. Section 2.2 (Table 2.2.6a) of the fibreglass pipe contractor's QC folder indicated that thrust control was to be included at buried elbows and that for 8" pipe up to and including 1000 pounds per square inch (psi) rating, sandbags were acceptable, but for 8" pipe >1250 psi rating, concrete thrust blocks were required.[9] Based on this documentation, it appears that concrete thrust blocks were required on this 8" 1250 psi (8619 kpa) pipe. Pengrowth licensed this pipeline as one at a maximum operating pressure (MOP) of 3450 kpa (500 psi); however, the recommendation for thrust block installation is based on a materials pressure rating specification, not a licensed MOP specification. Despite this, only sandbags were used for thrust control at this installation.

Construction records reviewed by the ERCB indicated that the fibreglass pipe contractor's on-site supervisor had some previous fibreglass-related experience, and the contractor had monitored the on-site supervisor for a couple of years. However, the on-site supervisor did not have any installation training or competency certification from the fibreglass manufacturer. The fibreglass pipe contractor stated that it followed the fibreglass "manufacturer's installation procedures that were set up with both the factory as well as the

[9] Fiberglass Systems, *Installation and Application Practices* (Texas, 2006), section 2.2.6, "Fitting Thrust Blocks" (DOC02).

vendor." Therefore, documents reviewed by the ERCB suggest that the fibreglass pipe contractor may have modified the fibreglass pipe manufacturer's installation procedures.[10]

Oil and gas pipeline design, construction, and operation requirements are detailed in *CSA Z662-11 Oil and Gas Pipeline Systems* (CSA Pipeline Standards), which are the Canada-wide, published mandated requirements for pipeline design, construction, and operation. ERCB legislation mandates the use of and compliance with the CSA Pipeline Standards, as well as with the *ASME B31.3 Process Piping Code* for other types of equipment. Therefore, there is no valid or acceptable reason why all parties involved in construction of the pipeline would not be aware of the CSA Pipeline Standards. Alberta legislation also requires that any work involving formal engineering practices must be conducted by registered professional engineers. It was therefore also mandatory that registered professional engineers be involved in the design or design review of this pipeline.

There are certain trades for which certified inspection competency is mandatory (e.g., nondestructive testing and storage tank inspection). However, certified inspection competency is not readily available in all trades, including pipeline construction. It has therefore been the ERCB's experience that licensees attempt to manage this risk by hiring companies with quality assurance programs and personnel experience verification. As the licensee is ultimately responsible to ensure its facility is properly constructed, some licensees choose to implement their own corporate quality assurance audit program and employ their own construction inspectors. While Pengrowth did use a consultant who signed off on the work as acceptable, the extent of that person's experience, responsibility, and authority is undocumented.

Based on the information collected by the ERCB, it was concluded that

- there is no evidence that the design of the pipeline and its supports have been approved by a registered engineer;
- the overhead header assembly may not have been supported in a sufficient manner so as to not impose undue stresses upon the fibreglass risers;
- the fibreglass elbows and risers were not installed according to the manufacturer's specifications and recommendations, particularly in regards to thrust restraint;
- the pipeline may have sustained physical damage during construction or backfilling;
- Pengrowth's site supervisor and consultant were not authorized to reject work; and
- there was no evidence that Pengrowth's consultant applied any additional construction scrutiny beyond that implemented by the individual contractors and foreman.

The ERCB has concluded that the causes of the pipeline failure, as they related to construction practices and quality, were inadequate measures in place to control construction practices and quality and inadequate inspection to identify and remedy faults and ensure that they were remediated. As indicated in section 3, the ERCB believes the construction deficiencies outlined above contributed to this pipeline failure.

[10] Noted in Appendix 4, Flint Energy Services Ltd, Western Fiberglass meeting checklist (17 Jan 2007) (DOC03); Western Fiberglass's representative requested sand-bagging of risers at location.

4.2 Operational Practices

4.2.1 ERCB Findings

As indicated in section 2 above, a power outage occurring earlier in the day on June 26, 2011, resulted in a loss of power to July Creek South A and B pool operations and to the Judy Creek production complex. Following the outage, Pengrowth's control centre issued a shutdown command to stop the pumping wells. However, because they had also lost power, the shutdown command was not received by about half the pumping wells. Inlets were closed at the central processing facility to manage high fluid levels in process vessels. Pengrowth operations personnel manually shut off flowing and miscible response wells to stop flow that could continue to build pressure while the central processing facility was unable to accept fluid.

When power was restored approximately three hours later, some of the pumping wells restarted automatically, as they had not received the shutdown command. It is probable that, during this period of pumping start-up, unusual pressure fluctuations or fluid surge situations may have occurred, which may have triggered the pipe elbow failure.[11] Pengrowth operations staff observed smoke above the pipeline failure location about 1.5 hours after the power was restored, indicating that the pipeline failure, and subsequent fire, occurred following the power restoration.

It would have been possible to prevent the uncontrolled start-up by preventing the power outage. However, the outage occurred at an ATCO electrical sub-station not under Pengrowth's control. Given this unique situation, if it has not already done so, Pengrowth may wish to consider adding an uninterruptable power supply to its pipeline control system.

It is important to consider why the uncontrolled resumption of pumping wells occurred upon power restoration. Pengrowth stated that about one half of its wells did not receive the shutdown command, as power had already been lost at remote wells when the shutdown command was sent. Once power was restored, the existing control logic called for these wells to automatically resume pumping. There were two factors leading to the automatic resumption of pumping:

1. A shutdown command was not received by some of the wells following power loss, nor resent following power restoration.
2. The control system's existing control logic was set up to automatically resume pumping following power restoration.

Following power loss, a shutdown command would not be received unless the systems were set up with battery backup or an alternate electricity supply (e.g., automatic on-site emergency generation). This is a possible solution, but a simpler solution is to resend the communication command immediately after power is restored. This did not occur, and the pumping wells were free to resume pumping as programmed. This suggests that Pengrowth's operations staff was not aware of the need to resend the shutdown command once power is restored. In addition, uncontrolled pump start-up could have been prevented by proper

[11] Licensee Incident Report, Supplemental Information Request 1, Pengrowth Incident Investigation Response (DOC04).

programming of the control system's logic to ensure that pumping does not automatically resume following power restoration. It should be noted that Pengrowth has since made these changes to its procedures. In consideration of the two factors above, it is necessary to determine

- if the operator was unfamiliar with the control system's operating parameters and
- if the pipeline automated control system was appropriately programmed to deal with a power loss.

To assist in making this determination, the ERCB reviewed Pengrowth's Control Room Procedures Manual (Control Room Manual). The Control Room Manual included descriptions of various processing plant units and their respective functions. It did not include detailed production-unit or control-system operating procedures. However it did include basic sequential procedures for some of the units.

The ERCB also reviewed the control room operator's training records. The records included a listing of defined tasks and, by the inclusion of the operator's and supervisor's sign-off and the operator's completed skills examination, clearly indicated the operator had completed training. These records suggest that Pengrowth's pipeline operator was sufficiently trained and proficient in standard control room operations. Nonetheless, it appears that Pengrowth's procedures and training failed to anticipate the need to instruct the control room operator to resend a shutdown command following power restoration.

Following the incident, Pengrowth implemented changes to restructure the control start-up logic for both the artificial lift equipment and equipment at the production satellites. The changes included a latched trip function for high pressure, power outage, or low instrument air pressure conditions. This means that following a system trip, the procedures require operations personnel to manually restart the tripped systems to allow for a monitored, staged, and controlled start-up. In correspondence to the ERCB during the period of July and September 2011, Pengrowth confirmed and verified the completion, implementation, communication, and verification testing of these changes.

The ERCB concluded that the following factors, related to operational practices, contributed to the pipeline failure:

- An improperly configured pipeline automated control system
- Operational procedures that failed to anticipate potential problems and implement processes to properly respond to and address them

4.3 Pipeline Failure

4.3.1 Pengrowth/Skystone Findings

The Skystone report stated that the pipeline failure occurred when the threaded male end of the pipe's horizontal run separated from the horizontal threaded female end of the elbow that turned upward to the vertical riser pipe. Skystone concluded that overburden stresses on the unsupported horizontal pipe caused a significant downward sag in the pipe. This overstressed the threads at the upper side of the pipe to the elbow threaded joint and provided a failure initiation point. There was also indication of mechanical wear on the pipe's bottom exterior and on the elbows. This suggested that pipeline movement or vibration may have occurred, though this movement was believed to have occurred following the pipeline failure.

Skystone also determined that an uncontrolled pressure event may have contributed to the pipeline failure's initiation at the overstressed pipe joint. As indicated above, Pengrowth field staff experienced a power outage earlier in the day on June 26, 2011, which resulted in the shutdown of numerous producing wells that are connected to the pipeline. When power was restored, uncontrolled start-up of field pumping wells occurred, which may have caused unpredictable pressure fluctuations or fluid pressure surges; it is possible that these events may have provided a mechanical shock that initiated the pipeline failure at the stressed elbow joint.

4.3.2 ERCB Findings

As stated in section 3, the ERCB has determined that the Pengrowth pipeline failure was caused by a combination of a number of factors, including faulty initial construction of the pipeline, default programming of the automatic pumping well start-up system, potential stresses to the pipeline resulting from the uncontrolled automatic start-up of multiple pumping wells following the power outage, and the lack of operational procedures to properly anticipate and make provision for the possibility that uncontrolled pumping at the wells might occur following certain shutdown scenarios.

The ERCB believes that the construction problems compromised the ability of the pipeline segment to withstand the stresses of an unstaged pumping start-up following shutdown.

In summary, the ERCB has concluded that the following combinations of factors were the cause of the pipeline failure in this case:

- A lack of operational procedures to properly anticipate and make provision for the possibility that uncontrolled pumping resumption could occur
- An improperly pre-programmed automated control system that was programmed to automatically resume pumping wells by default
- Potential stresses on the failed pipeline segment caused by the uncontrolled, unsupervised, and unstaged start-up of well pumping following shutdown
- Inadequate inspection of pipeline construction practices and quality to identify construction faults
- Inadequate measures in place to control and remedy construction faults and ensure quality

4.4 Noncompliance with ERCB Requirements

In its evaluation of the events leading up to the incident, the ERCB determined that Pengrowth failed to comply with *Directive 066: Requirements and Procedures for Pipelines* section 67, "Failure/Hit: Poor construction practices resulting in failure after one year's service/operation."

As a result of this finding, on April 4, 2012, the SAFC issued a Low Risk Enforcement Action against Pengrowth under *Directive 019: Compliance Assurance*, as the pipeline was operated for more than one year after construction before it failed. On April 11, 2012, the SAFC accepted the Pengrowth response.

Also, as part of the ERCB's incident investigation, the ERCB Emergency Planning and Assessment Section (EPA) staff conducted an audit of Pengrowth's ERP. EPA staff determined that both the ERP and Pengrowth's response to the incident complied with ERCB

requirements. However, EPA staff noted that the ERCB received notification of the incident from the CIC, not Pengrowth as the licensee.

Because it became aware of the incident from parties other than the licensee, the ERCB examined whether Pengrowth may have failed to comply with section 35 of the *Pipeline Act*. Section 35 requires pipeline licensees to "immediately cause the Board to be informed of the location of the lead or break" in a pipeline. The ERCB recognizes that Pengrowth's regulatory liaison staff did not arrive on location until 5:45 p.m. and immediately assisted with ground level response activities until 6:45 p.m. During this time, Pengrowth advises that its staff was in the process of acquiring accurate details needed to report the incident to the ERCB when they received the call from the ERCB at 6:46 p.m. requesting incident details. Given the unique circumstances of this case and the relatively short time frame involved (approximately one hour), the ERCB is prepared to accept Pengrowth's explanation as to why it did not immediately and directly report the incident to the ERCB. Therefore the ERCB finds that Pengrowth did not contravene section 35 of the *Pipeline Act* in respect of this incident. However, the ERCB hereby reminds Pengrowth that it expects strict compliance with the statutory notification requirements in respect of any future pipeline incidents. Compliance means that the ERCB is to be contacted by Pengrowth regardless of notification by other agencies.

5 ERCB-Directed Actions

Pipeline construction: Pengrowth must immediately modify its construction management system to incorporate and control all aspects of pipeline design and construction activities. The construction management system must include clear definitions of roles, responsibilities, experience, and expectations of all involved in pipeline design, construction, and inspection. Pengrowth must provide the modified construction management system to the ERCB for review within 120 days following the date of this report.

Automated control systems: Pengrowth must develop, adopt, maintain, and communicate written procedures that will adequately ensure the design, configuration, and testing of pipeline automated control systems properly anticipate and prevent potential problems such as those identified in this report. This will be done to mitigate risk and to ensure appropriate controls are implemented. Pengrowth must provide a copy of these procedures, together with confirmation that such procedures have been implemented, communicated to all applicable staff, and verification tested, to the ERCB for review within 120 days following the date of this report.

Incident reporting: Due to the noted time lines and circumstances surrounding the notification to the ERCB of the incident through a party other than the licensee, the ERCB directed Pengrowth to make necessary changes to its reporting procedures to ensure adequate and timely incident reporting occurs in the future. Pengrowth has made the necessary changes, which are documented in the letter from Pengrowth to the ERCB dated October 20, 2011.

6 ERCB Follow-up

The ERCB will follow up with Pengrowth on the actions identified in section 5 to ensure Pengrowth's compliance with ERCB requirements.

The SAFC will follow up with Pengrowth about improvements to its incident notification process as identified in the ERP audit and stated in the letter from Pengrowth dated October 20, 2011. This will be initiated within 30 days following the date of this report.