# Form 13-31 (Rule 13-31)

COURT FILE NUMBER Q.B. No. 733 of 2021 COURT OF QUEEN'S BENCH FOR SASKATCHEWAN IN BANKRUPTCY AND INSOLVENCY

#### JUDICIAL CENTRE SASKATOON

#### APPLICANT ABBEY RESOURCES CORP.

#### IN THE MATTER OF THE COMPANIES' CREDITORS ARRANGEMENT ACT, RSC 1985, c C-36, AS AMENDED (the "CCAA")

#### AND IN THE MATTER OF A PLAN OF COMPROMISE OR ARRANGEMENT OF ABBEY RESOURCES CORP.

#### **ELEVENTH AFFIDAVIT OF JAMES GETTIS**

I, James Gettis, of the City of Calgary, in the Province of Alberta, make oath and say as follows:

- 1. I am the President and sole director of Abbey Resources Corp. (the "**Company**"), and as such, I have personal knowledge of the facts and matters hereinafter deposed to, except where stated to be on information and belief, and whereso stated, I verily believe the same to be true.
- 2. Herein, I make reference to certain of my Affidavits previously filed in these proceedings particularly, my Affidavit dated July 13, 2021, (the "First Gettis Affidavit") my Affidavit dated July 28, 2021, (the "Third Gettis Affidavit"), my Affidavit dated August 3, 2021, (the "Fourth Gettis Affidavit"), my affidavit dated August 19, 2021, (the "Fifth Gettis Affidavit"), my Affidavit dated October 1, 2021 (the "Sixth Gettis Affidavit"), my Affidavit dated November 16, 2021 (the "Seventh Gettis Affidavit"), my Affidavit dated November 16, 2021 (the "Seventh Gettis Affidavit"), my Affidavit dated November 23, 2021 (the "Eighth Gettis Affidavit"), my Affidavit dated January 21, 2022 (the "Ninth Gettis Affidavit"), my Affidavit dated January 26, 2022, (the "Tenth Gettis Affidavit"). Capitalized terms not expressly defined in this Affidavit have the same meanings ascribed to them in the aforementioned Affidavits.
- 3. This Affidavit is filed in reply to the Affidavit of Brad Wagner dated January 25, 2022, (the "Third Wagner Affidavit") and the Affidavit of Kathryn A. Black dated January 25, 2022 (the "Black Affidavit") and in support of the Company's application for a Fifth Extension Order and other relief pursuant to the CCAA.

#### Update on Operations

4. The Company has continued to carry on its natural gas extraction and sales business since the granting of the Fourth Extension Order in these proceedings on January 27, 2022.

- 5. The Company produced an average of 6,862 GJ/day during the month of January of 2022. Below-average production on various dates throughout January is attributable to below-average temperatures. I am attaching a Gas Production Bulletin, prepared internally by the Company, detailing the Company's natural gas production for the month of January as Exhibit "A" of this Affidavit.
- 6. Current AECO Strip prices for futures for gas prices in Alberta remain above \$4.00/GJ throughout 2022. As of today's date, the AECO Strip spot price stands at above \$5.00/GJ. I am attaching a copy of a chart obtained from Gas Alberta Inc., a gas distribution and supply management company, showing AECO Strip price futures for natural gas as Exhibit "B" of this Affidavit. The Company is no longer able to obtain forward gas price model forecasts from Phoenix Energy Marketing Consultants Inc. without subscribing to receive such forecasts on what the Company understands to be a confidential basis.

#### Finances and Requirement for Outside Funding

- 7. A copy of the Company's cash flow statement is attached as Exhibit "C" to this Affidavit. As is shown in the cash flow statement, reductions in forecasted income and increases in expenditures now indicate that the Company will need to decrease expenditures, increase revenues, or generate capital inflows by other means in order to continue to meet its obligations as it restructures its affairs during these proceedings.
- 8. The current cash flow statement does not contemplate major capital expenditures through to the end of May of 2022. In light of changes to the Company's cash flow projections, the Company has determined that it is now necessary to obtain outside funding in the form of interim financing or investment in order to implement its restructuring plan, which requires significant capital expenditures in order to complete pipeline remediation works and decommissioning works.

#### **TransGas Security**

- 9. TransGas Limited ("TransGas") operates the transmission pipeline through which 100% of the Company's natural gas production is transferred. All of the Company's compressor stations are ultimately linked to TransGas' pipelines. I am not aware of any other transmission pipeline operator in the vicinity of the Company's base of operations through which the Company could transfer the natural gas it produces to market.
- 10. Previously, fees and charges payable to TransGas had been paid by Twin Eagle on the Company's behalf out of the Company's regular natural gas sales revenues. Such payments have been remitted by Twin Eagle to TransGas on the date upon which the Company receives payment.
- 11. On January 21, 2022, the Company received a correspondence from TransGas setting out terms for the continued use of the transmission pipeline offered by TransGas (the "TransGas Letter

**Agreement**"), a copy of which is attached as Exhibit "**D**" of this Affidavit. TransGas advised the Company that it would cease to provide service to the Company if it did not enter into the TransGas Letter Agreement. Accordingly, the Company executed the TransGas Letter Agreement so as to ensure its continued access to transmission services.

- 12. The TransGas letter agreement provides, *inter alia*, that the Company shall pay TransGas the sum of \$76,484 within three business days of the last day of each month in which TransGas provides transmission services to the Company. In other words, going forward, the Company will proceed to pay TransGas for services immediately following month-end, as opposed to Twin Eagle paying TransGas on behalf of the Company at the time Twin Eagle remits payment to the Company for prior month sales. The Company does not anticipate that remitting payment to TransGas immediately following monthend, as opposed to 25 days following month-end, will adversely affect its ability to carry on business.
- 13. The terms imposed by TransGas on the Company require the Company to apply to this Honourable Court for a critical supplier's charge pursuant to section 11.4(1) of the CCAA in the amount of \$153,000 to secure payment of fees and charges for transmission services provided to the Company by TransGas. Thus, the Company now seeks a critical supplier charge in favour of TransGas in this amount. For greater certainty, the Company has not defaulted on payment of any amount due and payable to TransGas and has budgeted to pay the costs associated with the transmission of its natural gas in its cash flow statements and financial modelling.

#### Surface Lease Update

- 14. The Company has continued to make progress in furtherance of its rent reduction project. As of February 19, 2022, a total of 230 surface leases have been amended since the Company's entry into CCAA proceedings (up from 171, as of January 14, 2022). Lessors have agreed in principle, but not yet executed, a further 7 amended leases.
- 15. During the month of February of 2022, restructuring counsel for the Company sent letters to all or substantially all of the Unsigned Lessors (i.e., the surface rights holders whose leases were not terminated and who have not yet entered into amended leases with the Company) advising that the Company has determined that it will be unable to restructure its affairs unless it is able to reduce its surface lease rental liabilities. Such correspondences advised the Company's lessors of its intention to avail itself of its right of disclaimer under section 32 of the CCAA. I am attaching a copy of a representative sample of a letter (with lessor identifying information redacted) sent to Unsinged Lessors who are not represented by counsel as Exhibit "E" of this Affidavit. A copy of a letter dated February 10, 2022, sent to Wayne Pederson, Q.C., counsel for a group of Unsigned Lessors, is attached as Exhibit "F" of this Affidavit.

- 16. Since the Company's restructuring counsel sent the above-mentioned letters, the Company has received notice (by way of a representative from Millennium Land, which the Company designated as the appropriate point of contact for lessors) that at least 28 lessors (holding at least 81 leases, collectively) have indicated that they wish to receive packages containing amended leases for their consideration. The Company has arranged for Millennium Land to prepare amended leases for review by those parties.
- 17. So as to ensure that as many Unsigned Lessors as possible understand the Company's position, the Company has instructed its restructuring counsel to arrange for its students-at-law to contact Unsigned Lessors who have not responded to the above-described letters by phone for the purpose of explaining the Company's position and soliciting verbal confirmation as to whether such lessors are amenable to entering into amended leasing arrangements.
- 18. The Company has not yet solicited the Monitor's endorsement of any disclaimer notices for surface leases. The Company intends to do so once for surface leases that it does not believe can be amended once all, or substantially all, of the Unsigned Lessors who are not represented by counsel are contacted by phone.
- 19. The Company acknowledges that it will remain responsible for decommissioning obligations, regardless of whether the Company has disclaimed surface leases. This is to say, the Company does not intend to use its right of disclaimer as a mechanism by which to avoid decommissioning obligations.
- 20. The Company will continue to pay the Unsigned Lessors on a prorated basis at un-amended rates until such leases are disclaimed or amended. The Company will pay compensation to surface rights holders whose leases have been terminated and surrendered at a rate of 35% of the original lease value. Both such payments will be made monthly at the end of each month going forward.
- 21. The Company will continue to make payment of rental amounts on amended leases on the anniversary dates of such leases as they arise.

#### CTK First Nation

- 22. On February 2, 2022, restructuring counsel for the Company received an email from counsel for the CTK First nation advising that the CTK First Nation had declined to accept the Company's proposal set out in its January 7, 2022, correspondence described in the Ninth Gettis Affidavit.
- 23. The Company now ultimately intends to disclaim the surface leases to the CKT wells and to abandon and decommission its well site infrastructure sited upon the CTK Lands. As was stated in the Ninth Gettis Affidavit, the Company will be unable to attend to downhole abandonment at any of the CTK Wells until October or November of 2022. As has been stated previously the Company does not intend

to retain and operate any of its wells indefinitely at original, un-amended lease rates. It, therefore, remains the Company's intention to avail itself of its right of disclaimer pursuant to section 32 of the CCAA with respect to the surface lease to the CTK Wells. However, given that the Company acknowledges that it may remain liable for occupancy costs (in addition to decommissioning obligations) until such time as its well infrastructure is removed, the Company intends to postpone disclaimer of the CTK Wells until a later date in 2022, closer to the point where the Company will be in a position to commence decommissioning works.

24. During that time, the Company will continue to make payments of production royalties and in respect of the surface leases to the CTK Wells. Payments made in respect of the surface leases to the CTK Wells will be made on a prorated basis at the end of each month.

#### Suspension of Pre-Payment of Municipal Taxes

- 25. As is discussed in paragraphs 12 and 13 of the Ninth Gettis Affidavit, the Company had previously represented that it intended to make voluntary advance payments of 2022 property taxes assessed by the Creditor RMs in the amount of \$100,000 *per* month on a prorate basis to each of the Creditor RMs based on estimates of such taxes.
- 26. The Company's plan to pre-pay 2022 property taxes was made prior to the issuance of the Minister's Order and prior to MOER and several of the Creditor RMs providing the Company with notice of their intention of their attempt to appoint a Receiver over the assets of the Company. Consequently, the Company had not budgeted for the extensive professional costs associated with its response to the Minister's Order, the Receivership Application, and conducting an unforeseen additional extension application at the time it had planned to make pre-payment of 2022 taxes. Given that such professional costs are immediately payable, the Company has determined that it is necessary to suspend its plan to pre-pay 2022 property taxes (which are not yet due and have not been demand by the Creditor RMs) so as that it may allocate its available cash flow to payment of its professional costs associated with this restructuring proceedings.

#### **Pipeline Regulatory Issues**

- 27. A single line break has occurred since the issuance of the Minister's Order. That line break occurred on February 9, 2022. That line break resulted in the release of fluid over an area of approximately 2.5M x 1.5M. The line break was reported to the Ministry and dealt with in accordance with the Safety and Loss Management System described below. I am attaching copies of a photographic log and a site map detailing the spill, collectively, as Exhibit"J "G" of this Affidavit.
- 28. On February 1, 2022 over one week subsequent to the issuance of the Minister's Order the Company's restructuring counsel received a correspondence from counsel to the MOER outlining

reasons for the MOER's order. The MOER did not ask the Company for any information, documents, or particulars prior to conveying reasons to it on February 1, 2022. A copy of the said letter is attached as Exhibit "**H**" to this Affidavit.

- 29. The February 1, 2022, correspondence solicited representations from the Company to be completed by February 16, 2022. The Company conveyed representations to the MOER in the form of a correspondence dated February 16, 2022 (the "**Representation Letter**"). I am attaching a copy of the February 16, 2022, correspondence as Exhibit "I" of this Affidavit. I note that Appendix "B" to the February 16, 2022, correspondence has been deliberately omitted from this Exhibit. That Appendix contains commercially sensitive information in the form of a quote for the purchase price of polyethylene liners from a supplier with which the Company has a longstanding business relationship. The Company is concerned that public disclosure of such pricing information would damage the relationship between the supplier and the Company, thereby jeopardizing the Company's ability to purchase materials at the quoted price. An underacted copy of the quote has been shared in confidence with both the MOER and the Monitor.
- 30. The Company has not received a reply from the MOER regarding the Representation Letter. A meeting between the Company and representatives from the MOER has been scheduled for February 25, 2022.
- 31. As is discussed in the Representation Letter, the Company plans to implement enhanced monitoring and risk mitigation protocols until such time as it has completed remediation works. The monitoring and risk mitigation protocols were adopted on the basis of the recommendations of Bob Prieston, P.Eng. of Explore Inc.
- 32. As is noted in the Representation Letter and has been discussed in the Ninth Gettis Affidavit, the Company plans to address issues afflicting its steel pipeline infrastructure on a long term basis by installing plastic (specifically, polyethylene) liners in such flow lines (the "Liner Installation Project"). Due to cold weather, is not presently feasible to complete any material works on the Liner Installation Project.
- 33. In the Ninth Gettis Affidavit, I had indicated that the costs of installation of liners were anticipated to average \$10.00 per meter. Upon having assessed costs further and having obtained a recent quote, the Company has revised that projection to an average cost of \$11.37 per meter. The per meter cost is variable as between the different diameters of steel flow lines operated by the Company. Estimated costs for various diameters are as follows: \$6.99/M for 2.5" lines; \$10.96 for 3.5" lines; \$16.16 for 4.5" lines. The Company's estimate takes into account labour, material costs, workspace costs, consulting costs, reclamation costs and a 10% contingency.

- 34. I have reviewed the estimate of costs set out in the Sproule Report at page 18 thereto. I note that SAML has estimates that installation costs will significantly exceed the costs estimated by the Company. I note that the Company's estimates and the estimates of SAML differ for two principal reasons. First, the Company appears to have been able to source material at a lower cost. Second, the Sproule Report assumes that all works would be completed by third-party contractors, whereas the Company plans to use its own personnel, tools, and equipment to complete the Pipeline Liner Project.
- 35. I note that the Company has already successfully installed a polyethylene liner using its own personnel, tools and equipment. The polyethylene liner was installed over 800m of 2.5" steel pipeline in December of 2021 at lands legally described as 16-1-23-18W3. The Company applied for and obtained approval for such installation works in September of 2021. In support of this fact, I am attaching copies of screen shots obtained from IRIS of the application identified as PA-00012224 and confirmation that such application was authorized by the MOER, collectively, as Exhibit "J" of this Affidavit. At no point did the Company receive any notice from MOER indicating that the approval granted to the Company for such works was cancelled or rescinded. Actual costs for the installation of this 800m liner amounted to \$8,936.86, or \$11/M.
- 36. Further to my remarks in the Tenth Gettis Affidavit and the statements made in the Representation Letter, the Company is of the view that the environmental and ecological consequences of individual line breaks do not pose an inordinate systemic risks to persons, property, or the environment. Upon review of the Company's filings in IRIS, I have determined that the average volume of fluid released *per* spill occurring in 2021 is 1.07 M<sup>3</sup> (or a total of 68.71 M<sup>3</sup> for 2021). By way of comparison, I note that a publicly available filing I have obtained from IRIS shows that a single spill occurring in early 2022 by an unrelated, third-party operator resulted in the release of 147.00 M<sup>3</sup> of fluid (or roughly double the volume of fluid spilled by the Company in all of its line breaks in 2021). In support of this fact, I am attaching a copy of the report identified as Incident Number 49225, which details the particulars of such line break, as Exhibit "**K**" of this Affidavit.
- 37. The Company has consistently reported all flow line breaks that it discovers to the MOER, which has had knowledge of the frequency of line breaks for years. Despite the MOER's knowledge of the frequency of line breaks, it only began to urgently insist that the Company assess and remediate its problematic pipeline infrastructure since the Company's entry into CCAA proceedings. In support of this fact, I refer back to the April 22, 2021, email of the MOER's representative, Jonas Fenn, which is produced as Exhibit "A" to the Fourth Gettis Affidavit. There, Mr. Fenn indicated that MOER considered it reasonable for the Company to take up to three years to address any restoration issues with past line breaks. Further, though the same email discussed the Company's plans to address the problems with the Company's pipeline infrastructure, it did not indicate that the Company was in jeopardy of having

the Ministry suspend the operation of such infrastructure if it could not be remediated in the immediate future.

38. For greater certainty, my foregoing remarks should not be taken as an indication that the Company does not treat line breaks seriously. The Company acknowledges that implementation of the Liner Installation Project is a necessary component of the Company's restructuring.

#### **Reply to MOER Affiants**

39. In the following paragraphs, I reply to certain portions of the Black Affidavit and the Third Wagner Affidavit. To the extent that those Affidavits contain arguments or opinions, the Company disputes or disagrees with such arguments or opinions.

#### Scope of Risk Assessment Analysis

40. Paragraph 4(d) of the Black Affidavit takes issue with the scope of the Risk Assessment Analysis - particularly, with respect to the fact that the Risk Assessment Analysis focuses on the Company's steel pipeline infrastructure and not the other pipelines operated by the Company. This is due to the fact that substantially all of the line breaks recorded in the history of the Company's operations have resulted from the failures of the steel pipelines. The plastic pipeline infrastructure operated by the Company (being the pipeline assets acquired from Husky and Shackleton LP) have not suffered from any systemic issues and have never been the focus of any of the discussions between the Company and the Ministry regarding remediation of pipeline risk.

#### **IRIS Deficiency Notices**

- 41. The . I note that the Company has previously indicated that it intends to address IRIS deficiency notices. However, I reiterate my remarks set out in the Ninth Gettis Affidavit wherein I stated that it is not practicable to address such deficiencies during winter months. The Company intends to address these deficiencies as soon as it is able to do so.
- 42. Paragraph 29 of the Third Wagner Affidavit states that none of the line items in the cash flow statements filed in these proceedings contain a line item specifically for IRIS deficiencies. As the deficiencies are generally addressed by the Company's own staff members using the Company's own equipment and resources, the Company did not revise its cash flow statements to include a specific line item for works required to address IRIS deficiencies. Rather, such costs are incorporated into the operating costs and, to the extent that any remediation works require extraordinary expenditures, by the amounts the Company has budgeted to address contingencies.

43. At no point has any representative from the MOER contacted the Company to ask for specifics as to the Company's plan to address IRIS deficiencies or to confirm that the Company is capable of completing such works given its budget.

#### Pipeline Integrity and Safety and Loss Management System

- 44. In paragraph 9 of the Black Affidavit, the MOER's express concern regarding the status of the Company's Safety Loss Management System ("**SLMS**") and a Pipeline Integrity Manual ("**PIM**"). Paragraph 45(c) of the Third Wagner Affidavit makes reference to the Company's SLMS.
- 45. The MOER has never requested that the Company complete PIM. The September 3, 2021, letter from the MOER to the company soliciting the Risk Assessment Analysis did not specifically instruct the Company to complete a PIM. Nevertheless, the Company voluntarily took the opportunity to arrange for the completion of a PIM at the time it arranged to prepare the Risk Assessment Analysis. In support of this fact, I note that the letter of engagement between the Company and Explore Inc. (which is produced as Exhibit "H" to the Seventh Gettis Affidavit) expressly contemplates the completion of a PIM as part of the scope of Explore Inc.'s engagement. I began work on a PIM for the Company with Mr. Prieston in October of 2021. The PIM was completed in February of 2022 and was promptly conveyed to representatives from the MOER upon its completion. The PIM sets out the Company's Pipeline Integrity Management Program ("IMP"). I am attaching a copy of the PIM as Exhibit "L" of this Affidavit.
- 46. Though not formalized and incorporated in a PIM until February of 2022, the Company has, at all times maintained, a system to manage flow line breaks. I am attaching a copy of a Spill Response Standard Operating Procedures guideline (the "SOP Guideline"), which was prepared by the Company in mid-2021, as Exhibit "M" to this Affidavit. The SOP Guideline outlines the Company's protocols for addressing and repairing line breaks. This document has previously been shared with a representative from the MOER, namely Jonas Fenn. The Company has followed the SOP Guideline in response to all of its line breaks since the SOP Guideline's implementation.
- 47. Paragraph 45 (c) of the Third Wager Affidavit states that that the Company represented it had a Safety and Loss Management "[d]uring its application to be licensed to operate the facilities in [*sic*] acquired." I note that the alleged "application to be licensed" appended to the Third Wagner Affidavit as Exhibit "G" thereto is, in fact, a Pipeline Liner Install Application submitted to MOER (in fact, this is the same Application submitted to MOER pursuant to which the Company applied for permission for the liner installation works completed in December of 2021, described at paragraph NTD above). The Company submitted this Application form (which I completed) to obtain approval to install a loose liner in one of the steel flow lines operated by the Company. This form was not submitted in relation to any application

to obtain licensure for pipelines acquired by the Company. Rather, the Application in question was made to attempt to obtain approval for the installation of a single liner in a single flow line segment.

48. Indeed, in the October 4, 2021, Application, I indicated that the Company did have a CSA Z662 compliant SLMS in place. In making this statement, I was referring to the SOP Guideline implemented by the Company. At that time, I did not refer back to the particulars of CSA Z662 (which is over 900 pages in length) to confirm whether SOP Guideline was complaint with CSA Z662. I made an assumption that the SOP Guideline was complaint. It was not my intention to mislead the MOER as to the status of the system employed by the Company to address pipeline risks.

#### Pipeline Remediation Costs

49. Paragraph 16 of the Black Affidavit indicates that the MOER estimates that the cost to remediate the Company's High Risk and Very High Risk pipelines, as identified in the Risk Assessment Analysis, would cost \$58,300,000. I note that tight-fit liners - a substantially different product from the loose liners the company seeks to install in the Pipeline Liner Project - cost significantly more than lose liners. While I acknowledge that the costs of installing tight-fit liners throughout the Company's network of steel pipelines may cost in the tens of millions of dollars, the Company stands by its estimate for the cost to complete the Pipeline Liner Project.

#### Difference in Decommissioning Cost Projections

- 50. In paragraphs 17 -19 and paragraph 43 of the Third Wager Affidavit, Mr. Wagner takes issue with the valuation of the Company's projected decommissioning costs. I reiterate my remarks in paragraphs 34 through 39 of the Seventh Gettis Affidavit and note that the Company's projects are based on quotes obtained or actual data.
- 51. Further to this point, and to address paragraph 43 of the Third Wagner Affidavit to the extent that it engages with concerns respecting the Company's LLR, I note that the MOER has provided the oil and gas industry with advance notice of a significant forthcoming change to the manner in which LLR is calculated. In support of this fact, I am attaching an excerpted copy of a Notice of Proposed Regulations prepared by the MOER as Exhibit "**N**" to this Affidavit. The notice indicates that, in light of "shortcomings" in the current LLR formula, the LLR formula will be amended to rely on "actual expenditure data for abandonment and reclamation under the ASCP."
- 52. The Company has completed a calculation for its anticipated LLR liabilities under the new formula. I am attaching a copy of the particulars of the calculation completed by the Company as Exhibit "**O**" to this Affidavit.

#### Payment of Post-Filing Obligations

53. In reply to paragraph 44(e) of the Third Wagner Affidavit, I note that the Company disputes the contention that it has failed to meet its post-filing obligations as they come due. I have examined reporting competed by the Company in conjunction with its cash flow statements prepared for these proceedings and have determined that, as of the week of February 20, 2022, the Company reports total capital outflows of \$6,017,490 since the Company was granted creditor protection on August 13, 2021. Such capital outflows represent several thousand payments made to hundreds of payees.

#### No Global Security over the Company's Assets

- 54. Since the discharge of the Twin Eagle Debenture in December of 2021, no party has maintained a registered security interest over the whole of the Company's assets. For greater certainty, the Company has not pledged any its property as collateral to any party (with the exception of the Administration Charge granted in the Initial Order) since the commencement of these proceedings.
- 55. The Company owns and utilizes a variety of personal property, including, without limitation, equipment, tools, inventory, and vehicles. Further, at literally all times, the Company holds property in outstanding accounts receivable (which the Company absolutely must receipt in order to continue to operate its business) given that its agreement with Twin Eagle provides for payment on deliveries on the 25<sup>th</sup> day of the month following the month in which its gas is delivered to Twin Eagle. The Company has not pledged such property as collateral to any party, let alone the R.M. of Lacadena, the R.M. of Miry Creek, the R.M. of Snipe Lake, or the MOER (being, collectively, the parties seeking to appoint a Receiver over the assets of the Company).

#### Restructuring Plan and Possible Alternatives Thereto

- 56. Broadly speaking, the Company's restructuring plan is unchanged from the plan set out in the Ninth Gettis Affidavit. In light of the Company's recent cash flow projections, whether the Company is able to implement its plan will depend upon whether the Company is able to secure outside funding in the form of interim financing or investment.
- 57. If the Company is not able to secure interim financing or investment, it will explore alternative solutions for the orderly liquidation of its assets or the wind-down of its operations within the confines of these proceedings under the supervision of the Monitor. Specifically, if the Company is unable to obtain such funding (or circumstances do not otherwise change to enable the Company to restructure), it may seek to Apply for an expansive "Enhancement of Monitor's Powers" Order from this Honourable Court. It would be the Company's intention for such Order to empower the Monitor to make both day-to-day decisions respecting the Company's operations as well as all decisions respecting the future relief sought in these proceedings (regardless of whether such relief is sought in furtherance of the aim of restructuring, liquidation, or wind down).

58. I make this Affidavit in support of the Company's Application for a Fifth Extension Order and other relief under the CCAA and for no other or improper purpose.

SWORN before me at the City of Calgary, in the Province of Alberta, this 25<sup>th</sup> day of February, 2022.

James Gettis

A Commissioner for Oaths for the Province of Alberta My appointment expires: <u>n/a</u> <u>Or Being a Solicitor</u>

proper purpose

James Gettis

## FORM PD1

## (Enacted March 25, 2020)

### (Amended August 7, 2020)

#### DECLARATION OF LAWYER WHO HAS WITNESSED DOCUMENTS

#### VIA ELECTRONIC MEANS

I <u>Kevin Hoy</u>, of <u>Calgary</u>, in the Province of <u>Alberta</u>, a Lawyer, did on <u>February 25</u>, <u>2022</u> witness <u>James Gettis</u> sign the following documents via electronic means:

- 1. February 25, 2022, Affidavit of James Gettis
- 2.
- 3.

Pursuant to Law Society of Saskatchewan Practice Directive 1, issued March 25, 2020 and amended on August 7, 2020, I have turned my mind to the risks associated with the witnessing of documents via electronic means. I have assessed the following risks, and have answered "yes" or "no" to indicate where I have identified concerns:

- 1. Have I identified any indicia that the transaction might be fraudulent? No
- Did I identify concerns, including the physical presence of a third party in the company of my client while they were signing the documents, suggesting that there is a risk that the client may be subject to undue influence or duress? <u>No</u>
- Did I identify concerns about my client's understanding about the documents they are executing?
   <u>No</u>
- 4. Did I identify concerns about my client not having an adequate opportunity to ask questions about the document being signed? <u>No</u>

Where I have indicated "yes" to the statements above, I managed the risks by the following means:

Attached hereto is a screen capture of my client with their photo identification that was presented to me via electronic means during the session where the above noted documents were executed.

I DO SOLEMNLY DECLARE that the statements contained in this form are complete and true in every respect. AND I make this solemn declaration conscientiously believing it to be true and knowing that it is of the same force and effect as if made under oath.

February 25, 2022

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Signature of Lawyer

DATE

**THIS IS EXHIBIT** "A" referred to in the Affidavit of **Jim Gettis** SWORN BEFORE ME this <u>25th</u> day of <u>February</u>, 2022.

14

**A COMMISSIONER FOR OATHS** in and for the Province of Alberta.

A

# Abbey Resources Corp.

# Weekly Gas Bulletin January 31<sup>st</sup>, 2022

# JANUARY PRODUCTION (GJ/DAY) (red text indicates plant meter reading or estimate)

•	GJs (per day unless total)											
Total	28065	0	24332	42940	46254	0	37735	33391	212718			
Avg	905		785	1385	1492		1301	1077	6862			
Goal	1248	0	1245	1424	2141	0	1940	1602	9600			
Avg vs. Goal	-342.4		-459.7	-38.8	-649.3		-639.2	-524.9	-2738.3			
HF (GJ/e3m3)	35.7	35.7	35.6	35.6	35.7	35.3	35.3	35.2				
	Cramersburg	White Bear	Miry Bay	Abbey	Shackleton	Snipe Lake	Lacadena North	Lacadena South	Total			
1-Jan	522		461	638	681		1020	214	3536			
2-Jan	871		514	1372	1093		1175	605	5630			
3-Jan	929		616	1401	1101		1104	1231	6382			
4-Jan	734		570	1244	902		1157	970	5578			
5-Jan	502		611	986	748		212	893	3952			
6-Jan	477		571	901	748			868	3565			
7-Jan	604		697	1001	886			781	3969			
8-Jan	517		720	978	840		790	840	4686			
9-Jan	546		613	892	845		1097	745	4739			
10-Jan	695		491	889	750		1016	721	4562			
11-Jan	1584		683	1282	1224		1937	1797	8507			
12-Jan	1589		719	1346	1618		1796	1638	8706			
13-Jan	1334		773	1544	1728		1387	1459	8225			
14-Jan	1195		760	1702	1703		1256	601	7217			
15-Jan	1191		913	1589	1644		1200	1371	7908			
16-Jan	1232		902	1513	2342		1323	1287	8599			
17-Jan	1100		882	1682	2367		1330	1217	8578			
18-Jan	698		927	1607	1933		1369	1435	7968			
19-Jan	568		749	1364	1566		1341	995	6583			
20-Jan	1004		771	1076	1493		1048	1062	6454			
21-Jan	997		859	1464	1712		1238	1199	7469			
22-Jan	1009		818	1390	1641		1344	1269	7471			
23-Jan	1062		867	1689	1869		1672	1220	8379			
24-Jan	1023		870	1927	1895		1806	1449	8970			
25-Jan	923		785	1605	1628		1552	1013	7506			
26-Jan	1202		969	1681	1701		1605	890	8048			
27-Jan	994		1131	1664	1901		1672	1297	8660			
28-Jan	833		1055	1532	1696		1715	1178	8008			
29-Jan	855		1057	1770	2145		1655	1371	8853			
30-Jan	802		1009	1683	2028		1566	1389	8477			
31-Jan	473		969	1528	1826		353	387	5536			

# JANUARY PRODUCTION (E3M3/DAY) (red text indicates plant meter reading or estimate)

	E3M3 (per day unless total)										
Total	787.2	0.0	684.3	1206.2	1296.0	0.0	1069.6	949.7	5993.0		
Avg	25.4		22.1	38.9	41.8		34.5	30.6	193.3		
Goal	35.0	0.0	35.0	40.0	60.0	0.0	55.0	45.0	270.0		
Avg vs. Goal	-9.61		-12.93	-1.09	-18.19		-20.50	-14.36	-76.68		
HF (GJ/e3m3)	35.7	35.7	35.6	35.6	35.7	35.3	35.3	35.6			
	Cramersburg	White Bear	Miry Bay	Abbey	Shackleton	Snipe Lake	Lacadena North	Lacadena South	Total		
1-Jan	14.642		12.964	17.921	19.081		28.900	6.100	99.609		
2-Jan	24.432		14.454	38.539	30.625		33.300	17.200	158.551		
3-Jan	26.059		17.323	39.354	30.849		31.300	35.000	179.885		
4-Jan	20.589		16.029	34.944	25.273		32.800	27.600	157.235		
5-Jan	14.081		17.182	27.697	20.958		6.000	25.400	111.318		
6-Jan	13.380		16.057	25.309	20.958		0.000	24.700	100.405		
7-Jan	16.942		19.601	28.118	24.825		0.000	22.200	111.686		
8-Jan	14.502		20.247	27.472	23.536		22.400	23.900	132.057		
9-Jan	15.316		17.238	25.056	23.676		31.100	21.200	133.586		
10-Jan	19.495		13.808	24.972	21.014		28.800	20.500	128.589		
11-Jan	44.432		19.207	36.011	34.295		54.900	51.100	239.946		
12-Jan	44.572		20.219	37.809	45.335		50.900	46.600	245.435		
13-Jan	37.419		21.738	43.371	48.417		39.300	41.500	231.745		
14-Jan	33.520		21.372	47.809	47.716		35.600	17.100	203.118		
15-Jan	33.408		25.675	44.635	46.063		34.000	39.000	222.781		
16-Jan	34.558		25.366	42.500	65.621		37.500	36.600	242.144		
17-Jan	30.856		24.803	47.247	66.321		37.700	34.600	241.527		
18-Jan	19.579		26.069	45.140	54.161		38.800	40.800	224.549		
19-Jan	15.933		21.063	38.315	43.878		38.000	28.300	185.488		
20-Jan	28.163		21.682	30.225	41.832		29.700	30.200	181.802		
21-Jan	27.966		24.156	41.124	47.969		35.100	34.100	210.415		
22-Jan	28.303		23.003	39.045	45.979		38.100	36.100	210.531		
23-Jan	29.790		24.381	47.444	52.368		47.400	34.700	236.082		
24-Jan	28.696		24.466	54.129	53.096		51.200	41.200	252.787		
25-Jan	25.891		22.075	45.084	45.615		44.000	28.800	211.465		
26-Jan	33.717		27.250	47.219	47.660		45.500	25.300	226.646		
27-Jan	27.882		31.805	46.742	53.264		47.400	36.900	243.993		
28-Jan	23.366		29.668	43.034	47.520		48.600	33.500	225.688		
29-Jan	23.983		29.724	49.719	60.101		46.900	39.000	249.428		
30-Jan	22.496		28.375	47.275	56.823		44.400	39.500	238.869		
31-Jan	13.268		27.250	42.921	51.163		10.000	11.000	155.602		

## TRENDS









## Budgeted Production Nov 1, 2021 to Oct 31, 2022



## AECO GAS PRICES JANUARY 2022 (Source: http://www.gasalberta.com/index.php?p=gas-market/market-prices)



## AB-NIT 5a - \$4.14/gj AB-NIT 7a - \$4.14/gj



## WEATHER MODEL



# Swift Current, SK Weather



## **January 2022 Ambient Operating Temperatures**





**THIS IS EXHIBIT** "**B**" referred to in the Affidavit of **Jim Gettis** SWORN BEFORE ME this <u>25th</u> day of <u>February</u>, 2022.

14

**A COMMISSIONER FOR OATHS** in and for the Province of Alberta.



**THIS IS EXHIBIT** "C" referred to in the Affidavit of **Jim Gettis** SWORN BEFORE ME this <u>25th</u> day of <u>February</u>, 2022.

14

**A COMMISSIONER FOR OATHS** in and for the Province of Alberta.

Normal Impart	ABBEY RESOURCES CORP Statement of Weekly Projected Cash Flow For the period from January 9, 2022 to June 5, 2022				1	Court No.: Estate No.:	733 of 2021 23-035247											
Image: base base base base base base base base			FORECAST															
Note:         Note: <th< th=""><th></th><th></th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th><th>13</th><th>14</th><th>15</th><th></th></th<>			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Image: bit is a large of the state is a state is		Notes	week 28	week 29	week 30	week 31	week 32	week 33	week 34	week 35	week 36	week 37	week 38	week 39	week 40	week 41	week 42	Forecast
Opening debins         1         1         100.00         5         100.00         5         100.00         5         100.00         5         100.00         5         100.00         5         100.00         5         100.00         5         100.00         5         100.00         5         100.00         5         100.00         5         100.00         5         100.00         10		Week of	2/20/2022	2/27/2022	3/6/2022	3/13/2022	3/20/2022	3/27/2022	4/3/2022	4/10/2022	4/17/2022	4/24/2022	5/1/2022	5/8/2022	5/15/2022	5/22/2022	5/29/2022	Total
Image: start with the	Opening Balance	1	\$ 109,095	\$ 347,051	\$ 218,852	\$ 147,672	\$ 109,057	\$ 826,061	\$ 538,795	\$ 268,607	\$ 229,991	\$ 223,116	\$ 678,518	\$ 504,217	\$ 368,909	\$ 351,034	\$ 1,534,496	\$ 109,095
Sparsed subsising resultsSparsed subsising result	Cash inflows																	
Martial marte a marte a martial martial martial martial martial martial marti	Operated Revenue (Less Marketing Fees)	2	927.507				1.016.652					1.475.034				1.363.677		4,782,869
Non-particle bring any many many many many many many many	Rovalties	3	,		(67,717)	(3000)	_,,		(74,226)	(3000)		_,,		(107.692)	(3000)	_,,		-258.635
Tail leave       5       9       1       6       6       1	Shon and Yard Rental to third party	4			3 413	()			3 413	(****)			3 413	()	()			10 238
Canadim         Financial Manage         Financin Manage         Financial Manage	Total inflows		\$ 927,507	\$-	\$ (64,305)	\$ (3,000)	\$ 1,016,652	\$-	\$ (70,814)	\$ (3,000)	\$ -	\$ 1,475,034	\$ 3,413	\$ (107,692)	\$ (3,000)	\$ 1,363,677	\$-	\$ 4,534,472
Value         Value <th< td=""><td>Contraction of the second se</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>	Contraction of the second se																	
minimized match mark (1)       minimized match	Cash outflows	-		76 404				76 404					76 404				76 404	205 027
Intel department       Integrate       Integrat	ransportation	5	4.45.000	76,484			72 500	76,484	72 500			72 500	76,484			72 500	76,484	305,937
mining constraint constr	Field Operators	5	145,000				72,500	100.000	72,500			72,500	72,500			72,500	275 000	507,500
manument lane       <	Field Operating costs - COD payment	/	1/5,000	15 000		8 000	10,000	15,000		8 000		285,000	15 000		8 000	10,000	275,000	915,000
state strain freehold Suring Humaning Humani	Field Operating Costs - auto debit	8	1,000	13,000		8,000	7,000	13,000		8,000		7,000	13,000		8,000	7,000	13,000	277.690
marke field form skarle and Minnen]         5,09         2,26         5,20         6,20	Lease Rentals (Freehold Surface) - amended lease	9	41,775				47,014					42,090					140,201	277,060
subs         startic         s	Lease Rentals (Freehold Surface and Mineral)	10	5 /00				33,333					306.053				7 600		373 552
property is marked models are alreaded         is an interval (wild) black for all and b	Lease Rentals (CTK Surface and Mineral)	12	5,455	2 246			360					22 000				7,000		24 606
number of veloci (size)         2,154         5         2,55         5,50	Property tax	13		2,240			500					22,000						21,000
contraction         0         0.200         <	Insurance / Vehicle Lease	14		2 154				2 154					2 154				2 154	8 617
statistic         statistic <t< td=""><td>Contingency</td><td>15</td><td>6.250</td><td>6.250</td><td>6.250</td><td>6.250</td><td>6.250</td><td>6,250</td><td>6.250</td><td>6.250</td><td>6.250</td><td>6.250</td><td>6,250</td><td>6.250</td><td>6.250</td><td>6.250</td><td>6,250</td><td>93,750</td></t<>	Contingency	15	6.250	6.250	6.250	6.250	6.250	6,250	6.250	6.250	6.250	6.250	6,250	6.250	6.250	6.250	6,250	93,750
payol [field Staff]	Total Field Operations & Related		\$ 380,524	\$ 102,134	\$ 6,250	\$ 14,250	\$ 243,523	\$ 259,888	\$ 78,750	\$ 14,250	\$ 6,250	\$ 821,454	\$ 172,388	\$ 6,250	\$ 14,250	\$ 103,350	\$ 521,089	\$ 2,744,601
payod (field staff)       16       20,740       20,7																		
Contraction         17         50,587         50,007         50,07         50,07         50,07 <td>Payroll (Field Staff)</td> <td>16</td> <td></td> <td>20,740</td> <td></td> <td>145,182</td>	Payroll (Field Staff)	16		20,740		20,740		20,740		20,740		20,740		20,740		20,740		145,182
Utile inspande and Health Benefits       4,700       11.31       5       5,700       1,713       5       5,700       1,713       5       1,713       5       1,713       5       1,713       5       1,713       5       7,701       1,713       5       7,701       1,713       5       7,701       7	Contract Fees (Calgary Staff)	17	50,587				50,000					50,000				50,000		200,587
Calgory Office Rent       19       2,22,5       >       5,00       > <td< td=""><td>Life Insurance and Health Benefits</td><td>18</td><td></td><td>4,700</td><td></td><td></td><td></td><td>4,700</td><td></td><td></td><td></td><td></td><td>4,700</td><td></td><td></td><td></td><td>4,700</td><td>18,800</td></td<>	Life Insurance and Health Benefits	18		4,700				4,700					4,700				4,700	18,800
Soltware       20       4,89       5,000	Calgary Office Rent	19	2,625					1,313				1,313					1,313	6,563
Office supplies, forstage, stank service (Large, etc.)       Sub       Sub <td>Software</td> <td>20</td> <td>4,690</td> <td></td> <td></td> <td></td> <td>5,000</td> <td></td> <td></td> <td></td> <td></td> <td>5,000</td> <td></td> <td></td> <td></td> <td>5,000</td> <td></td> <td>19,690</td>	Software	20	4,690				5,000					5,000				5,000		19,690
Contraction       22       6.5       6.25	Office Supplies, Postage, Bank Service Charge, etc.	21	500				500					500				500		2,000
SWOT Units       Status       Status <td>Contingency Total Office &amp; Related</td> <td>22</td> <td>\$ 59.026</td> <td>\$ 26.065</td> <td>\$ 625</td> <td>\$ 21 365</td> <td>\$ 56 125</td> <td>\$ 27 378</td> <td>625 \$ 625</td> <td>\$ 21 365</td> <td>\$ 625</td> <td>\$ 78 178</td> <td>\$ 5325</td> <td>\$ 21 365</td> <td>\$ 625</td> <td>\$ 76 865</td> <td>\$ 6.638</td> <td>9,375</td>	Contingency Total Office & Related	22	\$ 59.026	\$ 26.065	\$ 625	\$ 21 365	\$ 56 125	\$ 27 378	625 \$ 625	\$ 21 365	\$ 625	\$ 78 178	\$ 5325	\$ 21 365	\$ 625	\$ 76 865	\$ 6.638	9,375
SWG1 units       SWG1 units <td></td> <td></td> <td><i>y 33,020</i></td> <td><u>y 20,005</u></td> <td><del>,</del> 025</td> <td><u>y 21,305</u></td> <td><i>y</i> 30,123</td> <td><i>y</i> 27,370</td> <td><del>,</del> 025</td> <td><i>Ş</i> 21,303</td> <td><del>y 025</del></td> <td><i>y</i> 70,170</td> <td>Υ 3,323</td> <td>Ş 21,303</td> <td><del>,</del> 025</td> <td><i>y</i> 70,005</td> <td><i>y</i> 0,030</td> <td><b>3 402,130</b></td>			<i>y 33,020</i>	<u>y 20,005</u>	<del>,</del> 025	<u>y 21,305</u>	<i>y</i> 30,123	<i>y</i> 27,370	<del>,</del> 025	<i>Ş</i> 21,303	<del>y 025</del>	<i>y</i> 70,170	Υ 3,323	Ş 21,303	<del>,</del> 025	<i>y</i> 70,005	<i>y</i> 0,030	<b>3 402,130</b>
Wellag Shelter       Disposal Well (Drill, Complex, Tie-in)         Disposal Well (Drill, Complex, Tie-in)       s <td>SWOT Units</td> <td>23</td> <td></td> <td>0</td>	SWOT Units	23																0
Disposibility Mell (Drill, Complex, Till-ining) Disposibility Mell (Drill, Complex, Till-ining) Disposibility Mell Mell Mell Mell Mell Mell Mell Mel	Wellhead Shelter																	0
Downhole Abandonment Program       2         Total Other       5       -       5       4       400000       -       1000000000000000000000000000000000000	Disposal Well (Drill,Complete,Tie-in)																	0
Total Other       5       -       5 <th< td=""><td>Downhole Abandonment Program</td><td>24</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>	Downhole Abandonment Program	24																
Restructuring Costs (Trustee and Legal)       2 50,000       2 50,000       3       5	Total Other		\$ -	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$ -	\$-	\$-	\$-	\$-	\$-
Total Other       \$ <th< td=""><td>Restructuring Costs (Trustee and Legal)</td><td>25</td><td>250,000</td><td></td><td></td><td></td><td></td><td></td><td>120,000</td><td></td><td></td><td>120,000</td><td></td><td></td><td></td><td></td><td></td><td>490,000</td></th<>	Restructuring Costs (Trustee and Legal)	25	250,000						120,000			120,000						490,000
Total outflows       \$       689,550       \$       128,200       \$       6,875       \$       299,648       \$       287,266       \$       199,375       \$       35,615       \$       6,875       \$       17,713       \$       27,615       \$       14,875       \$       180,215       \$       5,67,797         Subtoal       \$       347,051       \$       218,852       \$       109,057       \$       826,061       \$       538,795       \$       268,607       \$       229,911       \$       223,116       \$       678,518       \$       504,217       \$       369,099       \$       31,034       \$       1,534,496       \$       1,006,769<	Total Other		\$ 250,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 120,000	\$ -	ş -	\$ 120,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 490,000
Subtotal         \$ 347,051         \$ 218,852         \$ 147,672         \$ 109,057         \$ 826,061         \$ 538,795         \$ 229,991         \$ 223,116         \$ 678,518         \$ 504,217         \$ 368,909         \$ 351,034         \$ 1,534,496         \$ 1,006,769         \$ 1,006,769           True- up of Cash Balances due to actuals         26           Closing Balance         \$ 347,051         \$ 218,852         \$ 147,672         \$ 109,057         \$ 826,061         \$ 538,795         \$ 268,607         \$ 229,991         \$ 223,116         \$ 678,518         \$ 504,217         \$ 368,909         \$ 351,034         \$ 1,534,496         \$ 1,006,769         \$ 1,006,769           Closing Balance         26         5 347,951         \$ 268,607         \$ 229,991         \$ 223,116         \$ 678,518         \$ 504,217         \$ 368,909         \$ 351,034         \$ 1,534,496         \$ 1,006,769 <td>Total outflows</td> <td></td> <td>\$ 689,550</td> <td>\$ 128,200</td> <td>\$ 6,875</td> <td>\$ 35,615</td> <td>\$ 299,648</td> <td>\$ 287,266</td> <td>\$ 199,375</td> <td>\$ 35,615</td> <td>\$ 6,875</td> <td>\$ 1,019,632</td> <td>\$ 177,713</td> <td>\$ 27,615</td> <td>\$ 14,875</td> <td>\$ 180,215</td> <td>\$ 527,727</td> <td>\$ 3,636,797</td>	Total outflows		\$ 689,550	\$ 128,200	\$ 6,875	\$ 35,615	\$ 299,648	\$ 287,266	\$ 199,375	\$ 35,615	\$ 6,875	\$ 1,019,632	\$ 177,713	\$ 27,615	\$ 14,875	\$ 180,215	\$ 527,727	\$ 3,636,797
True- up of Cash Balances due to actuals         26           Closing Balance         \$ 347,051 \$ 218,852 \$ 147,672 \$ 109,057 \$ 826,061 \$ 538,795 \$ 268,607 \$ 229,991 \$ 223,116 \$ 678,518 \$ 504,217 \$ 368,909 \$ 351,034 \$ 1,534,496 \$ 1,006,769	Subtotal		\$ 347,051	\$ 218,852	\$ 147,672	\$ 109,057	\$ 826,061	\$ 538,795	\$ 268,607	\$ 229,991	\$ 223,116	\$ 678,518	\$ 504,217	\$ 368,909	\$ 351,034	\$ 1,534,496	\$ 1,006,769	\$ 1,006,769
Closing Balance \$ 347,051 \$ 218,852 \$ 147,672 \$ 109,057 \$ 826,061 \$ 538,795 \$ 268,607 \$ 229,991 \$ 223,116 \$ 678,518 \$ 504,217 \$ 368,909 \$ 351,034 \$ 1,534,496 \$ 1,006,769 \$ 1,006,769	True- up of Cash Balances due to actuals	26																
	Closing Balance		\$ 347,051	\$ 218,852	\$ 147,672	\$ 109,057	\$ 826,061	\$ 538,795	\$ 268,607	\$ 229,991	\$ 223,116	\$ 678,518	\$ 504,217	\$ 368,909	\$ 351,034	\$ 1,534,496	\$ 1,006,769	\$ 1,006,769

Purpose:

The Statement of Projected Cash Flow has been prepared by the Company's management pursuant to Section 10 (2)(a) of the Companies' Creditors Arrangement Act (the "CCAA"). It is being filed specifically for the purposes contemplated in that section and readers are cautioned that it may not be appropriate for other purposes.

In addition, the Statement of Projected Cash Flow has been prepared based on assumptions regarding future events, therefore actual results may vary from the estimates presented herein and these variances may be material.

Abbey Resources Corp

Per: Jim Gettis President

#### ABBEY RESOURCES CORP Statement of Weekly Projected Cash Flow For the period from January 9, 2022 to June 5, 2022

#### **General Notes & Assumptions**

Amounts are represented in Canadian dollars

These projections are being prepared as part of the fifth extension of Abbey Resources estimated to end on April 27, 2022.

#### Specific Notes & Assumptions

#### 1 Opening cash balance, February 20, 2022

- 2 Estimated revenue Week 28 (7,586 GJ/d at \$4.196 per GJ), Week 32 (7,600 GJ/d at \$4.363 per GJ), Week 37 (9,500 GJ/d at \$4.52 per GJ), Week 41 (9,750 GJ/d at \$4.23 per GJ) Volumes estimated to reduce in Week 28 and 32 due to colder weather and pipelines freezing
- 3 Crown Royalties are current and are auto-debit, all other Royalties have been paid starting August 13, 2021.
- 4 Monthly Shop and Yard Rental to third party (\$3,412.50 per month)
- 5 Monthly Gas Transportation on Transgas- an estimate is paid at the beginning of the month and true-up at the end of the month
- 6 Field Contract Operators paid on an hourly rate, estimated 2 week period per pay period, payments to operators increased due to the cold weather to keep production volumes optimized
- 7 Essential Services for Field Operations includes Production Costs, Chemicals & Treatments, Safety & Environmental, Maintenance & Repairs and Trucking and Labour costs
- 8 Operating Expenses that are Auto-debit to the account (Intercom, Saskpower, Sasktel, Shaw, Xplornet)
- 9 Annual Surface Lease Rentals for the executed lease agreements based on area utilized, Forecast estimates tha all leases to be disclaimed or amended by May 2022.
- 10 Annual Surface Lease Rentals (amendment still to be executed by freehold surface rights owner; per diem payments prorated to CCAA stay period)
- 11 Annual Crown lease rentals and annual mineral leases
- 12 Annual Carry the Kettle lease rentals (per diem payments prorated to CCAA stay period) and annual mineral leases
- 13 Monthly Payment for 2022 property tax
- 14 Field Vehicle Lease (Auto-debit to the account)
- 15 Contingency for Miscellaneous Operating Expenses
- 16 Salary and Wages for Field Employees (Payroll service utilized- 2 week pay period)
- 17 Calgary Staff Administration / Management
- 18 Life Insurance and Healh Benefits (Auto-debit to the account)
- 19 Calgary Office Rent (monthly rent paid when invoiced)
- 20 Calgary Office (Accounting, Land Software)
- 21 Calgary Office Expense (Supplies, Postage, Courier, Bank Service Charge)
- 22 Contingency for Miscellaneous Calgary Office Expenses
- 23 SWOT Units project on hold
- 24 Downhole abandonment project on hold
- 25 Restructuring costs for Trustee and Legal (MNP, MNP Legal, DLA Piper, Anderson and Company)
- 26 True-up of actuals to estimates on cash balance projections. Cash opening and closing balance are reflective of actual cash available.

#### Abbey Resources Corp

MNP Ltd. in its capacity as Monitor under the Companies' Creditor Arrangement Act for Abbey Resources Corp and not in its personal capacity

Per: Jim Gettis

Per: Victor P. Kroeger Senior Vice President **THIS IS EXHIBIT** "D" referred to in the Affidavit of **Jim Gettis** SWORN BEFORE ME this <u>25th</u> day of <u>February</u>, 2022.

**A COMMISSIONER FOR OATHS** in and for the Province of Alberta.



1000 – 1777 Victoria Avenue Regina, SK S4P 4K5 T: 306-777-9173 F: 306-565-3332 tdahlem@saskenergy.com

Our File: LL12933

Delivered by Email

January 21, 2022

Abbey Resources Corp. 700. 505 3<sup>rd</sup> St SW Calgary AB T2P 3E6

Attention: Mr. Jim Gettis (jim.gettis@abbeyr.ca)

Dear Sir,

## Re: TransGas Limited ("TransGas") and Abbey Resources Corp ("Abbey"); TransGas Service Agreement Date: August 1, 2016

It has recently been brought to TransGas' attention that Abbey is operating according to an Order granted by the Saskatchewan Court of Queen's Bench on July 20, 2021, made pursuant to the *Companies' Creditors Arrangement Act*.

Subsequent to said Order, Abbey executed a contract with TransGas whereby it assigned its Transportation Contract Demand to Twin Eagle Resource Management Canada LLC. The value of the assigned Contract Demand is approximately \$76,484 per month. TransGas approved of this assignment by Abbey without being made aware that Abbey was in credit protection proceedings at the time.

Section 11.3 of the TransGas Comprehensive Tariff (the Tariff) reserves TransGas' right at any time during the term of any Service to require Abbey to post security reasonably acceptable to TransGas. This letter represents TransGas' notice to Abbey of its request for security pursuant to the Tariff. TransGas would normally request a letter of credit as security from Abbey, but in light of Abbey's current status in credit protection, TransGas is opting to request alternate security.

Further to a conference call between Abbey and TransGas on January 20, 2022, Abbey has agreed to apply to the Court of Queen's Bench during the week of January 24-28, 2022, to request that TransGas be granted a "critical supply charge" over Abbey's assets. Such charge shall be for \$153,000, being the sum of 60 days'

LL12933 Jan 21, 2022 Letter Agreement - Abbey Resources Corp.

Firm Contract Demand. Abbey agrees to keep TransGas promptly informed as to the status of the Court application in this regard.

As part of this critical supply charge, TransGas further proposes the following payment terms respecting Abbey's monthly Contract Demand. Should Abbey agree to these terms, please execute this letter agreement on page three. In accordance with these payment terms, for which the adequacy, receipt and sufficiency of valuable consideration is hereby acknowledged, TransGas and Abbey agree as follows:

- TransGas shall forthwith invoice Abbey for services provided from January 1, 2022 to January 31, 2022. Said invoice will be issued by Monday, January 31, 2022 and shall be payable by 5:00 p.m. three business days following the date of rendering of said invoice by TransGas.
- 2. TransGas shall forthwith invoice Abbey for any monthly Overrun/Interruptible (IT) charges. Said invoice will be issued on the 20<sup>th</sup> of each month of the contract term and follow the payment conditions set out in Article 12 of the General Terms and Conditions of the Tariff. If the 20<sup>th</sup> falls on a weekend or statutory holiday, invoices will be issued following the notifications posted on the TransGas website under Customer Central/Important dates.
- 3. Immediately thereafter, TransGas shall commence to invoice Abbey \$76,484 for services provided on a monthly basis, based on Firm transport Contract Demand. Said invoice will be issued on the last day of each service month and shall be payable by 5:00 p.m. three (3) business days following the date of rendering of said invoice by TransGas.
- 4. Meters shall be read at such frequency as TransGas may decide. TransGas shall have the right to estimate customer use and to render a bill on such estimated use (Firm and Interruptible transport). In the event estimates are used, the next monthly bill that is based on actual meter readings will be credited or adjusted for the difference between the estimated and actual transport. Said invoice shall be payable by 5:00 p.m. on the business day following the date of rendering of said invoice.
- 5. In the event of a failure to make payment as described in the foregoing paragraphs by 5:00 p.m. TransGas may thereafter discontinue or suspend any and all services, without further notice.

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6. Abbey further agrees that the payment terms described herein are nonstandard terms for a non-standard service, and that such terms and conditions shall supersede the standard terms and conditions of the Tariff in the event of any conflict or inconsistency.

Abbey can accept this payment offer by executing and returning to TransGas a copy of this letter agreement by 5:00 p.m., January 26, 2022.

Sincerely,

**TransGas Limited** 

Terence Dahlem Senior Legal Counsel

Senior Legal Counsel	
AGREED TO AND ACCEPTED THIS 26 DAY OF, 2022.	
Abbey Resources Corp.	
PER: PEng President 27 January	
AGREED TO AND ACCEPTED THIS DAY OF 2022.	
TransGas Limited	
Per: Docusigned by: 21447409F2A0495 Executive Vice President Stakeholder Executive Vice President and Chief Financial	G
Engagement, Chief Legal Officer & Corporate Officer	
Secretary	

cc: Rick Anderson, Vice President, Corporate Recovery and Restructuring, MNP Ltd Christine Short, Executive Vice President and Chief Financial Officer, TransGas Limited Kevin Adair, Executive Vice President, Customer Service Operations, TransGas Limited **THIS IS EXHIBIT** "E" referred to in the Affidavit of **Jim Gettis** SWORN BEFORE ME this <u>25th</u> day of <u>February</u>, 2022.

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**A COMMISSIONER FOR OATHS** in and for the Province of Alberta.



DLA Piper (Canada) LLP Suite 2700, Stantec Tower 10220 - 103rd Ave NW Edmonton AB T5J 0K4 www.dlapiper.com

Jerritt R. Pawlyk jerritt.pawlyk@dlapiper.com T +1 780.429.6835 F +1 780.670.4329

FILE NUMBER: 107373-00001

February 15, 2022

DELIVERED B	EMAIL	]

Attention:			

Dear Sir/Madam:

#### Re: Leasing arrangement with Abbey Resources Corp.

We act as lawyers for Abbey Resources Corp. ("**Abbey Resources**" or the "**Company**") in connection with its ongoing legal proceedings before the Court of Queen's Bench for Saskatchewan under the *Companies' Creditors Arrangement Act*, RSC 1985, c C-36 (the "**CCAA**").

Abbey Resources entered into Court ordered creditor protection in the CCAA proceedings on August 13, 2021, for the purpose of restructuring its financial affairs. We are writing all of the lessors of Abbey Resources who have not yet entered into agreements to amend surface leases between themselves and Abbey Resources to discuss the future of the relationship between Abbey Resources and its lessors.

The purpose of this letter is to: (a) notify you of an option to enter into an amended leasing arrangement with the Company; and (b), provide you with advance notice of the Company's intention to exercise its right to bring about the termination of its surface leases with parties who are unwilling to enter into agreements to amend their surface leases with the Company.

#### **Necessity of Surface Lease Rent Reductions**

Abbey Resources has determined that it will be unable to implement its restructuring plan in the CCAA proceedings if it is unable to reduce its fixed costs. Surface leases entered into during the early 2000s by the Company's predecessors were concluded during a period of much higher natural gas prices. Since that time, average natural gas prices have reduced and production from the Company's wells has declined or ceased. Even the Company's productive natural gas wells are uneconomic with surface leases set at their original, un-amended rental rates.

For these reasons, prior to its entry into CCAA creditor protection, Abbey Resources determined that would be necessary to reduce its surface lease rental amounts (in addition to certain of its other fixed costs) in order to remain viable. To date, the Company has concluded agreements to amend 1,014 of its 2,665 total surface leases.



Page 2 of 4

All of the Company's agreements to amend surface leases are based on the same formula: the acreage rented under the amended leases is reduced to correspond to the acreage actually used by Abbey Resources. The Company determines the actual acreage in use based on analysis of aerial photographs of its leased premises conducted by a third-party land management contractor, Millennium Land Ltd. ("**Millennium Land**"). Typically, rented acreage and total rental amounts payable under amended leases are reduced to approximately 35% of their original amounts.

Abbey Resources has not amended its leases under preferential or special terms for any individual landowner. Abbey Resources intends to treat all of its lessors on equal footing. No special or preferential terms will be offered to any individual landowner.

#### Proposal to Amend Surface Leases

The Company proposes to amend the surface leases for all well sites and access roads on lands owned by yourself, such that its leased space only corresponds to the space actually used by the Company. This will likely result in the reduction of total rents payable by the Company to approximately 35% of the amount payable under the original surface leases. Rents paid under amended surface leases will be paid annually in advance of the original anniversary date.

The Company does not propose to amend any of its surface leases for lands on which its headers or compressors are sited. The Company will continue to pay surface leases for header sites at original rental amounts.

If you are amenable to amending your surface leases with Abbey Resources, please contact Aaron Tait via email at <u>aaron@mland.ca</u> or phone 306-778-4430 by no later than Wednesday, February 23, 2022, at 4:00 p.m. (Saskatchewan time). If you indicate that you are amenable to amending your leases with Abbey Resources, Millennium Land will proceed to prepare an amended lease for your review and approval. Simply contacting Millennium Land to indicate your willingness to amend your leases will not be taken by the Company as binding confirmation of your agreement to amend leases. All lease amendments will be confirmed by way of your execution of a written amending agreement, which you will be entitled to review with your legal counsel.

If you do not contact Millennium Land by the above-mentioned deadline, we will presume that you are not amenable to entering into an agreement to amend your surface leases with Abbey Resources. In that event, we will proceed to take steps to "disclaim" your surface leases in the manner discussed below.

#### **Disclaimer of Surface Leases**

As is stated above, Abbey Resources is of the view that its restructuring plan cannot succeed unless it reduces all of its surface lease rental rates. For this reason, Abbey Resources intends to exercise its right to "disclaim" leases under section 32 of the CCAA.

The CCAA provides that a party restructuring in CCAA proceedings (such as Abbey Resources) may "disclaim" contracts, such as leases, with the approval of the Court or the Court-appointed Monitor (MNP Ltd, in these proceedings). Once its surface leases are disclaimed pursuant to the CCAA, the Company will no longer be bound by the original, un-amended terms of such surface leases. This means that the Company will cease to be under an obligation to pay rent to its lessors at the rate set out in the original surface leases.

Following the disclaimer of the surface leases, landowners whose leases have been disclaimed will no longer be paid prorated rentals amounts at their full rates. Instead, the Company will proceed to pay landowners whose leases have been disclaimed monthly compensation for occupancy at 35% of their



original monthly rental amounts. Such monthly compensation will be paid at this rate until such time as the Company is able to decommission its well site infrastructure. Following decommissioning, the Company will reduce compensatory payments for occupancy to \$250.00 *per* year until it is able to obtain reclamation certificates.

Natural gas wells sited on the premises leased under disclaimed surface leases will be permanently shut in by the Company. No natural gas will be produced from such wells.

#### Plan of Arrangement

Abbey Resources is in the process of preparing a "Plan of Arrangement." A Plan of Arrangement is a proposal made on behalf of a party restructuring in CCAA proceedings to repay all or a portion of the debts owing to the party's creditors. A Plan of Arrangement approved by a majority of a debtor's creditors and the Court will impose a legally binding obligation on the debtor to make payments to its creditors in accordance with the Plan of Arrangement.

The Company intends to propose a Plan of Arrangement that would see a significant portion of its debts dating from prior to its entry into CCAA paid to its creditors, inclusive of all of its lessors, over a period of several years. In other words, any Plan of Arrangement put forward by the Company will necessarily involve a provision requiring the Company to pay a considerable portion of its past rental arrears to its lessors. You will have the opportunity to vote on the Plan of Arrangement, which requires the approval of the majority of the Company's creditors whose claims against the Company constitute not less than two-thirds of the Company's total debts.

Any Plan of Arrangement put forward by the Company will involve net revenues over and above operating costs for a period of several years being allocated towards: (a) an agreed-upon portion of debts owing to the Company's creditors (inclusive of yourself); and (b), the costs of decommissioning shut in wells and other infrastructure.

Any Plan of Arrangement put forward by the Company will include a prohibition on distributions of any funds to the Company's shareholders by way of dividends or share buy-backs for the multi-year period during which the Company's creditors are set to receive distributions. In other words, the savings resulting from reductions to the Company's fixed costs (including reductions to surface lease rental payments) will first be allocated towards repaying the Company's creditors before the Company's shareholders receive any benefit from the Company's restructuring.

The Company currently estimates that it will generate total natural gas sales revenues of at least \$13,000,000 in 2022. Subject to fluctuations in natural gas prices, the Company estimates that it will continue to generate annual sales revenues of in excess of \$10,000,000 for years to come. As the Company decommissions its shut-in assets over the coming years, its fixed costs (principally, property taxes and surface rental payments) will continually decrease. This means that the Company will be left with a greater proportion of its revenues each year to allocate towards payment of its pre-CCAA debts and the decommissioning of its abandoned assets.

Abbey Resources will be unable to restructure if it does not reduce its surface rentals. If the Company fails to restructure in the CCAA proceedings, it will not be able to implement a Plan of Arrangement to pay its existing debts. Should the Company fail to restructure, the whole of its assets will likely be liquidated in a bankruptcy or other Court-supervised insolvency proceedings. The forced sale of the Company's assets is unlikely to generate sufficient proceeds to repay more than a small fraction of the total indebtedness owing to its various creditors. Additionally, even if any of the Company's natural gas assets should remain in operation following a liquidation (which is not assured), the future owner of the Abbey Resources' natural


Page 4 of 4

gas assets will be under no obligation to allocate any of its sales revenues (or any amounts whatsoever) to rental arrears owing to Abbey Resources' surface rights holders.

In light of the above, we believe that the Company's lessors only have a realistic chance of recovering any material value of rental arrears if the Company succeeds in its restructuring and in the implementation of its Plan of Arrangement. The Company will have the greatest chance of success of restructuring and implementing its Plan of Arrangement if the majority of its lessors agree to enter into amended lease agreements.

### **Decommissioning of Infrastructure**

The Company acknowledges that it will remain responsible for incurring the full costs of decommissioning all of its shut-in well sites, flow lines, and other related infrastructure, regardless of whether it has amended, terminated, or disclaimed its surface leases. Indeed, a central component of Abbey Resources' restructuring plan involves the allocation of significant portions of its revenues towards decommissioning its shut-in assets.

### Summary

In short, we are asking all of the lessors of Abbey Resources to voluntarily amend their leases so as to enable the Company to restructure its affairs. It will not be possible for the Company to succeed in its restructuring if it continues to pay its lessors original, un-amended lease rates. The Company believes that its creditors will see little benefit from the forced liquidation of its assets if it does not succeed in its restructuring in the CCAA proceedings. For this reason, the Company has determined that it has no other option but to offer its lessors the choice between entry into an amended rental agreement or disclaimer.

We thank you for taking the time to consider the position set out in this letter. We encourage you to speak to a lawyer if you have any questions respecting your legal rights in relation to this matter.

Sincerely, DLA Piper (Canada) LLP Per:

Jerritt R. Pawlyk JUP/KNH

Cc: MNP Ltd.

**THIS IS EXHIBIT** "F" referred to in the Affidavit of **Jim Gettis** SWORN BEFORE ME this <u>25th</u> day of <u>February</u>, 2022.

14



DLA Piper (Canada) LLP Suite 2700, Stantec Tower 10220 - 103rd Ave NW Edmonton AB T5J 0K4 www.dlapiper.com

Jerritt R. Pawlyk jerritt.pawlyk@dlapiper.com T +1 780.429.6835 F +1 780.670.4329

February 10, 2022

FILE NUMBER: 107373-00001

### VIA EMAIL (WPEDERSON@LELANDLAW.CA)

Wayne L. Pederson, Q.C. Leland Kimpinski LLP 336 – 6th Avenue North Saskatoon, SK S7K 2S5

Attention: Wayne L. Pederson, Q.C.

Dear Sir

### Re: Abbey Resources Corp. - Outstanding Leasing Issues

Further to the ongoing *Companies' Creditors Arrangement Act*, RSC 1985, c 36 ("**CCAA**"), restructuring proceedings of Abbey Resources Corp. ("**Abbey Resources**" or the "**Company**"), we are writing to discuss outstanding issues pertaining to surface leases between your various clients and the Company.

In brief, the Company has determined that its restructuring will necessitate the reduction of its surface leasing costs. The purpose of this correspondence is twofold: (a) to provide your various clients with a proposal for an alternative leasing arrangement that would allow the Company to restructure; and (b), to notify you of the Company's intention to disclaim surface leases pursuant to CCAA section 32 in the event that the Company and your respective clients are unable to come to terms for the alternative treatment of leases.

### Modified Leasing Proposal

As has been discussed in the Company's filings in its CCAA proceedings, Abbey Resources has been in the process of implementing a program to reduce its surface leases since prior to its entry into CCAA proceedings. All of the Company's agreements to amend surface leases are based on the same formula: the acreage rented under the amended leases is reduced to correspond to the acreage actually used by Abbey Resources. The Company determines the actual acreage in use based on analysis of aerial photographs of its leased premises conducted by a third-party land management contractor, Millennium Land Ltd. ("**Millennium Land**"). Typically, rented acreage and total rental amounts payable under amended leases are reduced to approximately 35% of their original amounts. To date, the Company has concluded agreements to amend 1,014 of its 2,665 total surface leases.

The Company proposes to enter into agreements with your clients to the acreage rented under its surface leases, such that the leased premises under such leases correspond only to the space actually used by the



Company. This will result in a reduction of total rents payable by the Company under any of the individual leases with any of your clients to approximately 35% of the original surface lease rental amount. Rents paid under amended surface leases will be paid annually and in advance at such amended surface leases' anniversary dates.

The Company does not propose to amend any of its surface leases for lands on which its headers or compressors are sited. The Company will continue to pay surface leases for header sites at original rental amounts.

As you are aware, our office sent notices of surrender and termination (the "**Termination Notices**") dated November 30, 2021, to certain of your clients - namely, DMN Ag Ventures Inc., Kelly Bradford, Aldor Farms Ltd., Alpiste International Ltd., Wine Glass Ranch Ltd., Wagner Land Co. Ltd., Litano Acres Ltd., Ernest Wagner, Lindsay Nobbs, Garry Wagner, and David Nobbs (the "**Terminated Lessors**").

In the case of the Terminated Lessors, the Company would propose to enter into novel leasing agreements, which would incorporate the terms of the original surface leases, but with the leased premises fixed at the reduced acreage basis described above.

Note that your clients are being treated on equal footing with all other freehold surface rights holders with whom the Company maintains surface leases. No freehold individual freehold surface rights holders are being offered terms more favourable to the terms offered to other surface rights holders.

We ask that you canvass the above proposal with your various clients. If any of them are amenable to entering into leasing arrangements with the Company on modified terms, please advise as much and we will expedite the completion of agreements for your review.

### **Disclaimer of Surface Leases**

If any of your clients are not amenable to entering into the leasing arrangements discussed above, please be advised that the Company will have no choice but to exercise its right to disclaim your clients' various surface leases pursuant to section 32 of the CCAA.

In the case of the lessors who were provided with Termination Notices, the Company intends to seek declaratory relief from the Court confirming the validity and effectiveness of such notices. In the alternative, in the event that the Court should disagree with our position on this front, we will be seeking to disclaim such leases as well. Accordingly, disclaimer notices will be conveyed in respect of such leases as well if lessors who received Termination Notices do not indicate that they are amenable to entering into the leasing arrangement discussed above.

We kindly ask that you provide us with notice of the identities of your clients who are amenable to entering into the leasing arrangement described above by not later than 4:00 p.m. on Friday, February 18, 2022. After that point, we will proceed to ask for the Monitor's endorsement of disclaimer notices in respect of the leases

We recognize that the Company's assets remain sited on your clients' lands and that the Company will, in any and all circumstances, remain under an obligation to decommission its abandoned assets at its expense. For this reason, in the event of disclaimer, the Company will seek an Order under section 11 of the CCAA entitling it to access your clients' lands for the purpose of attending to decommissioning and reclamation tasks. In this event, Company will seek that the section 11 Order require the Company to pay



Page 3 of 3

your clients compensation for occupancy of their lands at an amount equal to the reduced-acreage rental rate. Such compensation would be paid monthly and not annually.

Should the Company's restructuring fail, your clients will lose all opportunities to receive any future income whatsoever from the occupancy of their lands. Additionally, as we have consistently represented to the Court, any restructuring plan implemented by the Company will involve a proposal to pay all lessors a portion of pre-filing rental arrears. If the Company is unable to implement a plan of arrangement as a result of the termination of its restructuring proceedings, your clients will have no material chance of recovering any material value of pre-filing rental arrears.

Bearing the above in mind, we hope many of your clients will reconsider their positions. Please do not hesitate to contact the undersigned or Kevin Hoy from our office if you have any questions respecting the foregoing.

### Sincerely, DLA Piper (Canada) LLP Per:

Jerritt R. Pawlyk Partner

JUP/KNH/cpa

cc: MNP Ltd. - Via Email Ian Sutherland and Craig Frith - Via Email **THIS IS EXHIBIT** "G" referred to in the Affidavit of **Jim Gettis** SWORN BEFORE ME this <u>25th</u> day of <u>February</u>, 2022.

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CLIENT NAME: Abbey Resources Corp.						
<b>PROJECT NAME:</b> Abbey 16-01-022-19 W3M – February 9, 2022 Release						
Рнотодкарн ID: 1						
<b>PHOTOGRAPH LOCATION:</b> South of spill area						
<b>DIRECTION:</b> North	BARRIE BOOM					
<b>DATE:</b> February 10, 2022						
COMMENTS:						
View of the spill area and surrounding landscape.						





CLIENT NAME: Abbey Resources Corp.						
<b>PROJECT NAME:</b> Abbey 16-01-022-19 W3M – February 9, 2022 Release						
PHOTOGRAPH ID: 3						
<b>PHOTOGRAPH LOCATION:</b> North of spill area	and the state of t					
<b>DIRECTION:</b> South						
DATE: February 10, 2022						
COMMENTS:						
View of spill area and surrounding landscape.						





**THIS IS EXHIBIT** "H" referred to in the Affidavit of **Jim Gettis** SWORN BEFORE ME this <u>25th</u> day of <u>February</u>, 2022.

14



Government —— of —— Saskatchewan Ministry of Justice Civil Law 900 – 1874 Scarth Street Regina, Canada S4P 4B3 Bus: 306-787-Fax: 306-787-0581

February 1, 2022

Please Reply To: Leanne Lang Phone: (306) 787-5545 Fax: (306) 787-0581

Kevin Hoy DLA Piper (Canada) LLP Suite 1000, Livingstone Place West 250 2<sup>nd</sup> St. W. Calgary, Alberta T2P 0C1

Dear Mr. Hoy:

I am legal counsel for the Ministry of Energy and Resources (ER) regarding regulatory matters. I am writing in response to your application for an interim regulatory stay of the Minister's order and your comments in court on January 27, 2022.

### 1. Authority for the Minister's order

You asked for clarification regarding the authority for the Minister's order dated January 24, 2022 (MRO). The MRO was issued to Abbey Resources Corp. (Abbey) pursuant to subsection 12(1) of *The Pipelines Act, 1999* (PA) and subsection 17.01(1)(a) of *The Oil and Gas Conservation Act* (OGCA). The MRO suspends the licences and operation of Abbey's high and very high-risk pipeline segments effective January 24, 2022, and orders the pipeline segments to be shut in by February 7, 2022.

Subsection 12(5) of the PA requires the Minister to provide an opportunity for the licensee to make representations to the Minister within 15 days after the date of the suspension of the licence. ER officials can meet with Abbey officials to discuss your submission, or you can provide it in writing, or both. The contact persons at ER will be Kathryn Black, the Director of Pipelines and Facilities and Brad Wagner, the Director of Liability Management. We will need to receive your representations by Tuesday, February 16, 2022. If you would like to discuss this process further, please do not hesitate to contact me.

### 2. The Minister's authority to reconsider a decision under the OGCA

Subsection 6.1(2) of the OGCA allows the Minister to reconsider an order. Any representations by your client regarding the MRO will be considered by ER under the authority of ss. 12(5) of the PA and ss. 6.1(2) of the OGCA.

### 3. The reasons for the issuance of the MRO

The Minister was satisfied that the order was necessary for the purposes of public safety, protection of property and the environment. These factors were outlined in the affidavits of Kathryn Black and Brad Wagner.

### More specifically, the MRO was issued for the following reasons:

ER required Abbey to conduct a risk assessment of all its pipeline systems due to its high rate of pipeline failures and ER's concern with the integrity of Abbey's pipeline infrastructure. Abbey's own risk assessment report prepared by Explore, which is attached to the ninth affidavit of Jim Gettis, as Exhibit A, provides that 10% of Abbey's pipelines are at high or very high risk for spills and failures due to corrosion and erosion issues. Some of these pipelines are located in close proximity to the South Saskatchewan River, near Indigenous lands and in environmentally sensitive and protected areas. Abbey has not provided a reasonable plan to mitigate the risk of future spills and failures in relation to 343 kilometers of high-risk pipelines.

Abbey also has a high incidence of pipeline spills and ER has received many complaints from landowners regarding these spills. Abbey operates 2% of the wells in the province but contributes to 12% of the spill incidents in Saskatchewan. It also has 36 outstanding inspection compliance matters which relate to serious issues, including: elevated methane levels related to surface casing vent flows, inadequate spill cleanup, holes in the ground on leased areas, soil subsidence and corroded equipment.

The Explore risk assessment report states on page 21 that Abbey does not have a defined risk assessment and management process within an overall Pipeline Integrity management program. This is a mandatory requirement for pipeline operators, and the absence of the program increases the risk associated with the pipeline operation.

ER has significant concerns about the cost of repairing these pipelines and the resources (financial and otherwise) available to Abbey to repair in a timely manner. Abbey has failed to respond to some spills as they arise and has not reported all spills. Abbey has also failed to commit to a timeframe on its decommissioning and reclamation obligations and the cost of those obligations continues to increase. The Explore report also noted the following on page 19 of the report: "With the nature of Abbey Resources pipeline systems associated to the production of low pressure, sweet gas production, the challenge and largest overall limitation for Abbey is to identify economically feasible solutions to mitigate the risk identified in this assessment."

Please feel free to contact me if you have any further questions regarding the MRO.

Sincerely,

Locting luchal:

Leanne Lang Senior Crown Counsel LL/msf

> cc: Sharla Hordenchuk, Assistant Deputy Minister, ER Brad Wagner, Director of Liability Management, ER Kathryn Black, Director of Facilities and Pipelines, ER

**THIS IS EXHIBIT** "I" referred to in the Affidavit of **Jim Gettis** SWORN BEFORE ME this <u>25th</u> day of <u>February</u>, 2022.

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February 16, 2022

### Via Email

Ministry of Energy and Resources 1000, 2103 11th Avenue Regina, SK. S4P 3Z8

Attn: Kathryn Black, Director of Pipelines & Facilities Brad Wagner, Director of Liability Management

Dear Ms. Black and Mr. Wagner:

### RE: Reassessment of MRO 14/22 issued January 24, 2022

The Saskatchewan Ministry of Energy and Resources ("ER") issued to Abbey Resources Corp. ("Abbey") a Ministerial Order (the "MRO") dated January 24, 2022, pursuant to *The Pipelines Act, 1998*, SS 1998, c P-12.1 (the "*Pipelines Act*") and *The Oil and Gas Conservation Act*, RSS 1978, c O-2, (the "*Oil and Gas Act*"). This MRO required the suspended operation of all flowline segments listed in Table 1: Abbey Resources High and Very High Risk Segments from the risk assessment analysis (the "**Risk Assessment**") Explore completed in December 2021, as follow-up response to ER letter dated Sept. 3, 2021 requiring Abbey to complete a risk assessment on all pipeline systems within Saskatchewan.

In accordance with its right to make representations to ER pursuant to section 12(5) of the *Pipelines Act*, and with a view to encouraging ER to reconsider its decision to issue the MRO pursuant to section 6.1 (2) of the *Oil and Gas Act*, Abbey sets out the following representations:

- 1. Prior representations of ER, both made directly to Abbey and in evidence filed in the before the Court of Queen's Bench for Saskatchewan in the restructuring proceedings of Abbey Resources, indicated that ER would work with Abbey to review and assess. Abbey notes:
  - a. The ER letter to Abbey, dated September 3, 2021, in which ER requested the completion of the Risk Assessment, clearly stated "The Ministry of Energy and Resources (ER) is requesting Abbey Resources Corporation (Abbey) conduct a risk assessment of all Abbey pipeline systems within Saskatchewan....The purpose of this risk assessment is to identify and prioritize risk so that Abbey can develop a mitigation plan that can effectively reduce the number of incidents." The required risk assessment was completed December 3, 2021 in accordance with Annex B of CSA Z662-19 and submitted to ER as required. Following the completion of the risk assessment, Abbey initiated the next steps of developing a an accurate and detailed mitigation plan, however this order has not facilitated Abbey with the opportunity to present a finalized mitigation plan in lieu of suspending the pipelines;



b. In a sworn Affidavit, dated August 3, 2021, a representative from ER, namely Brad Wagner, indicated that the ER may order Abbey to "restore and replace its flowlines within a specific period of time. If [Abbey] fails to do so, this may serve as an additional reason for the Ministry to suspend [Abbey's] license." On the basis of this representation, Abbey reasonably presumed that it would have the opportunity to work with ER to implement a remediation plan prior to the issuance a Ministerial order suspending licenses of a material portion of Abbey's pipeline infrastructure.

In a manner inconsistent with its prior express representations, ER made its decision to issue the MRO without: making queries of Abbey regarding outstanding concerns relating to the Risk Assessment; assessing the status of Abbey's pipeline risk mitigation plan; providing Abbey with a reasonable opportunity to remedy pipeline infrastructure most susceptible to breakages; or, prior-consultation with, or advance notice to, Abbey.

- 2. ER protocol for past Abbey failures has provided the opportunity to provide alternatives to allow pipelines to be returned to service through accepted industry practices such as engineering assessments, pipeline rehabilitation (i.e. liners), or alternative approaches to corrosion mitigation programs. No such opportunities have been provided for maintaining service of the pipelines, or returning the pipelines to service, in the MRO.
- 3. The Risk Assessment identifies relative risk, not absolute risk. The Risk Assessment classified High Risk or Very High Risk lines based on a combination of likelihood and consequence weightings, relative to the lines included in the assessment, and plotted on a risk matrix to ascertain four different values of risk. This assessment however was not a quantitative assessment comparative to all licensed pipelines within the province, but only relative to each other within the Abbey pipeline inventory in Saskatchewan. Section 1 on Page 3 of the Risk Assessment clearly states the Risk Assessment was completed "in order to *identify and prioritize* the risk of all of their pipeline assets. This assessment has been completed as a prescriptive based assessment and is *intended to be utilized by Abbey Resources to develop a mitigation and/or rehabilitation plan* to effectively reduce the number of pipeline failures occurring within their pipeline systems." The scope of the Risk Assessment the Order was based off of was not to ascertain a level of "*public safety or the safety of any person or for the protection of property or the environment*" with regards to failure likelihood calculations.
- 4. The risk analysis within the assessment was completed in consideration of the recommended Risk Assessment approach as outlined in Section 5.5 of ASME B31.8S-2020 and accordance with the requirements in Section B.5.2 of CSA Z662-19, Annex B using mathematical modelling. As such, the pipelines identified as high or very high risk and encompassed within MRO 14/22 were *not a direct assessment of the likelihood of failure* (i.e. not ranked as a high or very high risk of failure). Section 3.3.3 on Page 18 clearly states "It should be noted that the output from the risk analysis and resulting risk matrix to cateogorize the pipelines into the categories of Low, Medium, High and Very High Risk *provides a relative measure of risk by combining the numerical estimates of likelihood and consequence*. This risk evaluation therefore *should not be considered a failure prediction ranking*, but rather a source for ranking and prioritizing pipelines for applying risk management strageies."

### ABBEY RESOURCES CORP.



- 5. Following the completion of the Risk Assessment, and in the first steps of developing a risk mitigation plan, Abbey completed mapping to clarify the relationship between historical failure locations and the Risk Assessment results to assign rankings of Medium, High and Very High risk (based on the combined numerical estimates of likelihood and consequence). These maps are provided in Appendix A hereto to help provide further clarification to the relationship, but not direct correlation, of pipelines that may have an elevated likelihood of failure.
- 6. Abbey has completed extensive research and planning to prepare an economically feasible cost option approach for the installation of loose fit polyethylene liners for the rehabilitation of pipelines for a long term approach to eliminating internal integrity issues associated with steel pipelines in the Abbey pipeline system. Once implemented, Abbey's mitigation plan will permanently remedy the susceptibility of steel pipelines to breakages. Thus, Abbey's mitigation plan will be viewed in contrast to mitigation measures to attempt to slow the progress of identified internal corrosion issues. Abbey is confident that its remediation plan will be cost-effective and feasible, notwithstanding budget constraints resulting from its ongoing restructuring proceedings. As is set out in Appendix B hereto, Abbey estimates that the cost to implement its mitigation will cost on average \$11.37/meter. Given estimated increases in production resulting allowable as a result of the remediation, Abbey anticipates that the implementation of its remediation plan will break even on costs on average within 303 days of project completion at a \$1.50/GJ net back, or within 227 days on average at a \$2.00/GJ net back.
- 7. Abbey has recently completed the creation of a Pipeline Integrity Manual that includes the clear definition of a Pipeline Integrity Management Program (IMP), inclusive of a defined Risk Assessment and management process.
- 8. Continued operation of Abbey's pipelines while Abbey works towards the implementation of its pipeline risk mitigation program does not present a serious risk to property, persons, or the environment. While Abbey acknowledges that it is absolutely necessary to implement an effective mitigation plan to substantially eliminate the risk of future breakages in its pipeline infrastructure, individual breakages are unlikely to cause serious or even moderate damage to the environment. Abbey's records show that on average, pipeline breakages in 2021 caused the release of 1.07 M<sup>3</sup> of fluid *per* leak. In aggregate, this amounted to the release of 68.71 m<sup>3</sup> of liquid. Such fluid is predominately water, does not contain a material (if any) volume of hydrocarbons and is very low in chlorides. By way of comparison, Abbey notes that a recent individual spill from a flowline operated by Burgess Creek Exploration Inc. (reported as Incident Number 49225 in ER's Integrated Resource Information System) resulted in the release of 147.00 m<sup>3 of</sup> fluid, which included oil.

Based on the above reasoning, Abbey requests the repeal of MRO 14/22 with the following clarifications on the next intended timely steps Abbey will be completing to accurately create a risk mitigation plan and then implement in a timely fashion:

➔ It is currently known from the historical failures experienced that the failures have predominantly occurred within low lying liquids/solids hold-up regions of steel pipelines.



Additionally, these failures have been caused by internal integrity degradation with no apparent concerns from external corrosion concerns, with the internal degradation appearing to be a combination of internal corrosion (due to liquids) and erosion (due to fine solids).

- Abbey will be taking additional steps to complete further failure analysis by a third party laboratory on recent pipeline failures to ensure a complete understanding on the root cause of the typical steel pipeline failures they are experiencing.
- → Abbey will be evaluating and implementing additional leak detection parameters through:
  - $\circ$  the use of third party aerial patrols for additional visual leak detection strategies, and
  - the identification of high failure likelihood pipelines that could be added to periodic "stand-up" leak tests for the confirmation of pipeline integrity and absence of an otherwise undetected pipeline leak.
- → Abbey has an extensive and robust maintenance pigging program in place on steel pipelines within the system under pigging frequencies and using pig designs that have historically been selected based on limitations with the limitations on low differential pressures within the gathering systems.
  - Abbey will complete additional pig type and frequency reviews of each gathering system, also in consideration of excessive inclination angle changes, to optimize the effectiveness of mitigation through maintenance pigging for the reduction of solids in the pipelines that would be contributing to internal erosional concerns, as well as the potential for under deposit corrosion within areas of liquids/solids hold-ups.
- → Abbey will complete and identify the priority pipelines to complete loose fit polyethylene liners for the rehabilitation of pipelines for a long term approach to eliminating internal integrity issues. This loose fit polyethylene liner installation has been confirmed to be economically viable for Abbey, and in the defined risk mitigation plan would include both shot term (i.e. 2022 calendar year) and long term (multiple future years) planning for these installations.

In order to diligently and accurately create a risk mitigation plan in consideration of the Risk Assessment results, Abbey will complete further analysis of additional operational parameters to create a failure prediction model. This will then allow Abbey to focus mitigation measures appropriately in consideration of both the entire Risk Assessment profile envelope, as well as potentially where future failures are most likely to occur. The proposed dates to allow for Abbey to accurately complete this work, yet in a timely fashion in order to limit the potential for future incidents that have the potential to affect public safety, protection of property and the environment, are as follows:

- 1. Completion of third party laboratory failure analysis on recent and system representing failures. Target completion date = March 15, 2022
- Completion of supplemental failure prediction modelling with the input of additional parameters reflective of the results of supplemental third party laboratory failure analysis. Target completion date = March 31, 2022



3. Completion of a risk mitigation plan for both short term and long term planning to implement. Target completion date =April 15, 2022.

Abbey believes the further information provide in this letter, along with the timeline commitment to effectively implement a risk mitigation plan with their risk management program, should effectively address the concerns the ER has raised on the basis of MRO 14/22. By repealing the requirements for the required the suspended operation of all High Risk and Very High Risk Segments pipelines from the risk assessment Explore completed in December 2021, and allowing Abbey to proceed with the next steps of creating and implementing a risk mitigation plan, as was originally discussed at the time ER solicited the Risk Assessment Analysis, Abbey will be able to effectively take steps to improve the integrity of their overall pipeline system and reduce the occurrence of pipeline failures.

Abbey trusts that the above provides the ER with satisfactory information related to appeal of MRO14/22. Abbey is willing to provide ER with any additional data, documentation, or particulars upon request if the same is required by ER as it evaluates this matter. If you have any concerns or questions, please contact the undersigned at your convenience.

Sincerely,

Jim Gettis, P.Eng President & CEO Abbey Resources Corp. 403-650-7511 jim.gettis@abbeyr.ca

Cc: M. Kim Anderson, Q.C. Leanne Lang MNP Ltd.

Attachments:

Appendix A – Pipeline System Maps

Appendix B – Pipeline Remediation Job-Costing Projections

### Appendix A - Pipeline Systems Maps



Rge 21

Rge 20

Rge 19 W3M

Rge18

**Twp 22** 

Twp 21







Rge 19 W3M

wp 22



Data extracted on January 9, 2022 Pipeline List has most up to date information provided by GDM, and is for the individual field area only.

PIPELINE CODES

**THIS IS EXHIBIT** "J" referred to in the Affidavit of **Jim Gettis** SWORN BEFORE ME this <u>25th</u> day of <u>February</u>, 2022.

14



## Ministry of Energy and Resources Integrated Resource Information System

### Liner Installation - PA-00012224

in Field Work Notifications	External Approva	ls Application			
Licence Details					
Licence # <u>PL-00000644</u> L	icence Type Flor	vline Licensee BA	35547 - ABBE	Y RESOURCES CORP.	
Segment Details					
Segment # 35 Segment ID	<u>SK PS 00108164</u>	Seg. Status Op	perating		
Application Details					
Industry Application Reference N	lumber				
Intended Date of Liner Installation	on	2021	L-10-04		
Will the Liner Installation activiti	ies involve Ground	Disturbance? Yes			
Application Classification –					
This application will go Routine.					
Free-Standing Liner Specific	ation				
Material Type	Polyethylene	SMYS/MPR (MPa)			
Material Standard	4710	Material Grade		N/A	
Outside Diameter (mm)	60.3	Wall Thickness (mm	)	6.7	
Other Standard		Other Grade			
Factor Type	Factor Value	Calculated Design Pr	ressure (kPa)	1725.00	
Service Fluid Factor	1.000				
Temperature Factor	1.000				
Hydrostatic Design Stress Facto	or 6.900				
Standard Dimension Ratio	9.000				
Segment Specification					
Segment Design Pressure (kPa)	1725.00 Ar	ticipated MOP (kPa)	1725.00	H2S Partial Pressure (kPa)	0.00 Requires Sour Service No
Does your proposed pipeline me ER directives and guidelines?	et the overpressu	re protection requiren	nents outlined	l in the latest  version of	Yes

### 9/28/21, 1:13 PM

### Liner Installation - PA-00012224

latest v	e pipeline have an overpress version of CSA Z662?	ure protection and pressur	e control system in place,	in accordance wit	h the Yes	
Have th the CSA	ne proposed segments been A Z662 standard?	designed to meet the requ	uirements for sour service	, as per the latest	version of No	
Class Lo	ocation	1				
Bidirect	tional Flow	No				
Length	(km)	0.796				
Disclo	osure Questions					
Di	isclosure Questions Answ	vered [6]				
Exteri	nal Approvals					
Extern	nal Approvals					
Extern Agenco No	nal Approvals cy Approval Number External Approvals Found					
Extern Agenc No	nal Approvals cy Approval Number External Approvals Found					
Extern Agenc No Attack	Approvals Approval Number External Approvals Found hments					
Extern Agenco No Attach	Approvals Approval Number External Approvals Found hments lential Help					
Extern Agenc No Attack	Approvals Approval Number External Approvals Found Amments Amments File	 	Document Type *	Is Confidential	Comments	Date *



## Ministry of Energy and Resources Integrated Resource Information System

### Liner Installation - PA-00012224

Main	Field	Work Notifications	Externa	l Approvals	Application				
Appro	Approval Status Authorized Approval Date 2021-09-28		8 13:11:18			Withdraw Approval			
<u>– Pl</u>	-00000	644							7
S	Seg. #	Segment 1	D	Compl	eted As Plann	ned?	Date		
35		<u>SK PS 00108164</u>		N/A			Liner Installation Date :	N/A	
									 ]

**THIS IS EXHIBIT** "K" referred to in the Affidavit of **Jim Gettis** SWORN BEFORE ME this <u>25th</u> day of <u>February</u>, 2022.

1 ly



## Ministry of Energy and Resources Integrated Resource Information System

### Viewing Incident: 49225

Main	Work It	ems Inspections Obligat	ions Notifications	
Gen	neral Info	ormation		
Incid	lent Ident	ifier	49225	
Incid	lent Statu	IS	Open Pending Reclamation	
Repo	orting Bus	iness Associate	35424 - BURGESS CREEK EXPLORATION INC.	
Minis	stry of Ene	ergy and Resources Field Office	Estevan	
Date	Found		2021-02-18	
Date	Occurred	1	2021-02-18	
Subn	nission Da	ate	2021-02-19 17:33:49	
Detai	iled Repo	rt Submitted Date	2021-05-18 15:48:20	
Emer	rgency Re	esponse Plan (ERP) Initiated?		Yes
Did t	his incide:	ent result in the release of a repo	rtable concentration of H2S?	No
Has t	there bee	n a public complaint related to $\vdash$	2S regarding this incident?	No
Have	e you calle	ed the appropriate ER Field office	via the Ministry's Emergency Support Line or contacted the	e field office directly? Yes
Do yo	ou need t	o submit a Reclamation Report a	s per Incident Report Requirements Directive?	Yes
Incid Desc	lent ription	Due to the extreme cold temp fluid from the tanks as well as	eratures a fibreglass recycle line from the treater to the FW incoming production fluid.	KO which was not in use cracked and drained

### **Contact Information**

Contact Name *	Job Title	Business Phone *	Email Address *
Colan Trail	Field Superintendent	(306) 495-7399	colan@burgesscreek.ca
John Jenkins	V.P. Engineering	(403) 874-4744	john@burgesscreek.ca

Surface Information		
Surface Location Information	03-02-005-08W	2
Surface Coordinates	Datum	NAD83 (CSRS)
	Latitude (DD)	49.35194933

			Longitude (DD) -102.9	98458555					
Was any	surface wa	iter impacted	? No						
Impact	ted Surfac	e Informatio	on						
Has any	Substance	been spilled	or released? Yes						
Size (Are	ea) of Spill	1962.000 m	1^2						
)/ On Lo		11.00	0/ Off Lanca 80.00						
% OII-Le	ease	11.00	% OII-Lease 89.00						
Substa	nce Inform	mation							
	Subs	tance *	Spilled / Released Amount	Recovered Amount	Lost Amount	Concer H2S	ntration of (in ppm)		
	Oil		32.000	20.00	0 12.000	)	0.000		
	Water		115.000	0.00	0 115.000	)	0.000		
Totals	•		147.000	20.00	0 127.000		0.000		
<b>Incider</b> Source	nt Source	<b>Information</b> Facility	I						
ncident	Causes	<ul><li>Extreme</li><li>Mechanic</li></ul>	Temperatures or Weather cal Or Equipment Failure						
acility L	icence ID	8777 - 35424	BURGESS CREEK EXPLOR	ATION INC.					
Attach	ments —								
Confide	ential Help								
			File *	Doc Ty	ument pe * Con	Is fidential	Com	ments	Date *
(	03-02 Incic	lent pictures.	pdf	Photo			Incident pictur	es	2021-05-18 15:42:26
(	03-02 Spill	Area Pictures	s.pdf	Photo			Spill Area pictu	ires	2021-05-18 15:42:26
E	EverGreen Battery.pdf	Enviro Spill A	ssessment 3-2-5-8W2	Site Ske	etch		EverGreen Env Assessment	iro Spill	2021-05-18 15:42:26
(	03-02 Clea	nup Picture.p	df	Photo			Cleanup Pictur	e	2021-05-18 15:42:26

### Incident Report Summary

	File *	Document Type *	Is Confidential	Comments	Date *		
Incid Batte	lent Investigation and Analysis Report 3-2-5-8W2 ery.pdf	Photo		Incident / Investigation Report	2021-05-18 15:42:26		
Reclamatio	on Reports						
Confidential Help							
Confidential I	Help						
Confidential File * Do	Help cument Type * Is Confidential Comments Dat	e *					

**THIS IS EXHIBIT** "L" referred to in the Affidavit of **Jim Gettis** SWORN BEFORE ME this <u>25th</u> day of <u>February</u>, 2022.

14

# Pipeline Integrity Manual



Suite 1420, 205-5<sup>th</sup> Ave SW Calgary AB, T2P 2V7

Prepared by:



### **REVISION INDEX**

Rev. #	Date	<b>Revision Description</b>	Sections Revised
1	February 2022	Manual Creation	



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Section 1

Pipeline Safety & Loss Management



# 1. Pipeline Safety and Loss Management

### 1.1. Statement of Authority

This Pipeline Integrity Manual (PIM) describes components of the Safety & Loss management System (SLMS) and Pipeline Integrity Management Program (IMP) used to ensure:

- The safe operation of pipelines owned and operated by Abbey Resources
- Pipelines are designed, constructed and maintained in accordance with applicable regulatory requirements;
- Integrity plans are communicated throughout the organization;
- Training systems are in place;
- Program compliance records are maintained;
- Continuous improvement programs are implemented.

In executing this program, various functions are delegated to the individuals described below:

The Abbey Resources Senior Management Team is hereby appointed to ensure that adequate resources are provided for the implementation of the tasks described by this Integrity Program, and ensuring this program is followed, kept up to date, and continually improved.

The Field Superintendent is responsible to develop and monitor the implementation of the Pipeline Integrity Manual (PIM) and to promote corporate policy relating to pipeline operation and maintenance and to ensure that these requirements are communicated and followed throughout field operations. They are appointed to provide necessary resources and support to ensure that the Field Operations follow the requirements of the Pipeline Integrity Management Program (IMP).

The Field Team Leads & Operators are hereby appointed to ensure implementation of and adherence to the Pipeline IMP within their assigned areas, and that their pipeline systems are operated according to regulatory and corporate requirements.

Any compliance issues that cannot be resolved by the above individuals shall be brought to my attention for resolution in accordance with the applicable regulatory requirements.

Feb 1<sup>st</sup>,2022

Jim Gettis President & CEO Date



# 1.2. Pipeline Safety & Loss Management Overview

A Safety and Loss Management System (SLMS) is defined by CSA Z662, Annex A as a system that "*provides for the protection of people, the environment and property*". This system contains systematic interrelated processes for the management of safety and loss control associated with activities throughout the lifecycle of pipeline systems. Additionally, this program ensures responsibilities, authorities, and job roles are defined and communicated as required.

The Abbey Resources Pipeline SLMS is designed to additionally meet the requirements of the CSA Z662 requirements, and is comprised of the following components within the organization:



Figure 1 - Abbey Resources Pipeline SLMS Components

These components address the required elements of a SLMS outlined within CSA Z662 Clause 3.1.2, as detailed in the chart on the following pages.



Abbey Resources						
Pipeline Safety Loss Management System Overview						
Pipeline SLMS Element		Abbey Resources	Abbey Resources			
•	Sub-Element	Primary Source	Secondary Source(s)			
Leadership Commitment	n/a	Pipeline Integrity Manual Sections 1.1 & 1.4.2				
Organizational Structure	n/a	Pipeline Integrity Manual Section 1.4.3				
	Competency Requirements	Pipeline Integrity Manual Section 1.11				
Resource Management	Training Evaluation	Pipeline Integrity Manual Section 1.11				
	Contractor Selection &	Pipeline Integrity Manual				
	Performance Monitoring	Section 1.11.2				
Communication Process	n/a	Pipeline Integrity Manual Section 1.5				
Documents/ Records	Document Control	Pipeline Integrity Manual Section 2.5				
Management	Records Management	Pipeline Integrity Manual Section 2.5				
	Risk Management	Pipeline Integrity Manual Section 1.11				
	Design, Material Selection & Procurement	Pipeline Integrity Manual Section 1.9				
	Construction	Pipeline Integrity Manual Section 1.9				
	Operations and Maintenance	Pipeline Integrity Manual Section 3	Pipeline IMP Procedures			
System Controls	Discontinuation and Abandonment	Pipeline Integrity Manual Section 3.2	Pipeline IMP Procedure – Pipeline Decommissioning			
	Integrity Management	Pipeline Integrity Manual Section 2				
	Engineering Assessments	Pipeline Integrity Manual Section 1.8				
	Emergency Preparedness, Response and Recovery	Corporate Emergency Response Plan				
	Security Management	Corporate Emergency Response Plan				
Management of Change	n/a	Pipeline Integrity Manual Section 1.7				
	Measurable Objectives and Targets	Pipeline Integrity Manual Section 1.7				
Continual Improvement	Data evaluation and reporting	Pipeline Integrity Manual Section 1.6 & 1.14				
	Incident Analysis Process	Pipeline Integrity Manual Section 1.14				
	Performance/Conformance Monitoring	Pipeline Integrity Manual Section 1.13				

<b>Table I</b> - Abbey Resources Pipeline SLMS Overvie	Tabl	le 1	- Abbey	Resources	Pipeline	SLMS	Overview
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# **1.3.** Pipeline Integrity Manual

An Integrity Management Program (IMP) is defined by CSA Z662, Annex N as a program that "sets out the guidelines for developing, documenting and implementing programs for a pipeline system to provide safe, environmentally responsible and reliable service."

The Abbey Resources Pipeline Integrity Manual (PIM) is written to fulfill the requirements of the provincial and interprovincial acts and regulations for components of pipeline safety and loss management, as well as the pipeline integrity management of Abbey Resources pipelines. The Abbey Resources PIM contains information on Pipeline SLMS, as well as the pipeline IMP, through the entire lifecycle of its pipeline systems. This encompasses the design, construction, commissioning, operation, maintenance, repair, and abandonment. It lays both the administration and documentation practices required by Abbey Resources, and the roles and responsibilities for personnel involved in pipeline design, operations, maintenance and rehabilitation.

# 1.4. Scope

A pipeline is defined by CSA Z662 as: "those items through which oil or gas industry fluids are conveyed, including pipe, components, and any appurtenances attached thereto, up to and including the isolating valves used at stations and other facilities." The scope of the Abbey Resources PIM includes all pipelines designed, built and operated in accordance with the requirements of CSA Z662.

# 1.4.1. Purpose

The primary purpose of the Abbey Resources PIM is to provide reference, direction and understanding to Abbey Resources personnel regarding pipeline design, construction, operation and maintenance. The PIM is to be used in conjunction with the most recent editions of Abbey Resources' Corporate HSE Program Manual and Corporate Emergency Response Plan (ERP).

The secondary purpose is to position Abbey Resources Operations, through the clarification of work requirements, to achieve compliance to regulatory requirements. The PIM is intended as a guide only and reference should be made to specific standards, regulations and manuals governing pipelines as referred to within the body of the Abbey Resources PIM. The intent is not to "paraphrase" existing regulations but act as an operational guideline and reference manual.

# 1.4.2. Regulatory Requirements and References

All relevant codes, standards and regulations are to be made available and accessible at all times to all employees. The Field Superintendent can provide these documents, which are also available via the Abbey Resources electronic filing system.

All changes to relevant codes, standards and regulations that affect the standards or procedures in the PIM are to be reviewed and the PIM updated within a reasonable period of time, once the revised and new documents are released.

The Abbey Resources PIM is designed to follow the relevant jurisdictional requirements of the following bodies:



- Saskatchewan Ministry of Energy & Resources (MER)
  - The Pipelines Act, 1998
  - o Saskatchewan Pipelines Code PNG-034. January 2020
- Provincial Occupational Health and Safety Requirements
- Provincial Environmental Protection Acts and Regulations

# **1.4.2.1.** Industry Standards

The following industry standards were referenced during the creation of the PIM:

- CSA Z662 Oil and Gas Pipeline Systems.
  - All aspects of design, construction, operation, maintenance, and abandonment of pipelines covered within the integrity management plan are contained within this standard.
  - Annex A provides the guidelines of a safety and loss management system for pipelines to.
  - Annex N provides the foundation for this integrity management document.
- CGA OCC-1 Recommended Practice for Control of External Corrosion on Buried or Submerged Metallic Piping Systems.
  - Section 4 Operation and Maintenance of Corrosion Control systems provides baseline requirements for cathodic protection systems.

### 1.4.2.2. Abbey Resources Standards

The PIM has been designed to work in synergy with Abbey Resources' existing manuals, policies and procedures. These documents are to be integrated into operations and are referenced throughout the PIM. They are maintained through a document revision process instigated by their various owner groups within Abbey Resources. These documents are the definitive source in their respective areas of expertise for their field requirements, guidelines and procedures:

- Abbey Resources PIM Manual
- Abbey Resources IMP Procedures
- Abbey Resources Corporate Emergency Response Plan (ERP) Manual



### 1.4.3. Document Control and Revision

The PIM is an uncontrolled document and is managed by the Field Superintendent. The control system is via electronic filing system access which will allow uncontrolled copy printing and distribution as required for hard copies.

As on-going processes to ensure improvement opportunities of the PIM contents, the Field Superintendent will ensure the document remains useful and pertinent to operations. The contents of the PIM will be reviewed periodically to ensure any relevant changes are included.

### **1.5.** Corporate Objective & Organization

### 1.5.1. Corporate Mission Statement

The Abbey Resources PIM is designed to evaluate, maintain and assure pipeline health through the entire pipeline life cycle across the entirety of the pipeline network by maintaining high standards of work in all aspects of pipeline integrity.

### 1.5.2. Management Participation

As laid out in the statement of authority at the beginning of this document, Abbey Resources' Senior Management Team is committed to ensuring the diligent and safe operation of all of Abbey Resources' pipeline assets. The PIM is intended to clarify the requirements Abbey Resources has laid out with respect to Pipeline Safety and Loss Management (SLMS) and a Pipeline Integrity Management Program (IMP) to all of Abbey Resources' employees and contractors. The Abbey Resources PIM, inclusive of SLMS, IMP and Operations and Maintenance (O&M) requirements is endorsed at the CEO level.

The integrity management of Abbey Resources pipelines requires that;

- Management will communicate the requirements and expectations of the PIM to all Operations personnel, and ensure that the PIM goals are being met and the practices within this document are carried out in a safe and effective manner;
- Management will ensure that personnel are equipped with proper funds, resources and training to adequately follow the program; and
- Management will ensure that the program is working as intended through reviews of the program and the activities involved with integrity management.

#### 1.5.3. Personnel Responsibilities

Abbey Resources' Senior Management Team has the overall accountability for the safe, reliable, and efficient operation of Abbey Resources' pipelines. All employees and contractors at various levels must visibly support this PIM, provide adequate resources for its implementation and maintenance, and have responsibilities to follow the PIM requirements pertinent to their job function. The organizational structure relevant to key responsibilities to pipeline integrity within Abbey Resources is shown in Figure 2.





Figure 2 - Abbey Resources Organizational Chart (Relevant to the PIM)

The following sections describe the responsibilities of those with significant impact on pipeline integrity at Abbey Resources. The Abbey Resources PIM Roles and Responsibilities Matrix document provides a thorough listing of PIM activities and identifies key accountabilities and responsibilities to the PIM.

### 1.5.3.1. Senior Management Team

These positions are assigned to ensure that adequate resources are provided for the implementation of the tasks described by this manual. The key responsibilities are as follows, but are not limited to:

- ensuring this program is followed, kept up to date, and continually improved;
- reviewing reports to management and support for the initiation of corrective actions, and;
- ensuring adequate and qualified resources, both human and financial.

# 1.5.3.2. Field Superintendent

This position is responsible for ensuring effective personal and resources are in place for the proper operation and maintenance of pipelines in a manner that promotes long term reliability as follows, but not limited to:



- managing the overall implementation of this PIM and ensuring appropriate personnel are familiar with the PIM;
- ensuring that operating and maintenance procedures are in place and that safe work procedures are followed;
- ensuring all pipelines are designed, constructed, discontinued and abandoned in accordance with Abbey Resources standards and specifications;
- ensuring that design and construction related documentation and record keeping is done in accordance with Abbey Resources procedures;
- approval of review of pipeline related Management of Change (MOC) documents;
- ensuring alignment of this program with Abbey Resources' measurable objectives, HSE standards, etc.;
- direction of PIM conformance reviews and/or audits, and ensuring corrective action is taken where necessary; and
- ensuring adequate and qualified resources on projects, both human and financial.

# 1.5.3.3. Field Team Leads

This position has the overall responsibilities pertaining to the operations, maintenance, and integrity of pipelines with the field operations group. Key responsibilities are as follows but are not limited to:

- directing the overall implementation of this PIM and ensuring appropriate personnel are familiar this program and that it is followed at all operating facilities;
- ensuring that operating and maintenance procedures are in place and that safe work practices are followed;
- approval of internal and external corrosion control strategies;
- review of pipeline related Management of Change (MOC) documents;
- ensuring adequate and qualified resources, both human and financial, and;
- participating in periodic internal pipeline IMP conformance reviews, and ensuring corrective action is taken where necessary.

### 1.5.3.4. Field Operators

These positions have responsibilities pertaining to the operation and maintenance of pipelines as follows, but are not limited to:

- ensuring that appropriate personnel are familiar this program and that it is followed at all operating facilities;
- ensuring conformance with expectations set out in this PIM manual with regards to pipeline operations and maintenance activities, record keeping and filing systems;
- assistance in coordinating activities related to pipeline failures including initial response, pipeline repair, follow up, and corrective action,



- liaison with vendors on the execution and implementation of pipeline integrity programs, and;
- participation in periodic internal PIM conformance reviews and/or audit activities, and ensuring corrective action is taken where necessary.

### 1.5.3.5. Vendors

### **1.5.3.5.1.** Pipeline Integrity Vendor

These are qualified individuals who are responsible for assisting with coordination and implementation of pipeline integrity and risk management related work to support Abbey Resources pipeline integrity and provincial Regulatory requirements. Responsibilities include the following, but are not limited to:

- assisting in managing the overall development and maintenance of this PIM;
- developing and maintaining pipeline integrity procedure documents;
- assisting with periodic internal PIM conformance reviews;
- providing technical assistance pertaining to and ensuring compliance with requirements of the applicable Provincial Pipeline Regulations and the CSA Z662 Pipeline Standards;
- liaison with the regulatory authorities on Abbey Resources' behalf;
- providing technical direction for the investigation of pipeline failures to determine the root cause and provide recommendations to prevent future failures;
- completing support as required for engineering assessment work;
- completing reviews of internal and external corrosion control strategies, and;
- conducting risk assessment/management work.

### 1.5.3.5.2. Cathodic Protection Vendor

These are qualified individuals who are responsible for technical expertise in external corrosion mitigation related work to support Abbey Resources pipeline integrity. Responsibilities include the following, but are not limited to:

- providing technical assistance pertaining to regulatory compliance;
- providing recommendations on external corrosion control strategies, and;
- completing annual adjustive cathodic protection surveys on Abbey Resources' pipeline assets.

#### 1.5.3.5.3. Chemical Vendor

These are qualified individuals who are responsible for technical expertise in internal corrosion mitigation related work to support Abbey Resources pipeline integrity. Responsibilities include the following, but are not limited to:

• providing technical assistance pertaining to regulatory compliance;



- providing recommendations on internal corrosion control strategies;
- providing monthly reporting on the implementation of internal corrosion control program utilizing corrosion inhibitors, and;
- completing periodic Internal Corrosion Susceptibility Assessments.

### **1.6.** Communication

The requirements of the PIM, inclusive of SLMS, IMP and O&M requirements, shall be communicated to all relevant personnel, as required following any significant changes. Reporting or requirements on components of the programs within the PIM shall be communicated to all relevant personnel through appropriate measures, including but not limited to:

- Email notifications; or
- Review at safety meetings or other staff meetings.

# **1.7.** Supporting Documents

Abbey Resources maintains an electronic document management system to store and recall pertinent information on its pipeline systems. This information is held and accessed by all relevant groups within Abbey Resources and stored in a manner that facilitates ease of updating and access to data from personnel that work directly with it. The initial design and construction of new pipeline assets is completed in house or utilizing third party Engineering and Procurement vendors to ensure design is completed to the Abbey Resources specifications and standard. After completion of the work and handover of the asset to Operations, record keeping is held within the Abbey Resources' corporate head office.

Documents referred to within the PIM can be found within the Abbey Resources electronic filing system or accessed through authorized Abbey Resources personnel. Required documentation and record keeping is discussed in further detail in Section 2.5 of the PIM.

The following documents are referred to within the PIM. For most up-to-date document versions, refer to the electronic filing system.

- Corporate Emergency Response Plan (ERP) Manual
- Pipeline PIM Forms:
  - o Internal Conformance Review
- Pipeline IMP Procedures:
  - Pipeline Chemical Batching
  - Pipeline Commissioning
  - Pipeline Decommissioning
  - Pipeline Leak Detection
  - Pipeline Expanded Liners
  - Pipeline Pigging
  - Pipeline Pressure Testing



- Pipeline Purging
- Pipeline Repairs
- Pipeline IMP Forms:
  - o Abandonment & Discontinuation Record
  - Failure Record
  - o Isolation Valve Maintenance
  - o Liner Vent Check Record
  - MOC Evaluation Record
  - Pigging Record
  - Presco Check Record
  - o Rectifier Check Record
  - ROW Inspection Record

# **1.8.** Change Management

Management of Change (MOC) is the process of planning, organizing, controlling, executing and monitoring changes including any that affect the safety and loss management of the Abbey Resources pipeline systems. It encompasses all components and activities required to protect the integrity of all aspects of Abbey Resources pipeline systems.

Abbey Resources utilizes a MOC review process and the MOC Evaluation Record form. This process is managed by the Field Superintendent.

### **1.8.1. MOC Process Execution**

The MOC evaluation shall be implemented prior to the initiation of the change and in accordance with the requirements of CSA Z662, Annex N.6. Any subsequent follow-up requirements identified in the MOC Review, following the completion of work, must be addressed in a timely manner.

### **1.8.2.** Monitoring and Anticipating Changes

Normal pipeline operating and maintenance activities such as pipeline corrosion monitoring and mitigation are regularly reviewed with consultants and production chemical suppliers. These programs may change on a monthly (or less frequent) basis depending on the results of the monitoring. These changes will not be required to follow a formal management of change process.

Where an engineering integrity assessment, risk assessment, failure analysis or field operations identified need indicates a change is required, the MOC process shall be followed.

# 1.9. Engineering Assessments

Engineering Assessments are completed and documented at Abbey Resources by the Pipeline Integrity Vendor. They are conducted and documented in accordance with CSA Z662, Clause 3.4 and shall include



the considerations as outlined in CSA Z662, Clause 10.1. Engineering assessments may be required for various activities including, but not limited to:

- Pipeline reactivations,
- Pipeline regulatory licensing amendments,
- Pipeline inspection defects evaluation,
- Pipeline hydro-testing, or
- Pipeline fitness for service assessments when new risks are identified.

# 1.10. Pipeline Design, Construction & Repair

The Field Superintendent is responsible to develop and maintain detailed pipeline system design, construction and repair standards or expectations via third party Engineering Procurement Vendor support for Contractors constructing or repairing their pipelines. These standards shall be utilized in all facets of pipeline design (including material selection and procurement), construction and repair. They shall comply with CSA Z662 and all relevant local jurisdictional requirements which may supersede CSA.

A permanent record of the design, the qualifications of personnel, the materials used in the construction and the construction and inspection records for all pipeline projects must be maintained for the life of the pipeline. Records may be kept in a central file and must be readily accessible and may be required at the field site for any pipeline audit.

NOTE: Abbey Resources does not have in house quality control procedures for welding repairs and requires that all contractors performing welding operations on their pipeline systems have a Quality Control Manual as it pertains to pipeline operations and maintenance.

Once a pressure test on the pipeline has been satisfactorily completed and fully documented, the pipeline can be placed in operation. Provincial regulations may have additional requirements. All start up activities must conform to provincial regulations.

# 1.11. Training and Competency Management

Abbey Resources personnel and all third-party contractors are required to be adequately trained for the tasks they perform. Abbey Resources is committed to ensuring that personnel have been provided with the training, tools, and knowledge they need to perform their jobs safely, efficiently, and effectively.

Some specific job functions are considered critical to pipeline integrity management. Where necessary, training requirements for these functions should be identified and implemented. Integrity assessment and auditing shall be completed by competent personnel.

The Field Superintendent shall provide the access and resources, and the personnel requiring training must ensure that they obtain appropriate knowledge and tools for their job before they begin work.

### 1.11.1. Employees



Abbey Resources personnel or contract Operators go through an orientation at time of hire or transfer, and have been evaluated to be competent in the role. Minimum required training requirements are detailed within the Abbey Resources Corporate HSE Program.

# **1.11.2.** Contractors and Consultants

Contractors are used for day to day Field Operations roles, as well as specific tasks within the realm of integrity management, and are generally retained due to their expertise in a specific field. Contractors and Consultants (i.e. workers who are working for an employer who has been hired by Abbey Resources) are expected to provide competent workers and equipment in safe working condition. This is consistent with the obligations of a Prime Contractor (who is typically the owner of the worksite unless specifically delegated). Part of the Vendor approval / Vendor management process (i.e. pre-qualification) is to address whether the employer has an HSE program in compliance with applicable regulations that require them to have safe work procedures, train their workers, etc. Workers come to site and go through a site specific orientation and safe work permitting process that allows for field-level validation that procedures etc. are in place by the employer.

# **1.12.** Hazard Identification and Control

Abbey Resources has committed to ensuring that its pipelines are run in as low of a risk method as possible, and actively tries to ensure that in the event of an incident that the consequences are managed in a safe and effective manner. These programs are intended to mitigate the risks and consequences involved with operating pipeline systems.

# 1.12.1. Hazard Identification Methods

Hazards can be identified by designers, construction personnel, operators and maintenance personnel whenever they are involved with a pipeline. The methods used include filling out all appropriate paperwork and forms, adhering to Abbey Resources policies and practices, and performing a risk assessment, in accordance with the forms used to document hazard identification that can be found in the Abbey Resources Corporate HSE Program Manual.

Pipeline Hazards can include the following:

- Internal/External Corrosion (only on steel risers on HDPE pipelines);
- Environmental Cracking (only on steel risers on HDPE pipelines);
- Third party (Pipeline Strikes or Unauthorized Access and Vandalism;
- Natural Hazards (i.e. earth movement, grass fires, etc.);
- Construction Defects or material flaws;
- Non-routine agricultural on third party construction activities;
- Over-pressure, temperature fluctuations or operator error; or
- Change in operating environment/conditions.



Hazardous conditions are communicated to all personnel at risk of exposure prior to commencing work, through the use of orientations, job planning, pre-job (tailgate) and general safety meetings, memos and postings. Employers, workers and contractors must be aware of potential hazards at all times.

Additionally, hazards can be identified and subsequently have the risk evaluated and managed for both normal and abnormal operating conditions, in several of the following methods as well:

- Annual risk assessment reviews;
- Chemical and cathodic protection vendor annual review recommendations;
- Annual ROW inspections;
- Annual gas sampling reviews;
- Device function testing and inspections; or
- Production data reviews.

### 1.12.2. Hazard Control

Abbey Resources conducts worksite hazard assessments at both the head office and field sites/facilities. Contractors may also be required to complete their own Hazard Assessment on a daily basis, encompassing their own operations and the area in which they will be working. Control measures to be put in place are evaluated by the Field Superintendent working in conjunction with the area field Operations personnel.

### 1.12.3. Risk Assessment

Abbey Resources also performs periodic hazard identification as part of risk assessments on all of its pipelines, in accordance with CSA Z662 Clause 3.2 Risk Management. A risk assessment will determine the susceptibility of the pipeline to integrity issues and will determine the consequence that may result from a failure. Risk assessment results are then further utilized during reviews of the Pipeline IMP to identify where risk management strategies utilized may need further review or alteration.

### 1.12.4. Significant Consequence Hazards

In the event that the initial risk assessment reveals that a pipeline has a significant susceptibility to a failure mechanism, or a significant consequence in the event of a failure, a more in-depth risk assessment of the pipeline shall be performed by the Pipeline Integrity Vendor, and reviewed with and approved by the Field Superintendent. Subsequently, a corresponding maintenance plan shall be developed and implemented with the area field Operations personnel.

### 1.13. Managing Frequency and Consequences of Incidents

Abbey Resources is obligated to take all reasonable measures to reduce the consequences of an incident through mitigation of:

- Operating errors;
- External interference;



- Imperfections;
- Natural hazards; and
- Consequence reduction

Considerations such as the availability of trained personnel to respond to emergencies; the effect of the pipeline on the public; the location, availability and operability of appropriate equipment; and, provisions for quick and efficient containment and cleanup of leaks will greatly reduce the impact on the environment.

To provide the highest level of public safety possible, Abbey Resources undertakes various measures. They include the methods of preventing unauthorized access to facilities such as locking buildings or fencing around facilities, as well as posting of signs to identify the possible hazards and to identify the property as Abbey Resources' along with an emergency phone number. Operating practices where practical may include mass balances and volume reconciliation.

Methods to reduce consequences should be used from the design step through to methods of spill cleanup and finally steps to properly abandon pipelines at the end of their life cycle.

# 1.13.1. Emergency Response Planning

All emergencies should be handled in accordance with the Abbey Resources Corporate Emergency Response Plan. Once the emergency is addressed, incident reporting and subsequent investigation should be completed in accordance with the Abbey Resources Corporate HSE Program Manual.

Records of pipeline emergencies should be maintained to enable each incident to be analyzed. Records should include, but not necessarily be limited to the date, location, event description, repair procedure, and acceptance tests. Refer to the Abbey Resources Corporate Emergency Response Plan Manual for additional information.

### 1.13.2. Emergency Communication

In the case of an emergency situation within the operating area, the Operator discovering the emergency will take any necessary remedial action and would initiate the Corporate Emergency Response Plan (ERP), where such a plan is in place and required.

# 1.14. Program Review for Continuous Improvement

Abbey Resources is committed to ensuring that the PIM contains adequate goals, planning and execution to comply with all regulatory requirements. Abbey Resources has processes in place to:

- 1. Assess for conformity to the requirements of the PIM through system specific internal conformance reviews, and
- 2. Continually improve the effectiveness of the PIM through periodic audits of the manual and program with all of the affected company stakeholders.

When a conformance review or audit reveals deficiencies in the PIM, recommendations should be made and carried out to improve the PIM.



### 1.14.1. Internal Conformance Reviews (ICRs)

Abbey Resources' PIM Internal Conformance Reviews (ICRs) with the PIM should occur periodically to determine the effectiveness of an internal compliance to the program. Fields and pipeline systems with a higher risk profile should be reviewed more frequently.

ICR results and learnings will be communicated to the appropriate stakeholders and any modifications to program requirements will be documented and filed within the pipeline filing system on the Abbey Resources PIM Internal Conformance Review document. The procedures for defining responsibilities and authority for handling and investigating non-conformances, taking action to mitigate any identified impacts, and for initiating and completing corrective and preventative action shall be in compliance with CSA Z662, Annex N, Clause 2.15.1.

If deficiencies in the PIM or compliance to the program are revealed by the ICR, an action plan to address the deficiencies shall be created. The action plan must contain at a minimum:

- The tasks required to correct the deficiencies,
- Personnel responsible for the corrective actions, and
- A schedule and deadlines for the actions.

The authority that will ensure the actions have been satisfactorily completed will lie with the Field Superintendent. Further to the above, the Field Superintendent will also ensure that ICRs are completed in operating areas at appropriate frequencies to ensure compliance with Abbey Resources' corporate objectives. This will include a review of documentation, processes and procedures with respect to the PIM.

### 1.14.2. **PIM Reviews**

The purpose of periodic reviews of the PIM is to ensure that the content, procedures, policies, and references to information are accurate, up-to-date, and compliant. Responsibility for verifying that Abbey Resources procedures are compliant with regulations lies with the Pipeline Integrity Vendor.

At a minimum, the reviews shall:

- Ensure that personnel are adequately trained in integrity practices according to Abbey Resources' competency management program.
- Ensure that the practices within the PIM are compliant with the most up-to-date version of the relevant standards.
- Ensure that the goals of the PIM are being met, and if not, to determine why and initiate changes that will allow goals to be met in the future.
- Include an analysis of completed activities (i.e. utilizing prior ICR results) to verify that:
  - The proper procedures were followed;
  - The intended objectives of the activities were completed;
  - Incomplete work has been identified;
  - Unresolved issues are being looked at; and
  - Appropriate records were kept.

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The review may include other activities not stated above. When a PIM review reveals deficiencies in the program, recommendations should be made, and carried out to improve the PIM.

# 1.14.2.1. Review Schedule

Periodic reviews of the PIM shall be completed at frequencies dictated by the identification of significant changes to either the company structure or regulatory requirements, or components of the PIM. These reviews will be completed within a time frame that allows for feedback from all required stakeholders and the incorporation of the changes.

### 1.14.2.2. Review Team

The Field Superintendent will coordinate and facilitate the review of the PIM document. In between reviews, the Pipeline Integrity Vendor will assist in collecting comments and suggested improvements from internal and external sources.

# 1.14.2.3. Review Procedures

Reviews shall include participation from any stakeholder groups at Abbey Resources with responsibilities tied to, or involvement in activities and procedures outlined in the PIM. The completion of the entire review process will be directed by the Field Superintendent, supported by the Pipeline Integrity Vendor.

If deficiencies in the PIM are revealed by the review, they shall be evaluated by the Field Superintendent and revised within the PIM manual as necessary. Review results and PIM revisions will be communicated to the appropriate stakeholders and modifications to this document will be documented in the revisions index of this document.

# 1.15. Failure and External Interference Incident Investigations

Upon notification of a failure or external interference incident within the Abbey Resources pipeline system, an immediate response is required to investigate the resultant integrity of the pipeline and to take appropriate actions as required to minimize any damaging effects while ensuring safety of personnel and public property.

# 1.15.1. Failure Investigations: Pipeline Failure Work Process

When a failure occurs, the response is managed by the Field Superintendent and directed by the Operations personnel. The documents related to this process are maintained in the electronic filing system.

After the initial failure response is handled by the Operations personnel, an incident investigation shall be initiated by the Field Superintendent and supported by the Pipeline Integrity Vendor. Investigations are performed and documented in accordance with the appropriate provincial regulatory requirements and are conducted within the guidelines of CSA Z662 Annex H. Failure reviews on any pipelines shall be documented on the Abbey Resources Failure Record form. All findings and recommendations with respect to a given incident are thoroughly reviewed by the Field Superintendent, or Senior Management Team, as required.



# **1.15.2.** External Interference Incident

External interference incidents are investigated by the Field Superintendent. All findings and recommendations with respect to a given incident are thoroughly reviewed by the Senior Management Team, as required.



Section 2

**Pipeline Integrity Management Program** 



# 2. Pipeline Integrity Management Program

# 2.1. Regulatory and Corporate Commitments

Abbey Resources designs, constructs, operates, maintains, tests and repairs its pipeline system in accordance with the applicable regulations and business practices. These standards of conduct with regards to the Pipeline Integrity Management Program (IMP) are discussed within this section as well as Abbey Resources' other processes to ensure continued compliance to the regulations.

# 2.2. Implementation of the Pipeline IMP

The steps for implementation and maintenance of a Pipeline IMP are addressed in this section.

Abbey Resources has established and documented operating and maintenance procedures in the PIM within Section 3, as per CSA Z662 Annex N, that include:

- 1. Plans and schedules for activities related to pipeline system integrity management.
  - The key components of the PIM with regards to pipeline system program planning are outlined in Sections 3.10 and 3.11.
- 2. Methods and procedures used to conduct inspections, testing, patrols, and monitoring.
  - The key components of the PIM with regards to pipeline inspections, testing, patrols and monitoring are outlined in Sections 3.5, 3.9 to 3.11, 3.15 to 3.22
- 3. Methods and procedures for evaluating the presence or condition of imperfections or system conditions that might lead to a failure or damage incident with significant consequences.
  - The key components of the PIM with regards to evaluating these conditions are outlined in Sections 3.5, 3.10, 3.11, 3.14, and 3.15.
- 4. The types of corrective actions that can be considered for conditions or imperfections identified above and procedures for mitigation or repair in these situations.
  - The key components of the PIM with regards to corrective actions are outlined in Sections 3.10 and 3.11.

Abbey Resources performs, at minimum, annual reviews of the integrity aspects (i.e. chemical program and cathodic protection program reviews) of each of its pipeline systems to ensure compliance with the above components of the IMP.

# 2.2.1. Key Content



- The manual prescribes the routine (time-based) and condition-based work necessary to comply with regulatory and Abbey Resources standards. The work requirements are derived based upon an assessment of the field validated pipeline inventory data;
- Standards for internal and external corrosion mitigation are applied to the Abbey Resources pipeline inventory to derive appropriate mitigation schedules which are subsequently communicated to, and;
- The assessment of the pipeline inventory, and generation of required work, is updated periodically based upon recent production volume data to ensure effective management of change for all activities

# 2.2.2. Integrity Management Goals

The goal of the Abbey Resources Pipeline IMP is to reduce the number of pipeline incidents to a level as low as reasonably possible; whether due to human error events, third party damage, or the impact of operation and maintenance practices.

In taking steps to reduce the occurrence of pipeline incidents, the primary importance will be to reduce the occurrence of significant consequences. The consequences Abbey Resources considers to be significant for consideration in the development of the Pipeline IMP are:

- Impacts to both the public and Abbey Resources personnel health and safety;
- Impacts to the Environment;
- Impacts to public perception of Abbey Resources;
- Impacts to the overall integrity of Abbey Resources assets.

The rationale for determining the significance of the consequences of potential pipeline incidents is identified in the pipeline risk assessment process and is further discussed in Section 1.10 of the PIM.

The secondary benefit to Abbey Resources reducing the occurrence of pipeline incidents will be improved system reliability and increased revenue to the company.

### 2.2.3. Field Data Verification

The Pipeline Integrity Vendor is responsible to work with the Operations to ensure the accuracy of Abbey Resources' pipeline inventory. This is accomplished through the use of GIS–based system maps, current field data, and the pipeline integrity electronic filing system. The pipeline integrity electronic filing system is managed by the Field Superintendent to efficiently and consistently capture field data allowing for accurate asset characterization.

### 2.2.4. Regulatory Compliance

In order to ensure regulatory compliance, there is a requirement for clear communication of expectations, timely completion of activities and appropriate documentation of work completed on pipelines. Direction

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and guidance for these activities will be provided by Field Superintendent, supported by the Pipeline Integrity Vendor.

Should any non-compliance issues be identified through any pipeline system reviews, they will be communicated to Operations with guidance on work plans which identify deficiencies and remedial actions. Any non-compliance issues that require licensing amendments shall be reported to the Pipeline Integrity Vendor.

# 2.3. System Description

Abbey Resources owns and operates pipelines throughout Saskatchewan that carry all types of oilfield fluids; Oil Emulsion, Fuel Gas, Natural Gas and Salt Water. Abbey Resources' pipeline systems are a collection of oil and gas gathering systems within west central Saskatchewan, as shown in Figure 3. The pipeline sizes range from 60.3 mm to 273.3 mm diameter pipelines, in a variety of materials including steel, composite and polyethylene. The steel pipelines within the system include internally uncoated and lines containing free standing polyethylene liners.



Figure 3– Map of the Abbey Resources' Pipeline Systems

As a competitive oil and gas producer, Abbey Resources' inventory of pipelines is expected to periodically change through field development, acquisitions and dispositions. Abbey Resources maintains detailed information on its pipeline assets to the best of their ability. Where Abbey Resources operates a pipeline system, the expectation is that the information is complete. When a new pipeline system is purchased, a

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thorough review of the system is undertaken to establish pertinent details on the physical attributes of the system, engineering design and construction documentation by the Pipeline Integrity vendor. The detail of this review however is dependent on the records handed over with the asset.

# 2.4. Risk Assessments

Pipeline risk assessments are a mandatory part of the CSA Z662 Clause 3.2, with the requirements further outlined in CSA Z662 Annex N Clause 2.9. Additionally, the MER in Saskatchewan has identified pursuant to Section 3.5 of *Directive PNG-034: Saskatchewan Pipeline Code*, operators are required to actively maintain the integrity of a pipeline in accordance with CSA Z662.

Abbey Resources has an industry developed risk assessment program to assist in:

- Estimating the consequences of incidents,
- Evaluating the internal and external corrosion likelihood,
- Identifying and evaluating the risk, and
- Implementing options for risk reduction strategies

### 2.4.1. Risk Assessment Guidelines

The first component in effective pipeline maintenance planning is a risk assessment. The assessment process classifies equipment according to its risk (Low, Medium, High and Severe). The risk classification is based on the asset's susceptibility to failure mechanisms and the associated consequence of the failure event. Depending on the risk classification, appropriate controls and maintenance requirements to prevent the occurrence of the failure mechanism can be determined. Risk assessments will be revised periodically with a frequency dependent on changes to field infrastructure and production volumes.

#### 2.4.2. Likelihood

For each pipeline, the foreseeable failure mechanisms are considered in terms of the pipeline's susceptibility to each mechanism. The mechanisms to be considered are internal and external corrosion threats. Internal and external corrosion likelihood is based on pipeline specifications, operating conditions, and mitigation/monitoring practices employed on the pipelines. Details are documented within the Internal and External Corrosion Management Sections 3.10 and 3.11 of the PIM.



The following failure mechanisms will be addressed individually outside of the risk assessment, via the engineering assessment process, when deemed required during reviews of Operating conditions:

- Stress Corrosion Cracking (SCC) and Hydrogen Induced Cracking (HIC). Details are documented in the Stress Corrosion Cracking section of the PIM;
- Overpressure susceptibility based on availability of high-pressure sources, probability of thermal expansion, hydrates and failure of overpressure protection devices;
- Natural Forces inclusive of Right-of-Way (ROW) movement / washout susceptibility based on the terrain, area history and non-routine agricultural or construction practices;
- 3rd Party Impact based on ROW location, i.e. proximity to populated areas, agricultural or construction activity, etc.;
- Material Defects based on pipe material type, age and quality control during manufacturing.

# 2.4.3. Consequence

The extents to which these failure mechanisms may cause a breach of physical integrity are considered (i.e. instantaneous failure caused by a rupture vs. progressive failure caused by a pinhole leak). The potential consequences considered include:

- Safety effects on people, based on the number of residents or workers near the pipeline, based on both the substance transported in the pipeline and the potential leak or spill volumes of the substance;
- Environment, based on the associated water or road crossings, substance, quantity, and land use, and;
- Financial impact of asset loss based on cost of the repair / clean up and production loss.

### 2.4.4. Risk Mitigation

Whenever the risk assessment has been periodically reviewed, maintenance plans are developed or reviewed as well for each operating area or pipeline system through the line by line review process. The plan determines all the maintenance activities required to effectively mitigate or monitor the pipeline risk.

The maintenance plan identified in the line by line review should include the following "maintenance tasks" within these categories:



### <u>Mitigation:</u>

- Internal corrosion mitigation (i.e. maintenance pigging, corrosion inhibitor application, etc),
- External corrosion mitigation (i.e. cathodic protection), and
- Pipeline rehabilitation through the installation of loose or tight fit liners or pipeline replacements.

# <u>Monitoring:</u>

- Corrosion rate monitoring through the use of electronic or coupon measurement techniques;
- Corrosion inhibitor application effectiveness (i.e. inhibitor residuals, Fe/Mn tracking, etc.);
- In-line intelligent tool inspections;
- Inspection excavations;
- Non-destructive examinations, and;
- ROW surveillance.

# Task Prioritization

All pipeline integrity activities should be prioritized with respect to both risk and economic payout. Activities that mitigate, repair, or eliminate high risk items are given the highest priority. Regardless of the risk category of a pipeline, compliance to regulatory requirement is higher priority.

# 2.5. Work Processes and Record Keeping

The following sections summarize the work process utilized by Abbey Resources Operations to establish and maintain compliance to regulatory and business requirements.

# 2.5.1. Pipeline Design, Construction and Repair Records

The Field Superintendent is responsible to develop and maintain detailed pipeline system design, construction and repair standards or expectations via third party Engineering Procurement Vendor support for constructing or repairing their pipelines. These standards shall be utilized in all facets of pipeline design (including material selection and procurement), construction and repair. They shall comply with CSA Z662 and all relevant local jurisdictional requirements which may supersede CSA. A permanent record of the design, the qualifications of personnel, the materials used in the construction and the construction and inspection records for all pipeline projects must be maintained for the life of the pipeline. The files must be readily accessible and may be required at the field site for any pipeline audit.



### 2.5.2. Integrity Management Program Records

Abbey Resources realizes that accurate records are vital to accurate pipeline integrity practices, including the risk assessment and hazard identification procedures. Proper documentation of PIM activities allows pipeline records to be accessed quickly and ensure that they are up to date and accurate.

A permanent record of the maintenance, servicing, inspection and testing of pipelines, process control devices, and pressure relieving devices shall be kept and filed within the electronic pipeline filing system. This information must be made available to regulatory authorities on request.

The Filing System section on the following pages details the hard copy and electronic filing systems that are maintained. The electronic pipeline filing system contains general field files for data which represents multiple pipelines as detailed within Section 2.5.2.1. Each area Operator is responsible for preparation and maintenance of site-specific records as defined within Section 2.5.2.2. These files must be established in a location accessible to Operations. The following sections outline the type of information that shall be retained for the life of operational, discontinued and abandoned pipelines.

### 2.5.2.1. Centralized Electronic Field Records

The electronic field specific files shall include the following data, where applicable:

- Audit Results Regulatory and Internal Compliance Reviews;
- Cathodic Protection Annual Adjustive Surveys & Rectifier Operational Checks;
- Flow Assurance Threat Mitigation Activities (as applicable):
  - o Corrosion Inhibition Continuous Injection or Chemical Batch;
  - o Wax Deposition Chemical Application; and
  - o Hydrate Inhibition.
- Corrosion Monitoring Results;
- ROW Surveillance; and,
- Water Crossing Depth of Cover Surveys



### 2.5.2.2. Site/Pipeline Specific Records

These files must be established in a location accessible to Operations and are maintained in electronic format. The field specific files shall include the following data, where applicable:

- Maintenance or Batch Pigging;
- Pipeline Isolation Valve Maintenance;
- Pipeline Liner Vent Checks;
- Presco Switch Checks; and,
- ESD Checks.

### 2.5.2.3. Pipeline Equipment Inventory Management

Centralized electronic field records or pipeline specific files summarized above should additionally include the following data:

- Available regulatory license information and critical static data that may include the license number, LSD, from-to locations, diameter, length, wall thickness, material specifications, internal/external pipe coating type, joint coating type, maximum operating pressure and H<sub>2</sub>S content. This should also include records of the work completed for changes in operational status (operating to discontinued and/or abandoned, as well as vice versa);
- Locations and details of special designs and construction methods;
- Detailed inspection, repair and QC records/reports;
- Records of pipeline leaks or equipment damage and details of the required repairs; and
- Detailed pipeline maintenance plans.

In addition, files should be maintained in such a way that will allow access to records associated with each pipeline identified on the inventory. Data pertaining to the following activities should be kept on file for the operating life of the pipeline.

- Inspection data:
- Service or repair data, including drawings.

All existing and any future new pipelines shall be registered with Sask 1<sup>st</sup> Call prior to going into operation and every licensed pipeline, regardless of the operational status of the pipeline must also be included.

There are several operational changes that require provincial regulatory approval before implementation. All changes to pipeline license information shall be completed in accordance with the regulations of the applicable jurisdiction.

### 2.5.2.4. Maps/Drawings

Field system maps are created to accurately depict gathering system interconnections and connectivity. A significant benefit of accurate mapping is the identification of discrepancies between public and Abbey

# **Pipeline Integrity Manual**



Resources data systems and the information required to support the risk assessment of individual pipelines and entire gathering systems. Maps are critical for emergency response planning, operations training, public consultation and maintenance planning.

Maps of the operating areas should be maintained illustrating the connectivity of the pipelines. Abbey Resources utilizes an electronic mapping and risk assessment program that is available to all Abbey Resources personnel requiring pipeline mapping information. Mapping for Abbey Resources pipelines is maintained electronically through the risk assessment software program utilized. The Pipeline Integrity Vendor, with assistance from Operations, is responsible to ensure the accuracy of the maps and will initiate the process for updates and corrections.

### 2.5.2.5. Third Party Records

When applicable, records from third parties operating Abbey Resources pipelines, pertinent to specific fields or pipelines, should be maintained, or available upon request, by the Operations groups at the field level. For systems acquired by Abbey Resources, a review of the available data is made by the Pipeline Integrity Vendor and incorporated into the information system.

#### 2.5.2.6. Missing/Incomplete Records

If information and records are missing, a review of available pipeline information is required. This review will look at the pipelines current operating conditions, any available historical information; whether design, construction, or maintenance records, and chemical Vendor records. Methods used for obtaining missing information will be guided by the Pipeline Integrity Vendor.



# 2.6. Pipeline Operating and Maintenance Activities

Section 3 of the PIM contains descriptions, guidelines, safety precautions, regulations, procedures, and record keeping requirements for many operating and maintenance activities for oil and gas pipelines. Refer to Section 3 for more detailed descriptions of each procedure.

- Pipeline Commissioning (Section 3.1)
- Pipeline Decommissioning (Section 3.2)
- Pipeline Pigging (Section 3.3)
- Pipeline Purging (Section 3.4)
- Pipeline Pressure Testing (Section 3.5)
- Pipeline Isolation Valve Maintenance (Section 3.6)
- Pipeline Pressure Protection Device Maintenance (Section 3.7)
- Pipeline Signage (Section 3.8)
- Right-of-Way Surveillance (ROW) (Section 3.9)
- Pipeline External Corrosion Control (Section 3.10)
- Pipeline Internal Corrosion Control (Section 3.11)
- Batch Inhibition (Section 3.12)
- Hydrate Control (Section 3.13)
- Leak and Break Detection and Incident Reporting (Section 3.14)
- Pipeline Inspection (Section 3.15)
- Pipeline Repairs (Section 3.16)
- Fibre-Reinforced Composite Pipelines (Section 3.17)
- Steel Composite Pipelines (Section 3.18)
- Polyethylene Pipelines (Section 3.19)
- Plastic Lined Pipelines (Section 3.20)
- Hot Oiling (Section 3.21)
- Depth of Cover Water Crossing Management (Section 3.22)



# Section 3

# **Pipeline Operations and Maintenance**



# Section 3.1

# **Pipeline Commissioning**

- 3.1.1 Scope
  - **3.1.1.1** Purpose
  - 3.1.1.2 Definitions
  - 3.1.1.3 Regulatory Requirements and References
- 3.1.2 Commissioning New Pipelines
- 3.1.3 Commissioning Discontinued Pipelines
- 3.1.4 Purging Pipelines for Commissioning
- 3.1.5 Record Keeping



# 3.1 Pipeline Commissioning

### 3.1.1 Scope

This operations and maintenance section provides a procedure for commissioning oilfield pipelines. It is specifically written for pipelines in all Canadian Jurisdictions.

### 3.1.1.1 Purpose

The purpose of a commissioning program is to ensure that the following conditions have been met whether a pipeline is new, has been repaired, or has been temporarily out of service (either formally discontinued or out of service for greater than 12 months).

- All equipment (pipe, valves etc.) is pressure tested to a specified percentage above the MOP and serviced as required.
- Provincial jurisdiction (MER) is notified and approvals granted prior to the resumption of an abandoned discontinued pipeline, or leave to open approved for new pipeline construction.
- All corrosion prevention requirements have been satisfied.
- Equipment is purged of air and contaminants, where applicable.
- Blinds are removed and valves are in the proper position.
- All applicable transmitters and alarms are active.
- The proper documentation and notification is complete.
- All pipeline marker signs at roads, highways, and water crossings are in place and indicate the correct ownership, pipeline product and contact phone numbers.

### 3.1.1.2 Definitions

Pipeline Commissioning	Performing the necessary work required to activate or reactivate the pipeline for transportation of oilfield substances e.g. gas, oil or water.		
Reactivation	The resumption of a pipeline that has been Discontinued or Abandoned		
Strength Testing	A type of pressure testing conducted on pressure equipment,		
	pipelines, piping, and components of a system to ensure their		
	operating integrity is at a pressure greater than the design working		
	pressure. Normally completed with fresh water and may be referred to		
	as hydrotesting.		



### 3.1.1.3 Regulatory Requirements and References

# Saskatchewan MER

For new licensed pipeline commissioning, or reactivation of existing discontinued pipelines, reference shall be made to the Saskatchewan Directive PNG-034: Saskatchewan Pipeline Code and the most current version of CSA Z662. A pipeline permit holder must not operate a new licensed pipeline, or reactivate an existing discontinued pipeline, unless:

- The MER Leave to Open Application has been approved for new pipeline construction.
- The pipeline design complies with the most current version of CSA Z662 and all relevant components of Annex N for a Pipeline Integrity Management Program.
- The pipeline has been added to Abbey Resources' integrity management program and will be operated in accordance with Section 10 and Annex N.

Section 3.3 of PNG-034 requires a license holder to notify MER through IRIS of pipeline reactivation activities a minimum of 2 business days prior to the scheduled work. An application must be submitted through IRIS and the application approval must be obtained, prior to the reactivation of the pipeline. Pressure testing of a pipeline that is being reactivated will be at the discretion of the licensee, based on the best method in accordance with CSA Z662 to ensure the integrity of the pipeline. If a pressure test is not completed for reactivation, the licensee shall submit an application through IRIS with the appropriate justification and documentation (typically through an engineering assessment) to support that the pipeline is fit for service.

# CSA Z662 Clause 16 (Sour Service Requirements)

"16.7.2 – Before admission of sour fluids to the pipeline, the operating company shall institute and maintain a program to mitigate internal corrosion and shall monitor the effectiveness of its internal corrosion control program."

"16.10.3.1 – New gas pipelines and gas pipelines that are being restored to service after repair shall be batch treated with a corrosion inhibitor before line start-up."

Note: In-line inspection tools can damage protective scales and inhibitor films and thereby provide initiation sites for corrosion damage. To help mitigate this damage, consideration should be given to batch-inhibiting the pipeline immediately after the running of an in-line inspection.



### 3.1.2 Commissioning New Pipelines

When commissioning a new pipeline, ensure pipeline license status is amended to "Operating". Procedures to follow for the steps to complete the new pipeline commissioning are identified in the Abbey Resources IMP Procedure for Pipeline Commissioning document.

# 3.1.3 Commissioning Discontinued Pipelines

Before putting a pipeline back in service that has been either formally discontinued, or inactive for an extended period of time, an engineering assessment of the pipeline may be required to determine if it is in suitable condition for service. The length of time the pipeline was discontinued, and the discontinuation procedures will determine what will need to be done to prove integrity in the pipeline for reactivation. The MER may require documentation on the engineering assessment that was conducted before granting approval to reinstate the operating status of the license. This assessment should include:

- A review of what was known about the state of integrity before the line was shut down. Inclusive of operating parameters, corrosion mitigation programs and previous inspection/monitoring results;
- A review of the removal from service procedure to determine if there was adequate corrosion protection while it was shut down. This includes Cathodic Protection records and procedural and testing records to ensure the pipe was left in a safe condition;
- Right-of-Way surveillance to ensure there has been no soil erosion/slumping or third-party activity that could have adverse effects on the pipeline. This includes depth of cover surveys within water bodies, if applicable;
- If, during this review, the state of integrity of the pipeline is suspect or if there is insufficient information to make a determination about the condition of the pipeline; further inspection may be required; and,
- If a mitigation program is required and must be addressed prior to placing the pipeline into service, consult the Pipeline Integrity Vendor for details.

*Note:* CSA Z662 – *Clause 10.1.1: Engineering assessments shall include consideration of the following, as applicable:* 

- a) design basis of the pipeline, including service fluid, operating pressure and temperature range, and the general and site-specific loading conditions that are anticipated throughout its design life;
- b) material specifications and properties;
- c) manufacturing process and installation method;
- *d)* construction and testing specifications;
- *e) the physical configuration and constraints of the pat of the pipeline system that are subject to the engineering assessment;*
- *f) depth of cover;*


- g) presence of crossings;
- *h)* presence of and proximity to other facilities;
- *i) load and interacting loads;*
- *j)* condition of the piping;
- *k)* potential presence and significance of undetected imperfections;
- *l)* mechanism or mode of imperfection
- *m)* service, operating and maintenance history;
- n) appropriateness of repair methods;
- *o) interaction of identified hazards; and*
- *p)* risk assessment.

Procedures to follow for the steps to complete the new pipeline commissioning are identified in the Abbey Resources IMP Procedure for Pipeline Commissioning document, as well as within the Abbey Resources IMP Procedure for Pipeline for Pressure Testing document. For third party operated pipelines, the responsibility to identify pipelines requiring this work to be completed lies with the Third-Party Operator, after consultation with Field Superintendent and the Pipeline Integrity Vendor.

#### 3.1.4 Purging Pipelines for Commissioning

Purging activities are completed to remove the air from the pipeline and replaces it with a non-combustible material such as low pressure natural gas or nitrogen. Refer to Section 3.4 of the PIM for Pipeline Purging. Procedures to follow for the steps to complete the new pipeline commissioning are identified in the Abbey Resources IMP Procedure for Pipeline Purging document.

#### 3.1.5 Record Keeping

New pipelines must be licensed and approved by MER, prior to construction. Resumption of discontinued or abandoned pipelines requires an amendment and MER approval in IRIS prior to commissioning of the pipeline.

Reactivation of repaired pipelines where the repaired section is less than 100 m do not require the license to be amended. This applies as long as long as the repairs are completed within the same right of way and completed using the same material or evaluated as being equivalent or higher grade for the licensed purpose and operating conditions. All record keeping should be completed in accordance with Section 2.5.1 of the PIM.



## **Pipeline Decommissioning**

- 3.2.1 Scope
  - 3.2.1.1 Purpose
  - 3.2.1.2 Definitions
  - 3.2.1.3 Safety Precautions
  - 3.2.1.4 Regulatory Requirements and References
- **3.2.2 Engineering Guidelines** 
  - **3.2.2.1** Timing of Pipeline Decommissioning
  - 3.2.2.2 Inactive Pipelines Retaining Operating Status (non-isolatable pipelines)
- **3.2.3 Pipeline Decommissioning Considerations** 
  - 3.2.3.1 Pipeline Isolation
  - 3.2.3.2 Pipeline Discontinuation
  - 3.2.3.3 Pipeline Abandonment
- 3.2.4 Record Keeping

**3.2** Pipeline Decommissioning

## **Pipeline Integrity Manual**



#### 3.2.1 Scope

This operations and maintenance section provides a program for managing inactive pipelines and reference to procedures for properly discontinuing and abandoning inactive pipelines. This section is specifically written for oilfield pipelines in Canadian Jurisdictions. The Field Superintendent is responsible to ensure the appropriate regulatory filing is carried out using the Abandonment & Discontinuation Record and the Field Operations are responsible for adherence to the work procedures provided.

#### **3.2.1.1 Purpose**

The purpose of a decommissioning program is to achieve the following:

- Compliance with Regulatory Requirements,
- Preservation of inactive pipelines for future use,
- Elimination of potentially expensive inspection or testing at the time of pipeline reactivation,
- Eliminate the possibility of explosion if a discontinued or abandoned pipeline is struck.
- Eliminate the possibility of environmental damage from degrading abandoned pipelines.

#### **3.2.1.2** Definitions

Inert Fluid	A non-explosive gas or liquid.	
Inactive Pipeline	A pipeline that has ceased transporting gas, oil or water. Periods of inactivity are calculated from the first day the pipeline ceases to transport a fluid. Inactive pipelines may be pressurized or non-pressurized.	
Discontinued	A pipeline that is to be inactive for a period of time, but may be used in the future shall be discontinued. A discontinued, deactivated or decommissioned pipeline has been isolated, purged with an inert fluid, and has effective internal and external corrosion control.	
Abandoned	A pipeline that will not be used in the future may be abandoned. An abandoned pipeline has been isolated, purged with an inert fluid, and does not have internal or external corrosion control.	
Inactive Non-isolatable	Inactive pipelines that cannot be isolated from an active flowing pipeline without modifications of existing facilities. These are also known as operating dead legs. All internal corrosion control techniques must be designed for the stagnant conditions, and reviewed annually, as per Section 3.12 of this manual.	

#### 3.2.1.3 Safety Precautions



There are several safety precautions that should be considered prior to decommissioning operations, and may include:

- Decommissioning may require excavation, welding (hot work), pigging, chemical inhibition and cathodic protection bonding. Trained personnel must complete each of the activities to the appropriate safety procedure.
- When pigging a sour line, a back-up person may be required when it has been determined there is a potential for a hazardous atmosphere.

## 3.2.1.4 Regulatory Requirements and References

## Saskatchewan MER

For licensed pipeline abandonments or discontinuations, reference shall be made to the Saskatchewan Directive PNG-034: Saskatchewan Pipeline Code for specific references to information required to be submitted for license amendment applications.

Section 3.3 of PNG-034 requires a license holder to notify MER through IRIS of pipeline reactivation activities a minimum of 2 business days prior to the scheduled work. Following the completion of IRIS notification:

- a pipeline permit holder does not require approval before performing pipeline discontinuation work, however shall submit a report using IRIS within 90 days of completion of the work of discontinuation of a pipeline.
- a pipeline permit holder does require MER approval before performing pipeline abandonment work, and additionally shall submit a report using IRIS within 90 days of completion of the work of abandonment of a pipeline.

## 3.2.2 Engineering Guidelines

## **3.2.2.1** Timing of Pipeline Decommissioning

While the Saskatchewan Pipeline Regulations do not state a period of time that the status of a pipeline must be addressed once inactive, it is recommended that as short of a time frame be applied as possible to address possible internal corrosion issues that may take place. The actions to mitigate corrosion in inactive pipelines should be completed prior to any extended periods of inactivity.

## **3.2.2.2** Inactive Pipelines Retaining Operating Status (non-isolatable pipelines)

The option to leave a pipeline in active flowing service is an option only for pipelines that cannot be isolated from another active pipeline without the modification of facilities (i.e. Operating dead legs). The choice to leave an operating dead leg in active flowing service must include an integrity review of the current mitigation program, and the implementation of a mitigation program that accounts for the stagnant conditions. This shall be included in the periodic pipeline integrity / corrosion assessment review.



This course of action is not recommended as a long-term solution for any pipeline, and inactive pipelines left with this status must be periodically assessed to determine if further decommissioning is appropriate. Dead legs should be discontinued or abandoned when the opportunity presents itself to expose and remove the buried tie-in point.

Pipelines that operate intermittently must also retain operating status and the mitigation program for the pipeline must take into account its intermittent activity. As required by CSA Z662 clause 16.7.3, sour service pipelines shall be batch treated before start-up after each inactive period.

## 3.2.3 Pipeline Decommissioning Considerations

The Pipeline Integrity Vendor is to be notified to evaluate any proper decommissioning activities required and the timing in order to complete this work. The appropriate steps should then be taken to decommission the pipeline.

If the pipeline can be isolated, follow the pipeline isolation procedures identified in the Abbey Resources IMP Procedure for Pipeline Decommissioning document.

If the pipeline cannot be isolated:

- 1. Perform facility modifications to isolate the pipeline; or
- 2. Retain the flowing status and ensure the mitigation activities are applicable for the stagnant conditions.

## 3.2.3.1 Pipeline Isolation

For pipelines that do not have the capability to be isolated from an active flowing pipeline, the first step for discontinuance and abandonment is to either disconnect the pipeline from the active pipeline or install isolation equipment.

Pipelines that can be isolated will have a valve and riser. The configuration of piping at the riser will dictate whether the pipeline can be pigged and purged without modifying the riser on the pipeline to be decommissioned. For pipelines to be discontinued, it is preferential to leave the riser in place.

Abandoned pipelines must be capped below ground (unless they are located within the boundaries of a facility that will continue to have other licensed equipment operating after the pipeline abandonment is completed), so modification of surface facilities will be required in any case. The exact procedure for the modification of the surface facilities must be determined for each specific facility. Underground valves must be removed if the stub from the active pipeline to the valve contains stagnant corrosive liquids. Any isolation or disconnection that results in an adjoining operating pipeline having fittings or connection points remaining that would create stagnant fluid traps or dead legs is only permitted if those locations are permanently accessible and subject to a scheduled inspection program, or the contained fluids are confirmed and documented as being non-corrosive. These locations should be removed at the earliest possible convenience.

## **3.2.3.2** Pipeline Discontinuations

## Pipeline Integrity Manual



A discontinued pipeline must be left in a safe condition, with both internal and external corrosion protection. During Discontinuation, the pipeline shall continue to be maintained. This includes periodic sampling for the presence of vapor phase inhibitor (if applicable), annual verification of the effective maintenance of cathodic protection, ROW patrolling, and pipeline sign maintenance.

## 3.2.3.3 Pipeline Abandonments

During Abandonment, the pipeline shall continue to be maintained only through the requirements for periodic ROW patrolling and pipeline sign maintenance.

## 3.2.4 Record Keeping

Abandonment & Discontinuation Record forms are located in the Abbey Resources electronic filing system. CSA Z662 clause 10.17.3 states that operating companies shall maintain records of all pipelines that are abandoned. All record keeping should be completed in accordance with Section 2.5.1 of the PIM.\_The record should include locations and lengths for each pipe diameter, and where practical, the burial depth. All changes in operating status must be reported to the MER within 90 days via a license amendment. An inactive Pipeline Inventory list and an Operating Dead Leg list should be maintained and reviewed periodically to ensure their accuracy.



# **Pipeline Pigging**

- 3.3.1 Scope
  - **3.3.1.1** Purpose
  - 3.3.1.2 Definitions
  - 3.3.1.3 Safety Precautions
  - 3.3.1.4 Regulatory Requirements and References
- 3.3.2 Engineering Guidelines
- 3.3.3 Procedural References
- 3.3.4 Pig Selection
- 3.3.5 Record Keeping



## **3.3** Pipeline Pigging

#### 3.3.1 Scope

This operations section is developed in compliance in with CSA Z662, Clause 9.10.2. This document describes the purpose of pigging, code requirements, safety precautions and references to the applicable Pipeline IMP Procedures. It is only intended for bare steel, polyethylene and freestanding fibre reinforced or composite pipe. Cement lined, coated and pipelines with tight fit liners are not addressed in this section, guidance for pigging in these applications can be provided by the Pipeline Integrity Vendor.

#### **3.3.1.1 Purpose**

Pipeline pigging is implemented for a number of reasons. Several (but not all) of these reasons are listed as follows:

- After the pipeline is built, it is recommended that pigs are run to remove any debris left in the line from new construction. Pigging may also remove mill scale or welding icicles in the pipeline.
- When the pipeline is in service, it may be necessary to pig the pipeline to maintain efficiency by removing any debris, solids, or liquids that may collect and restrict the flow through the pipeline. This includes, but is not limited to, removing liquids in wet gas systems, removing accumulated water in production pipelines, and paraffin or asphaltene removal and control in some gas, crude oil and oil effluent pipelines.
- The effectiveness of corrosion control through chemical mitigation can be aided by removing deposits, water traps, bacteria, and other corrosive materials that can damage the integrity of the pipeline. The proper batch application of corrosion inhibitors is achieved using specialized filming pigs.

#### **3.3.1.2** Definitions

**Pipeline Pig**Is defined as "A device that moves through the inside of a pipeline for the purpose<br/>of cleaning, dimensioning, or inspecting." This defines a variety of numerous<br/>different designs and types of pigs.

#### 3.3.1.3 Safety Precautions

There are several safety precautions that should be considered prior to pigging operations, and may include:



- Only conduct pigging operations during daylight hours, when possible.
- Pigging is only to be performed by trained personnel.
- Personal protective equipment, including breathing apparatus and H2S detectors, may be required in sour gas areas.
- When pigging a sour line, a back-up person may be required when it has been determined there is a potential for a hazardous atmosphere.
- Make arrangements for, and take appropriate actions in the event of, an off-lease odor release when pigging sour pipelines, with regards to the applicable Regulatory requirements.
- Never exceed the licensed/design Maximum Operating Pressure (MOP). (e.g. when removing stuck pigs)

#### 3.3.1.4 Regulatory Requirements and References

Removal of water and foreign material by scraping or pigging should be considered as one of the primary methods to control internal corrosion dependent upon the results of periodic testing for corrosive agents. Internal corrosion control methods are to be implemented and maintained in accordance with the applicable jurisdictional regulatory requirements.

#### 3.3.2 Engineering Guidelines

Refer to the field pipeline integrity/corrosion assessment to determine pigging frequency and details. Specific guidance on the recommended pigging intervals, pig types, and required record keeping can be provided by the Pipeline Integrity Vendor.

## 3.3.3 Procedural References

Refer to the Abbey Resources IMP Procedure for Sending and Receiving Pigs for the recommended steps to follow in order to confirm depressurization of pig senders/receivers, as well as sending and receiving pigs. When pigging is being completed utilizing pigging valves, also refer to the IMP Procedure for utilizing Pigging Valves.

When it is suspected that a pig may have become stuck in a pipeline, a site specific procedure should be developed by the Field Superintendent prior to any further activities to attempt to dislodge the stuck pig.

It is imperative that the licensed MOP of the pipeline is not exceeded during activities to remove a stuck pig, unless approval has been granted from the applicable regulatory body. The Pipeline Integrity Vendor can provide specific details around the licensed MOP of the pipeline, as well as any other risk to be aware of when exceeding the normal operating pressures of a pipeline, such as water body crossings or other high consequence areas along the pipeline route. In the event that it is determined that a pipeline must be exposed to pressures exceeding the licensed MOP of the pipeline, an engineering assessment of the pipeline shall be completed and follow up with the applicable regulatory body for approval, prior to exposing the pipelines to such pressures.



## 3.3.4 Pig Selection

It should be noted that foam pigs are not recommended for corrosion mitigation pigging since they tend to squeeze through debris and bacteria. Less aggressive pigs may be required for pipelines operating at low pressures. The recommended pig design is a urethane pig with discs for scrapping and cups. Brush pigs should be used prior to batch inhibition, particularity if concerns have been identified with potential concerns with internal corrosion pitting in the pipeline. The following are suggested pig specifications:

- <u>Lead Pig</u>: Super pig; shore 90 material, containing a cup and ideally at least 2 discs. Diameter should be 4 to 5% above pipeline I.D.
- **Film Pig:** Super pig; shore 80 material, containing a cup, notched disc(s) and a filming disk. Diameter should be 2 to 3% above pipeline I.D.
- The second pig must actually travel faster than the first pig in order to displace or squeeze the inhibitor back over it. The second pig will actually begin to catch the first pig. If this does not take place the two pigs and chemical simply travel through the system as a single unit transporting the chemical instead of leaving it on the circumference of the line.
- Although it will vary with shore hardness, super pigs are supposed to be 60% collapsible.
- Batch inhibitor pigs should be periodically sized prior to use and replaced if worn to less than 1% oversize of the pipe I.D. Pig diameter can be measured with:
  - a. Calipers or ruler across centerline,
  - b. Diameter tape measure,
  - c. Pushing the pig through a permanently mounted pipe sample located near the pig sender or pig ring, or
  - d. Pig sizing ring.









Lead Pig

Film Pig

## 3.3.5 Record Keeping

A log of all pigging operations should be maintained identifying the type/color of the pig sent, the date and time of the launch, and the date and time the pig was received. Any observations such as solids received with the pig should also be recorded. Pigging Record forms are located in the Abbey Resources electronic filing system. All record keeping should be completed in accordance with Section 2.5.1 of the PIM.



# **Pipeline Purging**

- 3.4.1 Scope
  - 3.4.1.1 Purpose
  - 3.4.1.2 Definitions
  - 3.4.1.3 Safety Precautions
- 3.4.3 Procedural References



## **3.4 Pipeline Purging**

#### 3.4.1 Scope

Pipeline purging may be required for instances such as pipeline commissioning / decommissioning or to perform pipeline repairs. This section describes when and why to purge, code requirements, reference to the procedure to displace fluids and other miscellaneous considerations related to pipeline purging.

#### 3.4.1.2 Purpose

The purpose of purging a pipeline is to safely remove:

- Combustible, chemical, toxic, or other hazardous materials from pipelines, vessels and piping systems prior to maintenance,
- Oxygen prior to placing a pipeline into service,
- Water after hydro-testing a line, or
- Production fluids when decommissioning a pipeline.

#### 3.4.1.2. Definitions

**Pipeline Purging** defined as removing a substance from the pipeline by displacing it with another substance.

#### 3.4.1.3 Safety Precautions

A Hazard Assessment following the requirements of the Abbey Resources Corporate HSE Program should be completed when purging a system of oxygen with fuel gas or a system of hydrocarbons with air. In these instances, the purge rate cannot be excessive because of the possibility of providing an ignition source as the critical explosive range is encountered. An ignition source can be from the static electricity generated from the flow of gas or by moving debris (rocks, nuts, etc.) with the gas velocity and creating a spark. The purge rate is dependent upon the volume of the system being purged and is therefore an 'experience' factor. Junior or inexperienced employees should never be in charge of a purging program. Purge pressure should be maintained as low as possible.

## 3.4.2 Procedural References

Refer to the Abbey Resources IMP Procedure for Purging a Pipeline document for the recommended steps to follow for purging pipelines. Additionally, ensure that any site specific operating procedures that have been developed for the location are referred to.



## **Pipeline Pressure Testing**

- 3.5.1 Scope
  - 3.5.1.1 Purpose
  - 3.5.1.2 Definitions
  - 3.5.1.3 Safety Precautions
  - 3.5.1.4 Regulatory Requirements and References
- 3.5.2 Procedural References
  - 3.5.2.1 Cold Weather Hydro Testing Requirements
- 3.5.3 Record Keeping



## **3.5** Pipeline Pressure Testing

#### 3.5.1 Scope

Pipeline pressure testing is required prior to commissioning a new or repaired pipeline (unless a pre-tested piece of pipe is used for the repair), and also often required for reactivating a pipeline that has been shut-in for an extended period of time. Pressure testing is also required for any applications to increase the MOP of a pipeline. This operations procedure describes when and why to perform a pressure or leak test, code requirements, calibrations required, stored energy concerns, and other miscellaneous considerations related to pressure and leak detection testing.

## 3.5.1.1 Purpose

The purpose of a pipeline pressure testing program is to describe the process and accountabilities required to assure that pipeline pressure testing procedures and records are in place and maintained.

Pressure testing existing pipelines may be required to re-affirm pressure capability or to re-qualify the pipeline to a higher operating pressure. In such cases, the integrity of the pipeline may be less than equivalent new pipe and an engineering assessment as per CSA Z662 is recommended prior to implementing the test.

#### 3.5.1.2 Definitions

Hydro testing is an accepted process used to pressure test a pipeline. This test validates the strength of the pipeline for the intended service. The test is not an indication of short or long term pipeline integrity and cannot be used as such.

Pneumatic testing of pipelines is only permitted through approval and consultation with the Field Superintendent. Additionally, the appropriate regulatory approval is required prior to proceeding with conducting any pneumatic testing of pipelines.

For clarification purposes:

- A pressure test is a 2 component pipeline hydro-test consisting of a leak test and a strength test. The test pressure exceeds the licensed operating pressure of the line by a factor assigned by CSA Z662 and the applicable Regulatory body. Minimum test duration is typically eight hours, held to either 1.25 or 1.4 X MOP.
- A leak test held below the licensed MOP is not controlled by the regulators and may NOT exceed license pressure. Typical test duration is four hours.

Although the minimum test durations are given, it is important to note that the test must go until it can be proved that the test is satisfactory. Any changes in pressure must be accounted for and any drop in pressure that cannot be reconciled for is considered unsatisfactory. Where inaccuracies or questionable results cannot be reconciled, tests shall be deemed unsuccessful. The test must continue beyond the minimum period to a point that a firm relationship can be established between changes in pressure and environmental factors can be established.



#### 3.5.1.3 Safety Precautions

- 1. All personnel working in the immediate area shall be notified of the test 24 hours prior to testing.
- 2. All pipelines shall be lowered in and backfilled and in the same condition as when operating.
- 3. Blinds and blanks will be installed to isolate facilities from pressure test. Testing against a closed valve is NOT acceptable.
- 4. Test pressure requirements for the job shall be obtained from the Facilities Engineering Group.
- 5. All personnel involved in the test shall review the requirements of the applicable Code and make sure it is clearly understood.
- 6. All test equipment shall be inspected for wear or damage and to ensure pressure ratings are not exceeded by the test pressure.
- 7. Warning signs and barricades shall be setup at all entry points and crossings to restrict access and to warn of danger.
- 8. All personnel present shall review all intended activities at a pre-job safety meeting.
- 9. No traveling shall be allowed on the right of way until pipeline has achieved test pressure and the test has been allowed to stabilize.
- 10. Road crossings shall be marked at each point by proper warning signs.
- 11. Unauthorized personnel shall not be allowed within 5 meters of pipeline under test.

## 3.5.1.4 Regulatory Requirements and References

Section 2.5 of PNG-034 requires a license holder to notify MER through IRIS of pipeline pressure testing activities a minimum of 2 business days prior to the scheduled work, for any pressure test that will exceed the licensed MOP of the pipeline.

Notwithstanding CSA Z662, if a natural gas pipeline is conveying more than 1 per cent hydrogen sulfide (H<sub>2</sub>S), the strength test for the pipeline must be conducted to a minimum of 1.4 times the maximum operating pressure and not greater than the maximum test pressure prescribed in CSA Z662.

Notwithstanding pressure test durations specified in CSA Z662, a licensee may only conduct a onehour pressure tests for fully exposed piping less than 100 m in length. For a pipeline that is to be buried under operating conditions it shall be pressured tested under similar such conditions. Pipeline pressures tests shall be monitored over the duration of the test in a manner that ensures the protection of the public, property and the environment,

## 3.5.2 Procedural References

Refer to the Abbey Resources IMP Procedure for Pipeline Pressure Testing document for the recommended steps to follow for pressure testing pipelines.



## **3.5.2.1** Cold Weather Hydro Testing Requirements

During colder months, to ensure safe and accurate pressure testing of pipelines, Abbey Resources makes use of anti-freezing agents during pressure testing. Using Propylene Glycol is Abbey Resources' preferred anti-freezing medium due to its non-toxic nature reducing the potential impact of a spill. If this is unavailable, a water methanol mixture of sufficient concentration to prevent freezing is an acceptable alternative media provided sufficient spill safeguards are in place.

## 3.5.3 Record Keeping

All record keeping should be completed in accordance with Section 2.5.1 of the PIM. All pressure test records must be kept on file for the life of the pipeline.



# **Pipeline Isolation Valve Maintenance**

3.6.1	Scope
	3.6.1.1 Purpose
	3.6.1.2 Regulatory Requirements and References
3.6.2	Pipeline Isolation Valve Maintenance
	3.6.2.1 Manual Isolation Valve Maintenance
	3.6.2.2 Automatic Valve (ESD) Maintenance
	3.6.2.3 ESD Simulation
3.6.3	Record Keeping



## **3.6** Pipeline Isolation Valve Maintenance

#### 3.6.1 Scope

This section provides a reference for isolation valve maintenance of oil field pipelines. It is specifically written for pipelines in Canadian Jurisdictions.

## 3.6.1.1 Purpose

The purpose of an isolation valve maintenance program is to ensure that noted valves will operate and function under emergency situations.

## 3.6.1.2 Regulatory Requirements and References

CSA Z662 Clause 10.9.6 pertains to identifying the open and closed positions of all major valves and valve maintenance and inspection programs. To determine whether or not a valve should be considered a major valve, consideration should be given to the importance of the valve for operation of the pipeline system, the location of the valve and the consequences of an undesirable valve position.

## **3.6.2** Pipeline Isolation Valve Maintenance

Pipeline valves that can be necessary during an emergency shall be inspected and partially operated at least once per calendar year, with a maximum interval of 18 months between such inspections and operations.

For the purpose of this section, a pipeline isolation valve is defined as a valve placed along the pipeline length for the purpose of interrupting the flow of produced fluids in an emergency situation. This valve can be manually or automatically actuated and requires inventory control and maintenance documentation.

The general requirements for testing, simulation and valve maintenance required to ensure safe, leak free service are described in this section.

## 3.6.2.1 Manual Isolation Valve Maintenance

Through daily contact with the production facilities, Field Operators are responsible for monitoring valves for leaks, improper operation and improper sealing. When minor problems arise, Field Operators are expected to perform minor valve maintenance as part of their routine activities (within the bounds of safety). For major maintenance requirements, repairs can be scheduled with a qualified Contractor at an appropriate time when this maintenance work cannot be completed by the Field Operators.

The testing of valve operation should be completed and documented at least once per year. This testing involves fully stroking the valve and documenting results.

Additionally, routine maintenance should be performed and documented in the following areas:

- Lubrication of the stem bearings;
- Adjust and/or replace packing;
- Valve body lubrication (when applicable);
- Injection of sealing compound (where applicable); and,



• Testing and service of power actuators.

These maintenance activities are usually carried out while the valve is in service and therefore, under pressure. This will require the use of acceptable service procedures, as outlined in the service manuals for each particular valve. These service manuals are to be made available for operations reference.

#### **3.6.2.2** Automatic Valve (ESD) Maintenance

An automatically actuated isolation valve is usually referred to as an Emergency Shutdown Device (ESD). This device is activated on pressure fluctuation and is designed to isolate a section of pipeline in the event of severe pressure loss due to a line break or other malfunction in the gathering system. The ESD is required to be calibrated annually.

The ESD valve consists of 2 major components:

- Isolation valve, this is a typical isolation valve sized to, and situated on, the specific flow line where protection is desired. This valve is very similar to the components of the manual valve and is serviced in the same manner; and,
- Valve actuator, this is a pneumatic/hydraulic instrument designed to drive the isolation valve. Valve actuation is controlled by a pressure sensing device or H<sub>2</sub>S monitor.

The pressure settings should be determined to be low enough to avoid shutting in sections of the field during line pressure changes caused by varying plant loading conditions. However, the setting must be high enough to instantly sense a sudden drop in pressure, which would result in the event of a pipeline rupture, severe valve failure or other system malfunction. ESD pressure set points shall be made accessible to the appropriate personnel.

#### **3.6.2.3 ESD Simulations**

The term simulation refers to the process by which the operator imposes "artificial" conditions on the ESD sensing components to test the reliability of the shut-in device. This simulation check is done to maintain the integrity of this important emergency shutdown system. ESD remote shutdowns and alarms are to be checked/calibrated annually. A scheduled maintenance program is also required annually to ensure the reliability of the ESD system components.



The scheduled maintenance program should include the following:

- Drain accumulated moisture and contaminants from the gas filter;
- Check gas/hydraulic tank fluid levels;
- Grease cam/trigger of the end of stroke valve;
- Clean out any drain/vent openings plugged by dirt, grease, insects, etc.;
- Check for adequate pressure and flow of supply gas and hydraulic fluid (i.e. Shutoff valve should be open, there should be no gas leaks, hydraulic speed control valve should be partly open.);
- Check manual operation with hand pump;
- Check manual operation with power gas (if equipped); and,
- Check remote/automatic operation.

Note: When conducting repairs or general maintenance to line break systems, the use of Teflon paste on fittings, bull plugs, etc. is preferred. If Teflon tape has to be used, special care must be taken in its application to ensure fragments do not end up in the hydraulic oil system.

#### 3.6.3 Record Keeping

A log of all pipeline isolation valve maintenance activities shall be maintained identifying the date of the function test or maintenance completed, as per the CSA Z662, Clause 10.4.2(b) requirements. All record keeping should be completed in accordance with Section 2.5.1 of the PIM.



# Pipeline Pressure Protection Device Maintenance

3.7.1	Scope

3.7.1.1	Purpose
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- 3.7.1.2 Safety Precautions
- 3.7.1.3 Definitions
- 3.7.1.4 Regulatory Requirements and References
- 3.7.2 Engineering Guidelines
- 3.7.3 Procedural References
- 3.7.4 Record Keeping



## **3.7** Pipeline Pressure Protection Device Maintenance

## 3.7.1 Scope

This section provides a reference for pressure protection device maintenance of oil field pipelines. It is specifically written for pipelines in Canadian Jurisdictions.

## 3.7.1.1 **Purpose**

The purpose of a pipeline pressure protection inspection program is to ensure that the following conditions have been met to ensure that a pipeline is protected from over pressure situations.

## 3.7.1.2 Safety Precautions

Setting or opening of electrical devices in hazardous locations shall be completed in accordance with the provincial electrical safety standards.

## 3.7.1.3 Definitions

A competent individual is either a certified instrumentation technician or a Abbey Resources Operator who has been adequately trained in the CSA requirements for function testing pressure control, pressure limiting or pressure relieving systems.

#### 3.7.1.4 Regulatory Requirements and References

## Saskatchewan MER

Section 2.6 of PNG-034 requires a pressure control system and overpressure protection to be installed at any point on a pipeline where supply from any source makes it possible to increase the pressure in the pipeline above its MOP.

Where artificial lift systems make it possible to increase the pressure in the flowline above its MOP, the flowline must have two independently functioning overpressure protection devices installed to protect it from experiencing pressures that do not exceed the MOP by more than 10 per cent or 35 kPa, whichever is greater. The licence holder must ensure the devices are inspected, tested and meet the requirements of CSA Z662. Alternatively, the operator of the flowline must have:

- a single overpressure protection device installed that will protect the flowline from experiencing pressures that do not exceed the MOP by more than 10 per cent or 35 kPa, whichever is greater;
- a competent individual inspecting and testing the overpressure protection device on a monthly basis; and
- a competent instrumentation technician conducting annual inspections and tests, with a maximum interval of 18 months between such activities, on the overpressure protection device to ensure that the monthly inspections and tests are conducted correctly and that the



device is not defective or malfunctioning. Operators may use an alternative inspection and testing time interval if the suitability of the interval is demonstrated.

If an overpressure protection device is found to be defective or malfunctioning, the flowline must cease operation and the device must be repaired or replaced before resuming operation.

Operator must maintain adequate inspection and testing records for the overpressure protection device and must provide records to ER upon request.

Inspection and testing records must document:

- the data and information used in inspecting and testing the device;
- the results of the inspection and tests; and
- the resolution details of a defective or malfunctioning device.

#### <u>CSA Z662</u>

CSA Z662 Clause 10.9.5 pertains to operation and maintenance of pressure control, pressure limiting, and pressure relieving systems.

All pressure-control and pressure-limiting devices shall be inspected, assessed and tested at least annually, by a certified instrumentation technician, with a maximum interval of 18 months, to confirm that they are:

- properly installed, protected from contamination,
- suitable for their intended service,
- have sufficient capacity, and

are in good operating condition and set to function at the correct pressure.

Pressure relieving systems or devices (with the exception of rupture disks) shall also be inspected assessed and tested annually, with a maximum interval of 18 months, or at an appropriate interval determined by the owner in accordance with API 576 (*Inspection of Pressure Relieving Devices (American Petroleum Institute)*) and supporting data and documentation. (CSA Z662 clause 10.9.5.3)

#### 3.7.2 Engineering Guidelines

As per CSA Z662 Clause 10.9.5.1 "Where the operating company considers that a pipeline system should be operated at pressures less than the maximum operating pressure, the operating company shall decide the appropriate reduced operating pressures and shall adjust any pressure-control, pressure-relieving, or pressure-limiting systems (or devices) accordingly."



#### 3.7.3 Procedural References

Function testing the operation of all pipeline pressure protection, control and limiting devices will occur monthly. Calibrations should be completed annually, with a maximum interval of 18 months, or more often as experience or the site-specific threat dictates. The need for more frequent testing and inspection may be addressed in the site-specific pipeline assessment.

If the pressure control, pressure limiting or pressure-relieving device has an isolation valve (i.e., Barber isolation valve) to allow for in-service calibration or repairs, the isolation valve must be locked in the open position.

#### 3.7.4 Record Keeping

Presco Shut Down Checks Record forms are located in the Abbey Resources electronic filing system. Complete and document required monthly inspections, and all annual assessments or testing on single over pressure protection devices in accordance with MER requirements. Devices should have a tag indicating date annually calibrated and the set pressure. Maintain an inventory of all pipeline pressure protection devices and their set points which affect pipeline operations using the electronic filing system. A Vendor list containing the minimum information can also serve as an inventory. All record keeping should be completed in accordance with Section 2.5.1 of the PIM.



# **Pipeline Signage**

3.8.1	Scope		
	3.8.1.1 Purpose		
	3.8.1.2 Regulatory Requirements and References		
3.8.2	Sign Design		
3.8.3	Sign Placement		
	3.8.3.1 Road and Railway Crossings		
	3.8.3.2 Group Pipeline Signs		
3.8.4	Sign Maintenance		
3.8.5	Signs at Other Facilities		
3.8.6	Temporary Warning Signs		



## **3.8** Pipeline Signage

#### 3.8.1 Scope

This section details the activities required by Operations pertaining to the maintenance of pipeline signage along pipeline right-of-ways (ROWs) to ensure the gathering system is operated in a safe and regulatory compliant manner.

## 3.8.1.1 Purpose

This section describes the requirements of pipeline signs. Highway warning signs will be setup in accordance with both the applicable provincial Pipeline Regulations and the Department of Highways regulations.

#### 3.8.1.2 Regulatory Requirements and References

## Saskatchewan MER

For ROW signage on all pipelines, reference shall be made to the Saskatchewan Directive PNG-034: Saskatchewan Pipeline Code and the most current version of CSA Z662. The MER requires "Every operator shall mark with conspicuous signs on the limits of a provincial highway or road, the place at which a pipeline enters and leaves or crosses under the provincial highways or road."

#### CSA Z662 Section 10

\*10.5.3 – Signs shall be installed to identify the presence of pipelines to reduce the possibilities of damage and interference. Signs shall be posted along pipeline ROWs, as applicable, at:

- a) railway and road right-of-way's; and
- b) strategic areas of:
  - a. utility corridors,
  - b. subdivision development,
  - c. construction activity,
  - d. drainage systems,
  - e. irrigation systems, and
  - f. other anticipated third-party activity.

\*10.5.6 – Consideration shall be given to placing signs at property boundaries to indicate the presence of a pipeline.



## 3.8.2. Sign Design

Signs shall include the following information, printed on a background of sharply contrasting color:

- The word "Warning", "Caution" or "Danger" prominently displayed.
- The type of product (e.g. gas, oil, water, NGL, etc.) prominently displayed.
- If a pipeline transports high vapor pressure products, the signs associated with that pipeline must clearly state the kind of high vapor pressure product.
- The name of the operating company and an emergency response telephone number.



Figure 1 – Pipeline Warning Sign



#### 3.8.3.1 Road and Railway Crossings

- The sign shall be placed on the land acquired for the pipeline, not within the right-of-way of the highway, road or railway.
- A sign must be placed on each side of every crossing.
- The sign shall face the highway, road, or railway.
- A bush or any other obstruction shall not obscure the sign.
- If the right-of-way of a railway adjoins the right-of-way for a highway, the sign shall be placed on the common boundary.
- If a pipeline is located in a ditch or unpaved area in the right-of-way of a highway or road, signs shall be erected at intervals that will clearly and continuously mark the location of the pipeline.

## **3.8.3.2** Group Pipeline Signs

If there are multiple pipelines within the same right-of-way, a group warning sign may be installed if the following conditions are met;

- the licensee is the same;
- each pipeline in the group conveys the same product;
- the warning sign contains the word "Multiple";
- the licensed product conveyed is not HVP or over 10 mol/kmol H<sub>2</sub>S; and,
- The warning signs must be placed on both sides of the right-of-way and must not be more than 60 meters apart.

#### **3.8.4** Sign Maintenance

Signs should be checked periodically by Field Operations staff to ensure they are up to date and shall be maintained in good condition. Checks on the condition of signs, or for damaged or missing signs, should also be completed and documented during annual ROW patrols. If a sign has been removed, destroyed, defaced, worn out or is illegible, it shall be replaced. This would apply for all pipelines in the ground, regardless of their operating status. If a pipeline or part of a pipeline is removed, the signs associated with the removed pipeline shall also be removed.

#### **3.8.5** Signs at Other Facilities

All aboveground facilities require a warning sign for identification. This includes risers in right of ways regardless of the equipment on site. (CSA Z662, Clause 10.5.4)

Signs shall be posted to identify the operating company and an emergency response telephone number.



"No Smoking" signs shall be displayed in hazardous areas.

Manifold piping in pipeline systems should be properly identified by the use of signs, stencils or color coding.

#### 3.8.6 Temporary Hazard Warning Signs

Hazard Warning Signs are used to prevent uninformed and unprotected personnel from being exposed to hazards.

Temporary hazard signs/barricades shall be prominently placed when conditions or activities present a hazard to personnel, the public, wildlife or domestic animals.

Temporary hazard signs/barricades shall be so placed that no personnel shall be able to enter the area, where the hazard exists, without prior knowledge of the hazard. Signs shall be placed outside the hazardous area.

Barricades and fluorescent flagging may be used in conjunction with, but not in lieu of hazard warning signs.

The design of hazard warning is dependent on the hazard that exists. There must be clear notification of the danger. Flagging with visible markings specific to the hazard are acceptable as hazards warning signs. Where applicable, there must be adequate fencing to prevent the intrusion of wild or domestic animals.

Personnel shall not enter signed/barricaded areas unless they obtain permission to enter the area from the company appointed personnel in control of the restricted area and having understood the hazards within the restricted area, taken the necessary safety precautions.

Hazard warning signs shall be erected as soon as the hazard is identified. The person who identifies the hazard is responsible to ensure the sign is erected.

Hazard warning signs and barriers shall be removed immediately by the employee who eliminated the hazard.



## **Right-of-Way Management**

3.9.1	Scope
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- 3.9.1.1 Purpose
- 3.9.1.2 Definitions
- 3.9.1.3 Regulatory Requirements and References
- 3.9.1.4 Engineering Guidelines
- 3.9.1.5 Pipeline ROW Inspection Categories
- 3.9.1.6 Required Minimum Inspection Frequencies
- **3.9.2 Procedural References** 
  - 3.9.2.1 Training
  - **3.9.2.2 Inspection Techniques**
- 3.9.3 Record Keeping



## **3.9** Right-of-Way Management

#### 3.9.1 Scope

This operations section provides a surveillance program and procedural references for oilfield pipelines in Canadian Jurisdictions.

#### **3.9.1.1 Purpose**

The purpose of right-of-way (ROW) surveillance is to ensure public safety and the safety of the pipeline through routine surveillance for evidence of pipeline breaks or activity near the pipeline.

3.9.1.2	Definitions	
Pipeline F	ROW	The public or private land across which the corporation has legally obtained a right of access for the installation, operation and maintenance of a pipeline.
Sour Gas	Pipeline	A sour gas pipeline is licensed for 10 moles of $H_2S$ per kilomole of natural gas (1 mole%). In a multi-phase pipeline, the concentration of $H_2S$ is measured in the gas phase.
Sensitive	Area	A location along a pipeline ROW that will have a significant consequence if the pipeline fails. Sensitive areas are defined as having a consequence of serious or catastrophic.

#### 3.9.1.3 Regulatory Requirements and References

#### <u>CSA Z662</u>

Operating companies are required inspect and maintain their pipeline ROW in accordance to CSA Z662 clause 10.6:

\*10.6.1.1 – Operating companies shall periodically patrol their pipelines in order to observe conditions and activities on and adjacent to their right-of-way's that can affect the safety and operation of the pipelines.

\*10.6.1.2 – The frequency of pipeline patrolling shall be determined by considering such factors as:

a) operating pressure,
b) pipeline size,
c) population density,
d) service fluid,
e) terrain,
f) weather, and
g) agricultural and other land use.

During routine well-site visits operators shall visually survey the pipeline ROWs and inspect for:



- Surface conditions on and adjacent to the ROW,
- Indications of any leak in the pipeline,
- Any non-routine agricultural activity or construction activity performed by others,
- Any encroachment or development near the pipeline ROW, and/or
- Any other condition affecting the safety or operation of the pipeline.

Particular attention shall be given to non-routine agricultural activity, construction activity, erosion, ice effects, scour, seismic activity, soil slides, subsidence, loss of cover and water crossings. Measurements in unstable areas where differential settlement or heaving is occurring should be monitored over time.

## 3.9.1.4 Engineering Guidelines

Regulations requires the pipeline licensee to assess the site-specific ROW inspection requirements as a component of the pipeline integrity management plan. A site-specific inspection plan shall be created for ROW inspection to suit the specific needs of an area, when required.

The following guidelines shall be used to create an inspection plan.

- Site-specific inspection plans shall be completed for all fields.
- Pipelines shall be grouped into ROW inspection categories as discussed below.
- Sensitive areas (water crossings, areas of loose soil) shall be highlighted in the plan.
- Frequency of ROW inspection shall be determined in accordance with Table 1.
- The time of year for the inspection shall be chosen to allow for a satisfactory inspection.
- Inspection techniques (walk/ride, aerial, or visual) shall be determined for each pipeline or group of pipelines.

Additionally, should any approved third party ROW activities be determined to require further assessment for potential impacts to the pipeline(s) within the ROW, an Engineering Assessment should be completed to review for potential concerns and controls to be put in place during the activities.



## **3.9.1.5** Pipeline ROW Inspection Categories

To simplify ROW inspection plan creation, pipelines may be grouped into categories of pipelines that will require similar inspection requirements. Pipelines in groups should:

- Transport the same substance (Natural Gas (NG), Sour Natural Gas (SG), Oil Effluent (OE), Fresh Water (FW), Salt Water (SW), Low Vapor Pressure Liquids (LVP), or High Vapor Pressure Liquids (HVP)).
- Have a similar internal corrosion likelihood.
- Have a similar consequence of failure.

It is recommended that ROW inspection groupings are readily apparent on the field's pipeline inventory. In addition to pipeline groups, sensitive areas shall be designated and addressed as separate items in the ROW surveillance plan. Sensitive areas should be assigned when a specific area of a pipeline requires more extensive or more frequent inspection techniques than the rest of the pipeline or the pipeline group.

Some examples of sensitive areas are:

- Water crossings all river crossing shall be considered High Consequence Areas HCAs). Refer to Section 3.22 of this manual for further details on water crossing management.
- Areas of unstable soil,
- High corrosion likelihood areas,
- Road crossings,
- Areas with landowner concerns or that have high public awareness.

## 3.9.1.6 Required Minimum Inspection Frequencies

Pipeline ROW inspection frequencies shall be no less than the requirements detailed in Table 1. For further clarification on specific pipelines as to which category in Table 1 they fall under, the Pipeline Integrity Vendor can provide assistance on this.



Pipeline Category	Class 1	Class 2	Class 3	Class 4
HVP (all)*	Bi weekly	Weekly	Weekly	Weekly
LVP Transmission*	Bi weekly	Weekly	Weekly	Weekly
LVP Gathering*	Monthly	Weekly	Weekly	Weekly
Sour Natural Gas (≥10 mol/kmol H <sub>2</sub> S)	Annual	Bi weekly	Weekly	Weekly
All other pipelines (Oil, Water, Natural Gas, Fuel Gas)	Annual	Annual	Annual	Annual
*Applies to Operating pipelines only				

## Table 1 – Regulated Pipelines Inspections Frequency

More frequent inspections may be required based upon individual risk assessments in the fields. Annual frequency intervals may be extended with an engineered ROW assessment plant. Any alterations to the ROW frequencies noted in the table above shall be completed in accordance with the factors identified for consideration in CSA Z662, Clause 10.6.1.2. Pipeline warning sign inspection (refer to Section 3.8) and crossing inspections (Section 3.23) shall be completed periodically for all pipeline systems.

## 3.9.2 Procedural References

## 3.9.2.1 Training

All employees, consultants or contractors involved in the inspection of pipeline ROWs shall be trained to be familiar with the Abbey Resources PIM requirements to accurately assess detrimental conditions during ROW inspections.

## **3.9.2.2** Inspection Techniques

ROW surveillance includes inspection of the following:

- Third Party Activities,
- Geotechnical Events,
- Environmental Issues,
- Mechanical and Operational Integrity (i.e visual checks for any indications of soil-to-air interface concerns on risers that may require follow-up), and
- Road or Water course Crossings.

In some cases, the ROW inspection may be combined with other activities such as depth of cover surveys, close spaced cathodic protection surveys, or gas detection surveys.



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The method used to inspect a pipeline ROW may be aerial surveillance, ground vehicle, foot patrol, visual inspection, thermal, geo reference video or flame ionization. Table 2 lists various inspection techniques that may be utilized.

Inspection Type	Description	Required for:		
Walk / Ride	100% of the pipeline ROW is inspected over ground via a vehicle or on foot.	Moderate risk, long inspection frequency or high risk, short-moderate inspection frequencies.		
Visual inspection	Pipeline ROW is viewed from the closest lease or roads.	Low risk, chosen for economical reasons. Long inspection frequency.		
Aerial	100% pipeline is viewed from an aircraft.	High risk, where walk/ride inspection is not feasible or too frequent.		
Pipeline Warning Sign Surveillance	Review of the pipeline Warning Signage to ensure they are accurate and undamaged. (See Section 3.8 Pipeline Signage)	All pipeline warning signs at road crossings, watercourse crossings and pipeline facilities.		
Depth of Cover Survey	Pipeline burial depth is determined. Completed in conjunction with Walk/Ride type of inspection.	Reviewed by the Field Superintendent		
Gas detection survey Gas detection equipment is used to determine if a hydrocarbon pipeline is leaking otherwise undetectable.		Reviewed by the Field Superintendent		
Close Spaced Cathodic Protection Survey	Cathodic protection current loss is measured at short intervals along the pipeline. (See Section 3.11 External Corrosion Control)	Reviewed by the Field Superintendent		

 Table 2 – Pipeline ROW Inspection Techniques

When choosing the inspection technique, consideration must be made:

- To ensure the inspection technique will reasonably minimize the disturbance or damage to surface property.
- That the technique can accurately assess the observations.
- Adequate economics and manpower are available to perform the inspection.

#### Waterway Crossings

Additional inspections of river or stream crossings should be carried out following excessive flood or runoff conditions. Refer to Section 3.23 of this manual for further details on water crossing management.


#### **Foreign Pipeline Crossings**

Crossing agreements shall be utilized for all crossings of Abbey Resources pipelines by foreign parties (i.e. other pipelines, utilities etc.) and for Abbey Resources pipelines that are to cross a foreign right-of-way. These agreements shall ensure that the proposed crossings meet the requirements of CSA Z662 Section 4.12.

All crossings of Abbey Resources pipelines shall be documented on a Backfill Inspection Report. A qualified Abbey Resources representative should remain on-site during non-routine agricultural activity or construction of the crossing to ensure that all terms of the agreement are upheld (i.e. line spacing, fencing, signage etc.) and to document additional details of the crossing (i.e. sketches and photographs).

Special consideration shall be given to the inspection of highway, railway, pipeline and other major crossings. Where existing pipelines are to be crossed by roads or railways, the pipelines shall be upgraded to meet the applicable design requirements or subject to an engineering assessment (CSA-Z662, Section 4.12.3).

Foreign pipelines crossing Abbey Resources pipelines must allow a minimum separation of 60 cm in order to minimize the effect on Cathodic (C.P.) systems. If 60 cm is not attainable, consultation with the C.P. Vendor will be required.

#### **Vegetation Control**

Where the terms of easement permit, vegetation on pipeline ROWs shall be controlled to maintain clear visibility from the air and provide ready access for maintenance crews (CSA-Z662 Section 10.6.2).

#### **Exposed Facilities**

Valves and other exposed facilities on pipeline right-of ways shall have access maintained and shall be protected to minimize unauthorized operation (CSA-Z662 Section 10.6.3). Overhead (aerial) pipelines and their supporting structures shall be inspected at a frequency appropriate for the deterioration mechanisms and maintained in a safe condition.

#### 3.9.3. Record Keeping

ROW Inspection Record forms can be utilized that are located in the Abbey Resources electronic filing system. This form is intended to record observations by exception i.e. documented and kept when concerns are noted during the ROW inspection. Inspectors shall select "Yes" or "No" in the drop down box beside each observation group to indicate that they have made every effort to observe all aspects of the group, and provide additional comments where applicable. If pertinent observations are found, the type of observation shall be recorded. Any observations should be disclosed to the Pipeline Integrity Vendor to determine if any follow up action is required. Alternatively, ROW inspection documentation can be completed utilizing third party Vendor reporting. All record keeping should be completed in accordance with Section 2.5.1 of the PIM.



## **External Corrosion Control**

3.10.1	Scope
3.10.2	<b>Corrosion Control Methods</b>
	3.10.2.1 Cathodic Protection
	3.10.2.2 External Corrosion Susceptibility Determination
	3.10.2.3 Maintenance of Mitigation Program
3.10.3	Record Keeping



### 3.10 External Corrosion Control

#### 3.10.1 Scope

This section defines the external corrosion assessment techniques and control measures that Abbey Resources considers for all pipelines.

#### 3.10.2 Corrosion Control Methods

External corrosion control procedures common to oil and gas pipelines are as follows;

<u>Pipeline Design and Construction</u>: The Facilities Engineering standards which adopt Industry Recommended Practices, Codes of Construction and Quality Installation Practices to maintain the integrity of the corrosion barrier coating on pipelines (i.e. yellow jacket coating) are the first line of defense against external corrosion. Proper quality control during pipeline installation is the single most important facet to preventing external corrosion.

<u>Cathodic Protection (CP)</u>: The basic principle of Cathodic Protection is that by inducing a current flow from a sacrificial anode through the earth to the pipeline, the anode will corrode instead of the pipeline. CP systems can be in the form of:

- impressed current systems which are powered by rectifiers, or
- sacrificial galvanic anode systems which are powered by natural potential differences between the pipeline and the anode

#### 3.10.2.1 Cathodic Protection

Cathodic Protection shall be maintained on all operating and discontinued pipelines. Bi-monthly or more frequent rectifier readings must be taken and forwarded to the cathodic protection service Vendor for review and kept on file.

Non-metallic pipelines with steel risers require a cathodic protection system in order to prevent external corrosion of the risers. These systems generally consist of a buried sacrificial galvanic anode in close proximity to the riser to be protected. This is a requirement in accordance with CSA Z662.

#### System Proximities

Foreign pipeline crossings must have a minimum of 60 cm of separation from a Abbey Resources pipeline.

All metallic pipelines should have a separation of 100m from an impressed current anode bed, when space permits. This applies to whether the line is being protected by the anode bed, or if it is "foreign" to the anode bed.

When 100m spacing cannot be achieved between the anode bed and any pipelines, specific testing will be required to ensure that no detrimental stray current interference is present. The CP Vendor will need to be consulted to determine if there are any other specific considerations in the CP system design that are required. Variances to the specified distances may be granted through consultation with the appropriate CP Vendor.



#### 3.10.2.2 External Corrosion Susceptibility Determination

An external corrosion susceptibility assessment may be required to determine if a pipeline is susceptible to external corrosion beyond what the CP system is capable of providing protection against.

The external corrosion susceptibility assessment considers the following criteria:

- inspection history of the operating area which is an indication of installation practice;
- pipeline age;
- coating system type;
- terrain and soil conditions;
- operating temperature including the degree of thermal cycling; and,
- CP system reliability.

If it is determined that a pipeline has very high external corrosion susceptibility, an inspection plan to verify the current state of integrity for that pipeline shall be developed.

#### **3.10.2.3 Maintenance of Mitigation Program**

An annual external corrosion mitigation inspection and adjustive survey shall be completed per regulatory requirements. Survey data will be recorded and maintained by the CP Vendor and provided to the Pipeline Integrity Vendor for review and follow-up, when required. The annual adjustive survey performed by a third-party CP Vendor must include:

- An inspection of all impressed current and galvanic anode cathodic protection systems.
- A potential survey of all piping systems to ensure adequate cathodic protection.
- A potential survey to assess the condition of cased road crossings and to check the integrity of insulating fittings, continuity bonds and interference test posts.
- Documentation of all equipment integral to the system including model, serial and target amperage numbers.
- Check for possible adverse effects of external AC sources (i.e. High Voltage AC lines in/near ROW).
- Check for potential stray current leakage concerns and complete Swain meter testing appropriately when identified.
- Visual checks for any indications of soil-to-air interface concerns on risers that may require follow-up.
- Continuity bonds, insulation checks, cased crossing vents and test posts shall be checked as often as required to ensure the integrity of the system. Particular attention should be paid on interference bonds and insulation fittings whose failure would jeopardize pipeline protection. All bonds and fittings shall be checked during the annual cathodic protection survey.

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Where a non-metallic pipeline contains steel risers that are attached to galvanic anode cathodic protection systems, the pipe to soil potential survey intervals may be extended out to a maximum interval of 5 years, as per CGA OCC-1.

On a minimum of a bi-monthly basis (maximum interval), qualified personnel will obtain D.C. voltage and current output readings from the Rectifier or Thermo-Electric Generator (TEG) associated with the impressed current cathodic protection system. Alternatively, where it is safe to do so, rectifier readings should be taken by properly trained Abbey Resources Operations personnel and forwarded to the cathodic protection service provider for review and kept on file.

Adjustment, troubleshooting or repairs to rectifiers, or TEG's is a task controlled by the Canadian Electrical Code. Only those personnel trained and appropriately certified to complete this work will be allowed to do so.

#### 3.10.3 Record Keeping

Rectifier reading forms and Annual Survey shall be documented and retained. All record keeping should be completed in accordance with Section 2.5.1 of the PIM.



## **Internal Corrosion Control**

3.11.1	Scope
3.11.2	Corrosion Control Methods
	3.11.2.1 Internal Corrosion Susceptibility Determination
	3.11.2.2 Definition of Corrosive
	3.11.2.3 Implementation and Monitoring
3.11.3	Maintenance of Mitigation Program
<b>.</b>	

3.11.4 Record Keeping



### 3.11 Internal Corrosion Control

#### 3.11.1 Scope

This section defines the internal corrosion assessment techniques and control measures that are to be considered for all Abbey Resources pipelines.

#### 3.11.2 Corrosion Control Methods

Internal corrosion control procedures common to oil and gas pipelines are as follows:

#### **Continuous Chemical Injection**

This is the process of injecting corrosion inhibitors, biocides and other chemicals at the beginning of a pipeline to reduce corrosion rates. These chemicals are designed to become soluble in the production fluids (liquids or gases) and reduce the corrosivity of the fluids and/or provide a protective film on the pipe wall. Injection rates are usually based on the amount of free water in the system and are determined in conjunction with the specialty chemical Vendor. Monthly tracking and recording of inhibitor use is to be reported by the specialty chemical Vendor.

#### **Pipeline Pigging**

Pigging is required to mitigate against flow assurance threats such as solid blockage (i.e. wax, asphaltene, sands or scales), hydrate formation and stagnant water accumulation causing corrosion. Pigging also helps remove protective scale disruptors and bacteria from the pipe walls to prevent initiation of corrosion. The frequency of pigging procedures will be outlined in the area specific pipeline integrity management plan. Section 3.3 of the PIM contains Pipeline Pigging guidelines. Procedures to follow for pigging pipelines are identified in the Abbey Resources IMP Procedure for Sending and Receiving Pigs document. Monthly tracking and recording of pigging activities are to be recorded and maintained with the detailed field specific records outlined in Section 3.3 of the PIM.

#### 3.11.2.1 Internal Corrosion Susceptibility Determination

As discussed in the Maintenance Planning section, an internal corrosion susceptibility assessment is required to determine the appropriate corrosion control program as part of the line by line review process.

Internal Corrosion Susceptibility Assessments are to be completed by the Chemical Vendors that Abbey Resources utilizes, reviewed the Pipeline Integrity Vendor, and approved by the Field Superintendent. The following steps detail the recommended considerations in an Internal Corrosion Susceptibility Assessment process that is utilized:

Fluid Composition Factors:

Corrosion rate / remaining life

Corrosion scale by-product

Oxygen ingress susceptibility

Fluid Flow Factors:

Gas flow severity - consideration of critical inclination angle exceedance



Oil flow severity – water and oil phase slippage Fluid trap severity – if detailed PIPEFLO analysis has been performed

Multipliers:

Bacteria counts Suspended solids Pre-existing condition related to historical operation

#### 3.11.2.2Definition of Corrosive

The following definitions of corrosive should be utilized in completion of an Internal Corrosion Susceptibility Assessment:

"Unless tests or experience indicate otherwise, any gas that has a water dew point that exceeds the minimum pipeline system operating temperature shall be considered to be corrosive." (CSA Z662 Sect. 9.10.1.2)

"Unless tests or experience indicate otherwise, any gas that contains hydrogen sulphide or carbon dioxide and has a water dew point that exceeds the minimum pipeline system operating temperature shall be considered to be corrosive." (CSA Z662 Sect 9.10.1.3)

"Unless experience or tests indicate otherwise, fluids that contain free water, bacteria, oxygen, hydrogen sulphide, carbon dioxide, or suspended or dissolved solids, singly or in combination, shall be considered to be corrosive." (CSA Z662 Sect 9.10.1.5)

#### 3.11.2.3Implementation and Monitoring

Once all of these factors in Section 3.11.2.1 have been determined, they should be documented in the line by line review, and the mitigation program developed and implemented. The maintenance plan identified in the line by line review should include methods to validate the effectiveness of mitigation programs. These methods may include inspection activities and corrosion monitoring with coupons, other electronic monitoring devices and fluid analysis sampling.

Implementation of the internal corrosion control program should include determination of the operating limits to which the program applies. Changes to the operation of a pipeline could render the mitigation program inappropriate (i.e. increase in water production, reduction in flow). These changes must be caught in a timely manner and the mitigation program adjusted as required. An operating envelope appropriate to the mitigation plan will be documented to establish the thresholds for change. The factors in need of monitoring are compositional testing, monitoring of flow rates, pressures, temperatures and liquid sampling (iron or manganese counts, inhibitor residuals, chloride concentrations, bacteria monitoring and direct corrosion rate monitoring.



If it is determined that a pipeline having very high internal corrosion susceptibility has had an inadequate mitigation program, an inspection plan to verify the current state of integrity for that pipeline should be developed.

With the mitigation programs implemented, compliance to inhibitor injection, pigging and batching programs are recorded as outlined in this PIM manual. This includes inhibitor injection rate/residuals check sheets and batching reports. The effect of any serious compliance issues shall be assessed by the Pipeline Integrity Vendor and the appropriate action taken.

### 3.11.3 Maintenance of Mitigation Program

Internal corrosion mitigation and monitoring programs for each gathering system are maintained as part of the Maintenance Plan line by line reviews and shall be reviewed annually by the Pipeline Integrity Vendor.

Additional integrity assessments should be updated at an interval that reflects the threats and rate of change for each system as identified through the risk assessment program.

#### 3.11.4 Record Keeping

All record keeping should be completed in accordance with Section 2.5.1 of the PIM.



## **Pipeline Batch Inhibition**

3.12.1 Scope
3.12.1.1 Purpose
3.12.1.2 Definitions
3.12.1.3 Engineering Guidelines
3.12.2 Procedural References
3.12.3 Record Keeping

Attachment 1 Maximum Flow Rates for Batch Treating



### **3.12** Batch Inhibition

#### 3.12.1 Scope

This section provides a standard for production treating chemical application and engineering guidelines for sizing and applying a batch corrosion inhibitor. Also included is reference to procedures for batching steel pipelines.

#### 3.12.1.1 Purpose

When applied properly, a batch applied corrosion inhibitor provides internal corrosion control in steel pipelines.

### 3.12.1.2 Definitions

Batch Applied Pipeline Corrosion Inhibition:	A corrosion inhibitor applied to the pipeline internals at a particular frequency to provide corrosion protection between applications.
Batch Train:	Includes a lead pig, a volume of diluted batch corrosion inhibitor and a rear filming pig.
Contact Time:	The length of time the batch train contacts the pipeline internal wall as it passes through the pipeline. Contact time = batch volume/cross sectional area/batch train velocity.

#### 3.12.1.3Engineering Guidelines

#### **Application Method**

The recommended application method for batch applied corrosion inhibitor is in a pig train with properly sized cup and disk pigs. Refer to Section 3.3.4 of the PIM for more details around proper pig selection.

Filming Pig	Lead Pig	
	Batch Inhibitor slug	3

Figure 1 - Batch Train Configuration



The batch train has the following features:

Filming Pig	A polyethylene multi-disk and cup pig, containing a cup, 1 or 2 notched disks and a filming disk. Cup diameter should be 2 to 3% above the pipeline inner diameter (ID). The pig must seal with the pipe wall to prevent gas bypass into the slug of batch chemical.
Lead Pig	A polyethylene multi-disk and cup pig with a diameter 4 to 5% larger than the pipeline ID. The pig is typically constructed from a stiffer material than the filming pig.
Batch Inhibitor:	A corrosion inhibitor is supplied by an approved chemical Vendor, often diluted 1:1 or 1:2 in diesel, condensate or methanol when applied to allow for sufficient contact time during application. The batch inhibitor, diluent and diluent ratio should be chosen specifically for each pipeline, and is typically determined by the chemical Vendor.



Figure 2 - Lead Pig Followed by The Film Pig



Figure 3 - Lead and Film Pigs

## Successful Batching

The following are requirements for the successful application of a batch inhibitor:

- The amount of production gas that enters the batch inhibitor slug must be minimized.
  - If gas enters the slug, the top section of the pipeline may not receive corrosion inhibitor coverage. If enough gas enters the batch inhibitor, coverage throughout the entire ID will be compromised. This is a concern in gas or multiphase pipelines.
  - Gas can enter the slug by:
    - Bypassing the filming pig,
    - If the lead pig is shipped with production fluids,
    - Entering through a downstream tie-in.
- The contact time of the batch inhibitor on the pipeline is 10 seconds or greater.



- This requires an understanding and control of batch train velocity and batch inhibitor volume sizing.
- The pipeline internals are free of solids, debris, and loosely adhering scale.
  - The pipeline should be cleaned prior to the batch inhibitor application.

#### **Batch Train Contact Time**

To allow the inhibitor adequate time to bond to the steel pipe, a contact time of no less than 10 seconds is recommended. Contact time can be calculated from the following formula:

## Batch Volume Cross Sectional Area \* Velocity of the Batch Train

#### **Batch Volume**

Batch volume sizing should be provided by the chemical Vendor. Typically batch volume sizing is calculated based on a 3 mil film thickness of inhibitor on the pipeline internal wall.

The formula to calculate the batch volume in liters for a 3 mm film thickness is:

#### $0.24D_{i}L$

Where  $D_i$  is the internal diameter in mm and L is the length in km

The batch volume to be used for the calculation of batch contact time should be the total amount of inhibitor left in the batch train at the end of the pipeline. It is difficult to predict the amount of inhibitor that will deposit on the pipeline wall, although field measurements have shown there is typically less than 1 mil of inhibitor deposited on the pipeline wall.

The following formula can be used to estimate minimum batch volume in the pipeline:

$$Initial Batch Volume [L] * \left(\frac{Film thickness used to size batch [mills] - 1}{Film thickness used to size batch [mills]}\right)$$

#### **Batch Train Velocity**

Batch train velocity will be approximately equal to the gas velocity for most pipelines. Gas velocity can be estimated by the following formula:

## Gas Flow Rate at standard conditions \* Atmospheric Pressure Cross Sectional Area of Pipeline \* Absolute Pressure in Pipeline

#### Maximum Gas Flow Rate

Combining the above formulas results in the following formula:

Maximum Gas Flow Rate  $(E^3m^3/d)$  for a 10 seconds contact time =

#### Minimum Volume of Batch Inhibitor [L] \* (Gauge Pressure [kPa] + 101)

11700

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Attachment 1 at the end of this Section contains a table with the maximum gas flow rate calculated at various pressures and batch volumes.

Note that this calculation assumes:

- A gas dominated flow regime (liquid flow rate is negligible)
- Pressure is no higher than 12,000 kPa
- Temperature is less than 60°C

### 3.12.2 Procedural References

Refer to the Abbey Resources procedural documents for the recommended steps to follow to batch apply inhibitor to the pipelines:

- Abbey Resources IMP Procedure for Pipeline Chemical Batching
- Abbey Resources IMP Procedure for Sending and Receiving Pigs

If the chemical Vendor has a specific procedure, consideration should be made to incorporating it. A sitespecific batching procedure should be created in areas where there are specific safety issues, pigging facility constraints, other operational considerations (downstream tie-in's, pressure fluctuations, etc.).

### 3.12.3 Record Keeping

All record keeping should be completed in accordance with Section 2.5.1 of the PIM. Batch applications of corrosion inhibitor can be documented as a record on the chemical monthly service report by the Chemical Vendor. The documentation should include:

- From and To locations of batched pipeline,
- Gauged sizes of the pigs used,
- Date and time of application,
- Batch volume of chemical and diluents, and
- Date and time pigs received.



## Attachment 1

## **Maximum Flow Rates for Batch Treating**

		00	3	5	7	08	30	53	75	97	20	42	66	57	15	74	34	95	19	46	77	11	50	92	39	90	45	71	517	87	82	05
		25	4	9	8	-	-	-	-	-	8	5	5	ñ	4	4	ŝ	2	2	ŵ	6	5	12	13	15	16	18	21	25	28	32	37
		2000	35	52	69	87	104	122	140	158	176	194	239	285	332	379	427	476	575	677	781	889	1000	1114	1231	1352	1476	1737	2014	2309	2626	2964
		1500	26	39	52	65	78	92	105	118	132	145	179	214	249	284	320	357	431	508	586	667	750	835	923	1014	1107	1302	1510	1732	1969	2223
		1250	22	32	43	54	65	76	87	66	110	121	149	178	207	237	267	297	359	423	488	556	625	696	769	845	923	1085	1259	1443	1641	1853
		1000	17	26	35	43	52	61	70	79	88	97	120	143	166	190	214	238	287	338	391	445	500	557	615	676	738	868	1007	1155	1313	1482
t Time.		750	13	19	26	33	39	46	52	59	66	73	90	107	124	142	160	178	216	254	293	333	375	418	462	507	554	651	755	866	985	1112
Contac		500	8.6	13	17	22	26	31	35	39	44	48	60	71	83	95	107	119	144	169	195	222	250	278	308	338	369	434	503	577	656	741
econd		400	6.9	10	14	17	21	24	28	32	35	39	48	57	66	76	85	95	115	135	156	178	200	223	246	270	295	347	403	462	525	593
a 10 S		300	5.2	7.8	10	13	16	18	21	24	26	29	36	43	50	57	64	71	86	102	117	133	150	167	185	203	221	260	302	346	394	445
/d) for	es)	250	4.3	6.5	8.7	10.8	13	15	17	20	22	24	30	36	41	47	53	59	72	85	98	111	125	139	154	169	185	217	252	289	328	371
(E3m3	peline (litr	200	3.5	5.2	6.9	8.7	10.4	12.2	14	16	18	19	24	29	33	38	43	48	57	68	78	89	100	111	123	135	148	174	201	231	263	296
/ Rate	ume in Pi	150	2.6	3.9	5.2	6.5	7.8	9.2	10.5	12	13	15	18	21	25	28	32	36	43	51	59	67	75	84	92	101	111	130	151	173	197	222
IS Flow	Batch Vol	100	1.7	2.6	3.5	4.3	5.2	6.1	7.0	7.9	8.8	10	12	14	17	19	21	24	29	34	39	44	50	56	62	68	74	87	101	115	131	148
um Ga	Minimum	75	1.3	1.9	2.6	3.3	3.9	4.6	5.2	5.9	6.6	7.3	9.0	11	12	14	16	18	22	25	29	33	37	42	46	51	55	65	76	87	98	111
Maxim		50	0.9	1.3	1.7	2.2	2.6	3.1	3.5	3.9	4.4	4.8	6.0	7.1	8.3	9.5	11	12	14	17	20	22	25	28	31	34	37	43	50	58	66	74
		40	0.7	1.0	1.4	1.7	2.1	2.4	2.8	3.2	3.5	3.9	4.8	5.7	6.6	7.6	8.5	10	11	14	16	18	20	22	25	27	30	35	40	46	53	59
		30	0.5	0.8	1.0	1.3	1.6	1.8	2.1	2.4	2.6	2.9	3.6	4.3	5.0	5.7	6.4	7.1	8.6	10	12	13	15	17	18	20	22	26	30	35	39	44
		20	0.3	0.5	0.7	0.9	1.0	1.2	1.4	1.6	1.8	1.9	2.4	2.9	3.3	3.8	4.3	4.8	5.7	6.8	7.8	8.9	10	11	12	14	15	17	20	23	26	30
		10	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.7	1.9	2.1	2.4	2.9	3.4	3.9	4.4	5.0	5.6	6.2	6.8	7.4	8.7	10	12	13	15
	Pressure	kPag	100	200	300	400	500	600	700	800	006	1000	1250	1500	1750	2000	2250	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	8000	9000	10000	11000	12000

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## **Pipeline Hydrate Control**

3.13.1	Scope
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- 3.13.1.1 Purpose
- 3.13.1.2 Definitions
- 3.13.1.3 Safety Precautions
- 3.13.1.4 Regulatory Requirements and References

### 3.13.2 Engineering Guidelines

- 3.13.3 Procedural References
  - **3.13.3.1** Preventing Hydrates
  - 3.13.3.2 Detecting Hydrates
  - 3.13.3.3 Removing Hydrates



#### 3.13 Hydrate Control

#### 3.13.1 Scope

Procedures for the detection and prevention of hydrates within gas pipeline systems provided in this section. The Field Superintendent should be consulted by the Field Operators when dealing with the prevention, detection or removal of hydrates in pipelines.

#### 3.13.1.1 Purpose

The purpose of a hydrate control and removal procedure is to:

- Provide an understanding of the conditions under which hydrates are formed so that, when possible, they can be prevented and,
- Ensure that hydrates are removed safely.

#### **3.13.1.2** Definitions

**Hydrate** A frozen mixture of water and hydrocarbons in a line that forms at a temperature well above the freezing point of water. Its physical form varies from a gelatinous mush to solid ice. Gas must be at or below its water dew point to form hydrates. This occurs in conditions of low temperature and high pressure and results in the presence of "free water".

Hydrates occur when free water is present in conjunction with certain conditions of pressure and temperature in the system. A hydrate forms only in the presence of light hydrocarbon molecules (or impurities such as nitrogen, carbon dioxide and hydrogen sulphide contained in natural gas). The higher the gas pressure, the higher the gas temperatures at which a hydrate can form.

Hydrate formation is a major hazard in pipelines that carry "wet" gas. Pockets of water form in low points of the line and hydrates then form. As the hydrates form, they restrict the flow of gas and therefore increase the velocity of gas and decrease its temperature. Hydrates form faster and eventually the line is plugged. Hydrates also form where there is a sharp reduction in pressure, at orifices, partially opened valves, sudden enlargement in pipelines, or elbows.

#### 3.13.1.3Safety Precautions

A hazard occurs when the differential in the pressures on either side of the hydrate accelerates the hydrate plug to extreme velocities. When stopped by a valve, bend, or other obstruction, the momentum can damage a pipe or other equipment through either impact or overpressure.

To avoid a serious incident all personnel must follow industry accepted guidelines and practices. Each operating site should develop site-specific procedures according to the guidelines, for each hydrate.

#### 3.13.1.4 Regulatory Requirements and References



There are no Regulatory requirements specific to hydrates. Provincial Acts and Regulations concerning occupational health and safety, however, do require the identification of known safety hazards.

### 3.13.2 Engineering Guidelines

Situation specific maximum differential pressures should be developed considering factors such as piping configuration, distance to impact, and the consequence of failure, when dealing with hydrates. This includes developing contingency plans and applies to all potential restrictions including ice, wax and asphaltene plugs.

### 3.13.3 Procedural References

#### 3.13.3.1 Preventing Hydrates

There are four options for hydrate prevention.

- 1. Dehydrate the gas.
- 2. Control the temperature and pressure. Pressure is controlled by means of chokes or regulators, and temperature is controlled through the use of line heaters or heat exchangers.
- 3. Inject a hydrate inhibitor. The most common hydrate inhibitors are ethylene glycol, diethylene glycol, methanol, or ammonia.
- 4. Redesign piping system to remove low points, restrictions.

Refer to procedures to follow which are outlined in the Abbey Resources Upstream HSE Program Manual Procedures for Hydrates.

#### 3.13.3.2 Detecting Hydrates

Determination of the location of the plug can be completed according to the various methods outlined below:

- Past experience with hydrates in the system. Most systems have common locations of hydrate accumulations and problems. These include low spots in the line or line restrictions such as valves, meter runs, headers.
- System geometry, such as heat sinks (muskeg areas, creek crossings, road crossings), extreme elevation changes (valleys).
- Volumetric methods, such as critical flow provers or positive displacement meters.
- Sonic detection methods.



• Line Isolation. Isolate a section of line, preferably at a change in elevation as this is the most likely location for a hydrate. Install a pressure indicator at each end and slowly depressurize one end of the isolated section. If both gauges read the same, and decrease at the same rate, the plug is not in that section. Continue to move along the pipeline and isolate the shortest possible sections, testing as stated until the section containing the plug is located. Conducting the tests in the shortest possible sections reduces the distance a plug could travel once it becomes dislodged.

#### 3.13.3.3Removing Hydrates

Hydrates are never removed by exceeding the maximum differential pressures specifically developed for the situation and are always treated as a multiple plug scenario.

Hydrate removal procedures should be deemed as Critical Procedure and should be developed specifically for each incident. There should be a consultation with the Field Superintendent to develop a site specific Hydrate Removal Procedure for the particular hydrate. Additional procedural references can be found in the Canadian Association of Petroleum Producers (CAPP) *Prevention and Safe Handling of Hydrates* document.



# Leak and Break Detection and Incident Reporting

3.14.1	Scope
	3.14.1.1 Purpose
3.14.2	Leak Detection for Pipeline Systems
3.14.3	Response to a Leak or Break
	3.14.3.1 Line Failure Sampling Requirements
	3.14.3.2 Spill Reporting Requirements
3.14.4	Record Keeping



### 3.14 Leak and Break Detection

#### 3.14.1 Scope

This section describes the steps for recognizing and responding to leaks and breaks in pipelines. Additional steps to follow for a spill response related to a pipeline are outlined in Abbey Resources Corporate Emergency Response Plan that should additionally be referenced as required.

#### 3.14.1.1Purpose

Early leak detection is required for several reasons:

- To reduce any real or potential hazard created by the uncontrolled escape of product into the soil or the atmosphere;
- To protect the public;
- To meet Regulatory Requirements;
- To determine potential problems in the system; and,
- To reduce economic loss.

Abbey Resources personnel shall be aware of the signs of a leak or break in a pipeline. These signs include:

- Unexplained loss of pressure;
- Unusual temperature changes;
- Unexplained production imbalances;
- Unexplained odors;
- Pooling of hydrocarbons or produced water on the right-of-way; and,
- Wilting or yellowed vegetation.

#### 3.14.2 Leak Detection for Pipeline Systems

Knowledge of normal production rates and operating pressures is critical for early detection of line failures. Operations staff are expected to be familiar with normal operating pressures, and potential fluctuations within normal operating parameters, related to individual pipelines. This would be a result of the knowledge of operated pipelines and ensuring all metering is accurate (test meters, turbine meters etc.). Production data that is collected for accounting should be checked for large discrepancies and be promptly evaluated for metering accuracy issues and the possibility of a pipeline failure.

Potential leaks are to be evaluated by the operator who uses his or her best judgment to determine if the difference is sufficient to be a leak and shut down the pipeline, or if the difference is within acceptable range. In the event that a leak is suspected due to production loss or pressure drop, eliminate all other possibilities such as meter problems, closed valves, or electrical problems.



As per CSA Z662, Section 10.3 regular surveys or analyses for evidence of leaks shall be performed. This analysis is encouraged to utilize technologies consisting of gas-detector surveys, aerial surveys, mathematical modeling analyses, pressure drops or low pressure alarms or any other method that has been determined effective. Leak detection programs shall be reviewed periodically to confirm their adequacy and effectiveness.

All surveys are to be conducted in appropriate weather conditions. Contract personnel must be familiar with field and its safety practices. A surface leak detection survey should not be conducted in adverse weather conditions such as frost conditions, soil moisture saturation, and excessive winds. If a pipeline leak is suspected but cannot be confirmed by any other means, a pressurized leak test may be required. Special odorants or dyes can be added to the test medium to aid in detecting the leak location.

### 3.14.3 Response to a Leak or Break

When operating personnel suspect the presence of a leak, they are responsible for verifying the leak and notifying the Field Superintendent.

- Procedures to follow when normal operating pressures and potential fluctuations within normal operating parameters provide indications of the potential for a leak in a single pipeline or a pipeline system are identified in the Abbey Resources IMP Procedure for Pipeline Leak Detection document.
- The steps required for response to a confirmed leak/rupture identified in the Abbey Resources Corporate Emergency Response Plan shall then be followed.

Inspection and repair plans following a failure must be prepared with the consultation of the Pipeline Integrity Vendor and approved by the Field Superintendent. If it is not feasible to make a permanent repair at the time of discovery and the leak is due to a corrosion pit, a temporary repair, such as a bolt-on leak clamp (of appropriate design), may be made, but a permanent repair should be made at the first opportunity. In addition to Management of Change (MOC) approvals, approval from the MER through IRIS is mandatory for temporary repairs. The temporary repair is to be adequately marked within the right of way and recorded for ease in locating when rechecking or when permanent repairs are to be made.

To aid in the investigation of the failure and reporting to the regulators, all pertinent information surrounding the failure must be preserved. The pipe coupon should be kept for failure analysis if required after consultation with the Pipeline Integrity Vendor.

#### 3.14.3.1Line Failure Sampling Requirements

After a leak, break or contact damage has been removed as a coupon from the failure site, the following steps should be followed to aid in completing an accurate failure analysis:

- Avoid contamination of the sample by bagging and taping the pipe;
- Avoid damage to the corroded surface;
- Maintain the condition of associated deposits; and,
- Provide information on the physical location and orientation of the pipes.

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Submission of the written report to the regulator is managed by the Field Superintendent, with assistance from the Pipeline Integrity Vendor as required. The MER may additionally initiate a formal investigation into the cause of the leak.

Further direction on releaser reporting requirements are outlined in Abbey Resources Corporate Emergency Response Plan that should additionally be referenced as required.

#### 3.14.3.2Spill Reporting Requirements

Saskatchewan MER requires notification for pipeline incidents on all pipelines regardless of whether or not they are licensed pipelines or flowlines, to the appropriate area office, as per the Pipeline Directive PNG-034: Saskatchewan Pipeline Code.

#### 3.14.4 Record Keeping

Pipeline Failure Record forms are located in the Abbey Resources electronic filing system. All record keeping should be completed in accordance with Section 2.5.1 of the PIM.



# **Pipeline Inspection**

3.15.1	Scope
3.15.2	Inspection Techniques
3.15.3	<b>Evaluation of Piping Imperfection</b>



#### 3.15 **Pipeline Inspection**

#### 3.15.1 Scope

This section describes pipeline inspection requirements and techniques.

### 3.15.2 Inspection Techniques

The best inspection technique is the running of an intelligent, in-line inspection (ILI) tool because it provides information about internal and external defects throughout the entire pipeline.

In some cases, pipelines are not constructed to facilitate ILI tools. It is then acceptable to excavate a section of the pipeline and conduct a non-destructive examination of the exposed pipe utilizing Radiography and/or Ultrasonics. Selecting the location for this type of inspection is very important and requires the assistance of the Pipeline Integrity Vendor and approval by the Field Superintendent.

### 3.15.3 Evaluation of Piping Imperfection

Pipeline wall loss will be assessed in accordance with CSA Z662 Clause 10.10 and/or ASME B31G criteria. CSA Z662 Clause 10.10 shall be used to evaluate imperfections in all pipe. Imperfections not allowed within the CSA criteria shall be subject to an engineering assessment and review by the Pipeline Integrity Vendor. Where appropriate, assessments of imperfections shall include inspection methods capable of detecting cracks. Suitable external coatings shall be applied after cleaning, inspecting and repair operations. When piping is unsuitable for continued operation at the established operating pressure, either the piping shall be operated at pressures that are determined by engineering assessment to be acceptable or the affected piping shall be repaired.



## **Pipeline Repair**

3.16.1	Scope
	3.16.1.1 General Policies
	3.16.1.2 Pipeline Repair Work Process
	3.16.1.3 Regulatory Requirements
3.16.2	Pipeline Repair Procedural References
	3.16.2.1 Hot Tapping
	3.16.2.2 Dents

3.16.3 Record Keeping



#### **3.16 Pipeline Repair**

#### 3.16.1 Scope

This section describes the guidelines for carrying out repairs to pipelines. Repairs are defined as replacement in kind without exceeding 100 meters of pipeline length.

#### **3.16.1.1 General Policies**

- Repair procedures are developed on an ad-hoc basis relative to the specific situation. These practices are developed using industry best-practices and technology relevant to the threat at hand.
- Existing repair procedures are made available on an as-needed basis to maintain control over field-based activities.
- The Field Superintendent is responsible for approving any proposed mitigation and repair of pipeline defects.
- When a repair procedure is performed, the method of the repair, the repair location, and any other relevant data shall be recorded in the pipeline record. Record keeping practices shall be consistent with those described in Section 2.4 of this document.

#### 3.16.1.2 Pipeline Repair Work Process

When a pipeline failure has occurred, the Field Superintendent will be responsible for the development of a pipeline repair plan, in consultation with the Pipeline Integrity Vendor.

#### 3.16.1.3 Regulatory Requirements

#### Saskatchewan (MER)

A "repair" means a temporary sleeve, permanent sleeve, cut out, or other fix that is a continuous segment less than 100 meters in length within the existing right of way. Application in IRIS and MER approval are not required before performing repairs. A licence holder shall submit a report to IRIS within 90 days of completion of the work if performing a pipeline repair that meets one or more of the following conditions:

- the repair is the result of an incident reported in accordance with Directive PNG-014;
- the repair is the result of pipeline exposure due to erosion;
- the repair is the result of ground movement;
- the repair is located in a class location greater than 1 as defined in the CSA Z662;
- the repair is within the setback of permanent watercourse specified in chapter 4;
- The repair does not use a permanent sleeve and the damaged pipe is not removed.



#### 3.16.2 Pipeline Repair Procedural References

Pipeline repairs will be managed by the Field Superintendent. Permanent repairs may be done by using methods identified in CSA Z662 Clause 10.11. Cutting into a process line or pipeline shall be supervised and conducted under the direct supervision of a qualified pipeline construction Vendor. Refer to the Abbey Resources IMP Procedure for Pipeline Repairs document for the recommended steps to follow for completing pipeline repairs, as well as the Abbey Resources IMP Procedure for Pipeline Pressure Testing document when pressure testing is required.

When repairing a section of pipeline with a replacement piece, a minimum pup length the greater of 1m or two times the specified pipe OD shall be replaced. Deviations to this shall conform to the requirements of CSA Z662 Clause 10.11 and any further local jurisdictional requirements.

Replacement pipe shall meet or exceed the specification of the pipeline and have mill certificates on file, to be retained in the QC package. Any pipe wall thickness variation from the original shall meet the design requirements of Clause 5.2.4 of CSA Z662.

#### 3.16.2.1 Hot Tapping

The practice of Hot Tapping pipelines shall only be considered when all other options are exhausted. Consider the alternatives to the hot tap - run a temporary line, wait for an impending shutdown, isolate the particular piece of equipment, de-pressure and gas free, etc.

All applicable codes must be adhered to when designing a hot tap installation, including Provincial Pressure Equipment and ANSI Codes B31.1 or B31.3, for plant and compressor station piping systems.

#### 3.16.2.2 Dents

CSA Z662 Clause 10.10.4 requires dents to be inspected using visual and mechanical measurement methods capable of determining the location of the dent with respect to mill and seam welds, the depth and shape of the dent, and the presence of gouges and grooves. Internal pressure should be reduced to 40% Specified Minimum Yield Strength (SMYS) or less as may be necessary for safe excavation of constrained dents that are identified as integrity issue. Constrained dents typically occur on the bottom of the pipe.

The actual wall thickness of areas to be repaired by grinding in-service pipelines shall be assessed in accordance with Clause 10.10.1.5 and verified prior to grinding. The maximum allowable grind length and depth limits for safe working pressure conditions shall be established prior to grinding to depths greater than 10% of nominal wall thickness. Grinding on pipe containing pressure should be conducted utilizing soft-back sanding disks or sanding flappers except where minimizing grind length is critical and specific geometric and temperature control procedures are implemented. Bluing (heat tinting) the metal surface should be avoided and any such tinted material should be removed.



## 3.16.3 Record Keeping

A file shall be completed for the repair with all applicable QC documentation. All record keeping should be completed in accordance with Section 2.5.1 of the PIM.



# **Fibre-Reinforced Composite Pipelines**

3.17.1	Scope	
	3.17.1.1	Purpose
	3.17.1.2	Safety Precautions
	3.17.1.3	<b>Regulatory Requirements and References</b>
3.17.2	Engineerin	g Guidelines
3.17.3	Procedura	l References



### 3.17 Fibre-Reinforced Composite Pipelines

#### 3.17.1 Scope

This operations and maintenance section describes unique practices that must be employed for fibrereinforced composite pipelines with respect to, for example, repair, joining, pressure testing and pigging. These requirements were developed in compliance with CSA Z662.

#### 3.17.1.1 Purpose

Fibre reinforced composite pipe is generally used as an alternative to steel pipe as a means of transporting oil and gas products. Fibre reinforced composite pipe may be applied for a number of reasons. Several (but not all) of these reasons may include:

- Greater internal and external degradation resistance,
- Reduced weight,
- Lower long term capital cost and reduced maintenance cost.

#### **3.17.1.2** Safety Precautions

There are several safety precautions that should be considered when using fibre-reinforced pipe during operation and maintenance. Several (but not all) are listed below:

- Inhalation of fibre dust (typically during repairs upon cutting) or fibre perforation of bare skin,
- Risk of static electricity acting as a source of ignition,
- Product limitations to hot oiling (or similar) solids removal practices,
- Product degradation when exposed to long term cyclic or vibratory service, and
- Susceptibility to surficial damage when the product is exposed during ground disturbance activities in proximity to the pipe.

#### 3.17.1.3 Regulatory Requirements and References

#### <u>CSA Z662</u>

The governing specification for oil and gas pipeline systems is CSA Z662. Specifically, clause 13.1 covers additional requirements for pipelines constructed of fibre-reinforced composite pipe and fittings, including both individual and continuous length pipe.

#### **Other References**

Other documents recommended for further reference include ASTM D2517 and D3517, API RP 15 TL4 (fiberglass) and various manufacturer installation and maintenance manuals.



#### 3.17.2 Engineering Guidelines

Engineering may be required to specify connections for these types of pipelines and or the selection of product used. Typically, this should be provided by the fibre-reinforced composite manufacturer.

#### 3.17.3 Procedural References

#### **Dissipation of Static Electricity**

Fibre-reinforced composite pipe may not be electrically conductive, dependent upon materials used. Therefore, the following procedure for dissipation of static electricity shall be followed when pipelines are purged, repaired, replaced, or extended in the presence of, or potential presence of, flammable gas-air mixtures.

The most effective method to minimize the hazard of static electricity discharge is to apply a film of water to the work area prior to handling. A ground wire will only discharge the static charge from its point of contact. For further details refer to the pipe manufacturer.

#### **Tracer Wire**

These pipelines are typically installed with metal tracer wire used for locating purposes.

#### <u>Repair</u>

Fibre-reinforced composite pipelines (includes fiberglass pipelines) shall be repaired and pressure tested in accordance with CSA Z662 clause 13.1.8 and 13.1.6, and the general Abbey Resources IMP Procedure for Pipeline Repairs document.

The following repair methods are acceptable for repairing fibre-reinforced composite pipelines, provided that the repairs are in accordance with the manufacturer's recommendations.

1. Cut out the defective portion as a cylinder and replace it with pipe that meets the design requirements, using adhesive bonded collars, repair couplings, or flanges, or

2. Use of suitable repair clamps, as approved by the pipe manufacturer.

Note: Ensure the tracer wire or electrical continuity has not been damaged.

The repaired pipe shall at a minimum, be immediately, left exposed and subjected to a four-hour visual leak test at the highest available operating pressure.



#### <u>Joining</u>

Joints shall be made by competent personnel, in accordance with a documented fibre-reinforced composite pipe joining procedure, based upon the manufacturer's joining recommendations. Depending on the service, acceptable joining options are outlined in CSA Z662. Elastomers supplied by the manufacturer to provide joint sealing in fibre-reinforced composite pipe connections shall be rated for all conditions expected to be encountered during installation and use.

Where connected to fibre-reinforced composite pipelines, any steel pipe, risers, valves, or other heavy components shall be supported so that no load capable of damaging the fibre-reinforced composite pipe is imposed. For transitions from fibre-reinforced composite pipe to steel pipe that use threaded or adhesive-bonded tapered connections, steel shall form the outside portion of the connection (e.g., the steel collar shall be screwed over the fibre-reinforced composite pipe threads). For example see CSA Z662 Figure 13.1.

#### **Pressure Testing**

Fibre-reinforced composite pipelines shall successfully undergo concurrent strength and leak tests after installation in accordance with the CSA Z662 applicable requirements, the general Abbey Resources IMP Procedure for Pipeline Pressure Testing document.

During pressure testing, fibre-reinforced composite pipe material is more prone to pressure variances caused by temperature fluctuations of the testing fluid or ambient temperature than steel pipe. Maximum test pressures shall not exceed the manufacturer's published specification and recommendations, as applicable. Minimum test pressures shall be 125% of the intended maximum operating pressures identified in CSA Z662 Section 13.1.6.4. For gas service containing  $H_2S$ , there may additionally be requirements to test the pipeline at pressures greater than 125% of the maximum operating pressure (regulations require that all sour service piping containing more than 10 moles of  $H_2S$  per kilomole of natural gas shall be tested to a minimum of <u>1.4</u> <u>times the MOP</u> in all class locations). The maximum operating pressure at any point shall not exceed the lesser of

- a) the design pressure; or
- b) 80% of the minimum test pressure.

Portions of fibre-reinforced composite pipelines that leak during testing shall be repaired or replaced, and retested. An unsuccessful pressure test needs to be reported to the appropriate regulatory body, as applicable. Where fibre-reinforced composite pipelines are segmented into sections for pressure testing, re-testing of the completed pipelines shall not be required after tying-in, provided that a flanged connection is used. Flanges used for joining the segments shall be the same flanges used for the segmented pressure testing.

During the pressure test, the maximum temperature shall not exceed the pipeline design temperature rating or the manufacturer's maximum recommended operating temperature, whichever has been used as the limiting factor in the pressure design.

#### **Pigging**

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After the pipeline is built, it is recommended that pigs are run to remove any debris left in the line from new construction. When the pipeline is in service, it may be necessary to pig the pipeline to maintain efficiency by removing any debris, solids, or liquids that may collect and restrict the flow through the pipeline. In order to reduce the risk of damage to the pipeline, the use of foam pigs or polyethylene pigs designed specifically for fibre-reinforced pipelines is recommended.

#### **Removing Blockages**

The Field Superintendent, in consultation with the Pipeline Integrity Vendor, will work with the Field Operations to develop task specific procedures to attempt to remove blockages in non-metallic pipelines. Critical procedures and safety precautions that should be developed for using Coiled Tubing to complete clean outs on plugged composite pipelines will be developed on a project specific basis.



# **Steel Reinforced Composite Pipelines**

3.18.1	Scope
	3.18.1.1 Purpose
	3.18.1.2 Safety Precautions
	3.18.1.3 Regulatory Requirements and References
3.18.2	Engineering Guidelines
3.18.3	Procedural References


#### **3.18** Steel Reinforced Composites

#### 3.18.1 Scope

This operations and maintenance section describes unique practices that must be employed for steel reinforced composite pipelines with respect to, for example, repair, joining, pressure testing and pigging. These requirements were developed in compliance with CSA Z662.

#### 3.18.1.1 Purpose

Steel reinforced composite pipe is generally used as an alternative to steel pipe as a means of transporting oil and gas products. Steel reinforced composite pipe may be applied for a number of reasons. Several (but not all) of these reasons may include:

- Greater internal and external degradation resistance,
- Reduced weight,
- Lower long term capital cost
- Reduced maintenance cost

#### **3.18.1.2** Safety Precautions

There are several safety precautions that should be considered when using steel reinforced pipe during operation and maintenance. Several (but not all) are listed below:

- Exposed steel reinforcement (typically during repairs upon cutting) can cause lacerations;
- The requirement to monitor and dissipate the buildup of pressure in the annulus space between the inner liner and the outer shield, and
- Product limitations to higher operating pressures or lower operating temperatures

#### 3.18.1.3 Regulatory Requirements and References

#### <u>CSA Z662</u>

The governing specification for oil and gas pipeline systems is CSA Z662. Specifically, clause 13.1 covers additional requirements for pipelines constructed of reinforced composite pipe and fittings, including both individual and continuous length pipe.

#### **Other References**

Other documents recommended for further reference include API 17J and various manufacturer installation and maintenance manuals.



#### 3.18.2 Engineering Guidelines

Engineering may be required to specify connections for these types of pipelines and or the selection of product used. Typically, this should be provided by the steel reinforced composite manufacturer.

#### 3.18.3 Procedural References

#### **Dissipation of Static Electricity**

The carbon black additive to the line and the helically wrapped steel reinforcement may help dissipate static electricity as the steel reinforcement is electrically connected to the end fittings where the static charge can be discharged.

The most effective method to minimize the hazard of static electricity discharge is to apply a film of water to the work area prior to handling. A ground wire will only discharge the static charge from its point of contact. For further details refer to the pipe manufacturer.

#### **Electrical Continuity**

Steel reinforced composite pipelines typically have electrical continuity between the steel strip reinforcements and the fittings provided by continuity strips applied during fitting installation. The resulting continuous electrical path also allows the flow of a signal to facilitate pipe-locating, as well as rectifier and anode voltage for cathodic protection current through the pipe. As well, the continuity strips can be omitted to provide electrical isolation.

#### <u>Repair</u>

Reinforced composite pipelines shall be repaired and pressure tested in accordance with CSA Z662 Clause 13.1.8 and 13.1.6, and the general Abbey Resources IMP Procedure for Pipeline Repairs document.

The following repair methods are acceptable for repairing steel reinforced composite pipelines, provided that the repairs are in accordance with the manufacturer's recommendations.

- 1. Cut out the defective portion as a cylinder and replace it with pipe that meets the design requirements, using adhesive bonded collars, repair couplings, or flanges, or
- 2. Use of suitable repair clamps, as approved by the pipe manufacturer.

Note: Ensure the electrical continuity has not been damaged.

When installing new fittings, the outside and inside of the pipe should be completely cleaned of any chemical residue or paraffin, to allow the fitting to be in direct contact with the bare pipe to ensure a proper seal with the pipe is developed. The repaired pipe shall at a minimum, be immediately, left exposed and subjected to a four-hour visual leak test at the highest available operating pressure.

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#### <u>Joining</u>

Joints shall be made by competent personnel, in accordance with a documented steel reinforced composite pipe joining procedure, based upon the manufacturer's joining recommendations. Depending on the service, acceptable joining options are outlined in CSA Z662.

When welding fittings, the use of chill rings to direct heat away from the sealing section of the fitting, is recommended.

#### Pressure Testing

Steel reinforced composite pipelines shall successfully undergo concurrent strength and leak tests after installation in accordance with the CSA Z662 applicable requirements, the general Abbey Resources IMP Procedure for Pipeline Pressure Testing document,.

Maximum test pressures shall not exceed the manufacturer's published specification and recommendations, as applicable, and a field test should never exceed 1.5 times the nominal pressure rating. Minimum test pressures shall be 125% of the intended maximum operating pressures identified in CSA Z662 Section 13.1.6.4. For gas service containing H<sub>2</sub>S, there may additionally be requirements to test the pipeline at pressures greater than 125% of the maximum operating pressure (regulations require that all sour service piping containing more than 10 moles of H<sub>2</sub>S per kilomole of natural gas shall be tested to a minimum of 1.4 times the MOP in all class locations). The maximum operating pressure at any point shall not exceed the lesser of

- a) the design pressure; or
- b) 80% of the minimum test pressure.

Portions of steel reinforced composite pipelines that leak during testing shall be repaired or replaced, and retested. An unsuccessful pressure test needs to be reported to the appropriate regulatory body, as applicable.

During the pressure test, the maximum temperature shall not exceed the pipeline design temperature rating or the manufacturer's maximum recommended operating temperature, whichever has been used as the limiting factor in the pressure design.

#### Annulus Testing

Annulus testing is identified as a requirement within Section 6 (Installation and Handling) of the Flexsteel Installation and Operations Manual FLD-H-9925 where Flexsteel identifies in Section 6.4.7 that "As a component of the pipeline integrity management program for flexible pipelines, Flexsteel recommends an annulus test be performed on new installation construction projects. An annulus test ensures shield integrity of pipe following installation and handling and verifies that vent paths are free of blockages."

Flexsteel document TN-154 (Flex steel Inspection & Maintenance) further identifies in Section 2 that subsequent annulus testing following construction "may be performed at any time if there is concern of a shield breach. The purpose of this test is to ensure that the vent paths are free from any blockages and that the riser is venting freely. An annulus volume test may also be carried out to determine if there is any excessive gas build-up."



Should it be determined through visual inspection work that there are potential concerns with a shield breach, annulus testing should be completed at that time in accordance with the Flexsteel Installation and Operations Manual FLD-H-9925.

#### Pigging

After the pipeline is built, it is recommended that pigs are run for the removal of any solids and trapped air from the pipe. When the pipeline is in service, it may be necessary to pig the pipeline to maintain efficiency by removing any debris, solids, or liquids that may collect and restrict the flow through the pipeline. In order to reduce the risk of damage to the pipeline, the use of soft (foam or urethane) pigs or composite pigs that have foam disks supported by molded PU reinforcement, is recommended. Pigs made of metal; gauging pigs or squeegee pigs should not be used in the pipelines, as they can damage the polyethylene liner.

#### **Removing Blockages**

The Field Superintendent, in consultation with the Pipeline Integrity Vendor, will work with Field Operations to develop task specific procedures to attempt to remove blockages in non-metallic pipelines. Critical procedures and safety precautions that should be developed for using Coiled Tubing to complete clean outs on plugged composite pipelines will be developed on a project specific basis.



# Section 3.19

# **Polyethylene Pipelines**

3.19.1	Scope
	3.19.1.1 Purpose
	3.19.1.2 Safety Precautions
3.19.2	<b>Engineering Guidelines</b>
3.19.3	<b>Procedural References</b>



#### **3.19 Polyethylene Pipelines**

#### 3.19.1 Scope

This operations and maintenance section describes unique practices that must be employed for polyethylene pipelines with respect to, for example, repair, joining, pressure testing and pigging. This operations procedure was developed in compliance in with CSA Z662.

#### 3.19.1.1Purpose

Polyethylene pipe is generally used as an alternative to steel pipe as a means of transporting oil and gas products. Polyethylene pipe may be applied for a number of reasons. Several (but not all) of these reasons are listed as follows:

- Greater internal and external degradation resistance,
- Reduced weight,
- Long term capital cost,
- Reduced maintenance cost.

#### **3.19.1.2Safety Precautions**

There are several safety precautions that should be considered when using polyethylene pipe during operation and maintenance. Several (but not all) are listed below:

- Risk of static electricity acting as a source of ignition,
- Product limitations to hot oiling (or similar) solids removal practices,
- Product limitations to higher operating pressures or lower operating temperatures, and
- Product degradation when exposed to long term cyclic or vibratory service.

#### 3.19.2 Engineering Guidelines

As per CSA Z662, exposure to certain hydrocarbons has a cumulative effect and can reduce the pressure capability of polyethylene pipe. Continued exposure may also cause a reduction in tensile strength and an increase in physical dimensions (swelling) due to absorption of hydrocarbons by the pipe wall. The degree of absorption is a function of pressure, temperature, the nature of the hydrocarbons, and the polymer structure of the polyethylene. The company should consider each of such parameters before verifying the suitability of polyethylene for liquid hydrocarbon pipelines. The effects on polyethylene pipe of chemical additives to pipeline fluids should also be considered. Service temperatures for polyethylene pipe shall not exceed 60°C.

The material shall be qualified for butt fusion joining capability by the pipe manufacturer and initial butt fusion joining parameters for the material shall be provided by the pipe manufacturer. The pipe manufacturer shall supply a material test report (MTR).

#### 3.19.3 Procedural References



#### **Dissipation of Static Electricity**

Polyethylene pipe is not conductive. Therefore, steps should be taken for the dissipation of static electricity when pipelines are purged, repaired, replaced, or extended in the presence of, or potential presence of, flammable gas-air mixtures.

The most effective method to minimize the hazard of static electricity discharge is to apply a film of water to the work area prior to handling. A ground wire will only discharge the static charge from its point of contact. For further details, refer to the pipe manufacturer.

#### **Tracer Wire**

These pipelines are typically installed with metal tracer wire used for locating purposes.

#### <u>Repair</u>

Polyethylene pipelines (includes fiberglass pipelines) shall be repaired and pressure tested in accordance with CSA Z662, and the general Abbey Resources IMP Procedure for Pipeline Repairs document.

It shall be permissible to:

1. Perform temporary repairs to polyethylene pipelines using full-encirclement clamps approved by the pipe manufacturer. Temporary repairs shall be replaced by permanent repairs within one year.

2. Make permanent repairs to polyethylene pipelines containing defects by cutting out the defective portions as cylinders and replacing them with pipe or flanges that meet the design requirements, using heat fusion joining.

Pipe used for repair shall be pretested to 1.25X pipeline design pressure (but less than the manufacturer's maximum product rating). Immediately following any repair, the repaired pipe shall be left exposed and subjected to a 1 hour leak test at normal operating pressure. In gas gathering systems, another test shall be performed using flame ionization or proven equivalent between a minimum of two days and a maximum of one month after being placed in service.

During the completion of any required repairs, consideration should be given to the increased susceptibility of polyethylene pipelines to third party damage. Polyethylene pipe shall not be bent to radii smaller than the minimum recommended by the manufacturer. Backfill material shall be free of rocks that could damage the pipe and shall be composed of clean soil or sand that extends a minimum of 150 mm from the pipe wall in all directions. All other manufacturers recommendations for preventing third party damage during exposure should also be followed.

#### <u>Joining</u>

Procedures for joining polyethylene pipe are outlined in CSA Z662 clause 13.3.5. Pertinent sections are as follows. Polyethylene pipe and fittings shall be joined by heat fusion (method approved by manufacturer), special manufacturer approved fittings or flanges, or both. Threaded connections shall not be used. The company shall ensure that the personnel performing heat fusion joining are determined to be competent in the joining procedure by the liner installer. Procedures regarding the quality control and testing requirements of production fusion joints are outlined in CSA Z662 Clause 13.3.6 and 13.3.7.



#### **Pressure Testing**

Polyethylene pipelines shall successfully undergo concurrent strength and leak tests after installation in accordance with the CSA Z662 clause 13.3.8, the general Abbey Resources IMP Procedure for Pipeline Pressure Testing document, and the following specific to polyethylene pipelines:

- For all operating pressures, polyethylene pipelines shall successfully undergo a pressure test following installation and prior to being placed into service.
- Pipelines shall be given a field pressure test at 125% of the design pressure, using air, water, or water with freezing-point depressant as the test medium.
- For tests using water or water with freezing-point depressant, the test pressure shall be maintained for a continuous period of 3 hours after stabilization of the pressure (typically 3 to 4 hours). For tests using air, the test pressure shall be maintained for a continuous period of 24 hours after stabilization of the pressure. It is noted that polyethylene pipe undergoes expansion upon initial pressurization. Therefore, it may be necessary to add the test medium and allow sufficient time (e.g., 2 to 4 hours) for the pressure to stabilize prior to initiation of the pressure test. Additionally, the pipe manufacturer should be consulted regarding the produce specific pressure-test procedure.

Where polyethylene pipelines are segmented into sections for pressure testing, complete re-testing of the pipeline after tying-in shall not be required, provided that a flanged connection is used. Flanges used for joining the segments shall be the same flanges used for the segmented pressure testing. Where either heat fusion or flanges are used to connect tested segments, a 1 hour leak test of the joint shall be performed at the highest available operating pressure. For gas gathering pipelines, following backfilling, an additional leak detection test of the tie-in joint shall be performed, using flame ionization test methods, after a minimum of 48 hours and within one month of the pipeline being placed into service.

The maximum test pressure shall not exceed the value recommended by the pipe manufacturer. The maximum operating pressure at any point shall not exceed 80% of the test pressure. Pipelines that leak during testing shall be repaired or replaced, and re-tested.

#### Pigging

After the pipeline is built, it is recommended that pigs are run to remove any debris left in the line from new construction. When the pipeline is in service, it may be necessary to pig the pipeline to maintain efficiency by removing any debris, solids, or liquids that may collect and restrict the flow through the pipeline. Degradation control can be aided by effectively removing deposits, water traps, bacteria, and other materials that can damage the integrity of the pipeline. In order to reduce the risk of damage to the pipeline, the use of foam pigs is recommended.



# Section 3.20

# **Plastic Lined Pipelines**

3.20.1	Scope			
	3.20.1.1	Purpose		
	3.20.1.2	Definitions		
	3.20.1.3	Safety Precautions		
3.20.2	<b>Regulatory Requirements and References</b>			
3.20.3	Engineering Guidelines			
3.20.4	Procedural References			



3.20.4.1	Freestanding Liners
3.20.4.2	<b>Expanded Liners</b>

3.20.5 Record Keeping



#### **3.20** Plastic Lined Pipelines

#### 3.20.1 Scope

This operations and maintenance section describes unique practices that must be employed for plastic lined pipelines with respect to, for example, installation, joining, pressure testing, start-up, operation and pigging. This operations procedure was developed in compliance in with CSA Standard Z662.

#### 3.20.1.1Purpose

Plastic lined pipe (within a steel carrier pipe) is generally used as an alternative to internal bare steel pipe as a means of transporting oil and gas products. Plastic lined pipe may be applied for a number of reasons. The primary reason is that one may choose to install a liner in a pipeline to improve or maintain the integrity of a new or existing pipeline, and minimize internal corrosion concerns.

#### 3.20.1.2 Definitions

Liner	Is defined as a tubular product that is inserted into buried pipeline to form a corrosion-resistant barrier, or a separate freestanding pressure-containing pipe.
<b>Expanded Liner</b> (e.g., high-density polyethylene or nylon)	Is only a corrosion barrier; it is not acceptable as a pressure-retaining component. The steel pipeline it is installed into must have (proven) pressure integrity on its own before installing a liner.
<b>Freestanding Liner</b> (e.g., high-density polyethylene, fibre-glass, or other composite material)	Is a pressure-retaining component and may be acceptable as a substitute for sour service pipe if the liner material is suitable and licensing limitations are met. The steel pipeline it is installed into is not required to have any pressure-retaining ability.

#### 3.20.1.3Safety Precautions

There are several safety precautions that should be considered when using plastic lined pipelines during operation and maintenance. Several (but not all) are listed below:

- The requirement to monitor and dissipate the buildup of pressure in the annulus space between the plastic/composite lining and the steel carrier pipe in expanded liner applications,
- Product limitations to hot oiling (or similar) solids removal practices,
- Product limitations to higher or lower operating temperatures, and
- Product degradation when exposed to long term cyclic or vibratory service.

#### 3.20.2 Regulatory Requirements and References

#### <u>CSA Z662</u>

The governing specification for oil and gas pipeline systems is CSA Z662. Clause 13.2 covers additional requirements for thermoplastic-lined pipelines. Freestanding plastic pipe (fibre reinforced composite or



polyethylene) used as liner are addressed in Clauses 13.1 and 13.3 respectively.

All metallic pipe and components for sour service, as defined in Clause 16, require materials and welding for sour service to meet Clause 16.

#### 3.20.3 Engineering Guidelines

Thermoplastic (expanded) liners are installed to provide internal corrosion resistance for the pipelines. The steel piping provides the hoop strength requirement for the lined pipeline, thereby permitting pipeline design pressures in excess of the pressure rating of the liner pipe.

Consultation with the liner supplier shall verify the suitability of the liner material for all conditions anticipated during installation and service. Special consideration shall be given to the effects in particular absorption, of pipeline service fluids, including any additive chemicals, on the mechanical and physical properties of the liner.

Where fibre-reinforced composite pipe or polyethylene pipe is installed as a freestanding liner inside a steel pipeline, bend radii and the relative diameters of the liner and the steel pipe shall be in accordance with the liner manufacturer's recommendations. It is recommended that a pressure test on the liner pipe be performed following insertion.

Fluids left between the liner and the steel pipeline may damage the liner if allowed to freeze. The line should be pigged or verified to be clear of any obstacles that may damage the liner pipe.

#### 3.20.4 Procedural References

#### 3.20.4.1 Freestanding Liners

#### **Installation**

Pipelines that are intended to be lined shall have long radius bends to accommodate liner installation. Care should be taken in pulling liners through bends to prevent cutting of the carrier pipe by the cable used to pull in the liner. Continuing the pipe liner through elbow or tee fittings that are installed in the pipeline is not normally performed and may result in liner failure.

Pipelines that have been in service shall be internally cleaned of waxes, sludges, or other deposits prior to liner insertion. Prior to liner insertion, a sizing pig shall be run through the pipeline to verify that the internal diameter is such as to allow the liner to be installed without damage.



#### <u>Joining</u>

All end flange or mid-point pipe to pipe connections of free standing composite liners should be installed in accordance with the manufacturer's specifications.

#### **Pressure Testing**

All pressure testing of free standing composite liners should be installed in accordance with the manufacturer's specifications.

#### **Change in Service**

Where there are changes in service, the liner should be compatible with the new service fluid. The operating company shall ensure that fluids or operating conditions that are detrimental to the design life of the liner, as determined in accordance with CSA Z662 Clauses 13.2.2.1 to 13.2.2.3, are not introduced without assessment of their effect.

#### **3.20.4.2Expanded Liners**

#### **Installation**

Prior to the liner installation, thread-o-let or sock-o-let fittings to facilitate venting of the annulus between the liner and the carrier pipe shall be installed on the carrier pipe as recommended by the liner installer or manufacturer. Intermediate venting connections between flanged ends may additionally be required in operation. Provision shall be made for the monitoring and removal of any gases that accumulate in the liner annulus.

Pipelines that are intended to be lined shall have long radius bends to accommodate liner installation. Care should be taken in pulling liners through bends to prevent cutting of the carrier pipe by the cable used to pull in the liner. Continuing the pipe liner through elbow or tee fittings that are installed in the pipeline is not normally performed and may result in liner failure.

Immediately prior to liner installation, newly constructed pipelines shall be pressure tested in accordance with the requirements of Z662 Clause 8.

Prior to the lining of in-service pipelines, any leaking areas of the pipeline shall be repaired or replaced in accordance with the requirements of Z662 Clause 10.10. For the lining of in-service pipelines with an expanded liner, the mechanical integrity of the steel carrier pipe shall be confirmed immediately prior to the liner installation by:

- a) A 4 hour leak test at the intended maximum operating pressure of the lined pipeline; or
- b) An engineering assessment to determine if the pipeline is suitable for lining. Such an assessment should consider operating history; intended maximum operating pressure, past inspection results and known defects.

Prior to liner insertion, a sizing pig shall be run through the pipeline to verify that the internal diameter is such as to allow the liner to be installed without damage.



Pipelines that have been in service shall be internally cleaned of waxes, sludges, or other deposits prior to liner insertion. Chemical treatment prior to lining, to arrest or prevent internal corrosion of the pipeline, should be considered by the company for expanded liner installations.

Following liner insertion, the portion of the liner that is visible at the exit point shall be inspected; mechanical damage that exceeds the maximum recommended by the liner manufacturer or is deeper than 5% of the liner wall thickness shall not be permitted.

#### <u>Joining</u>

Liner and flange adapter fittings shall be joined using a butt fusion procedure that meets the requirements specified for polyethylene pipelines in CSA Z662 Clause 13.3.5. The company shall ensure that the personnel performing the joining of liners are determined to be competent in the joining procedure by the liner installer. The pipeline installer shall provide documented evidence of the competency, experience, training, and qualification for all fusion joining personnel installing polyethylene pipelines.

Prior to insertion of the liner joints, excess external weld bead on the liner shall be trimmed using equipment and procedures prescribed by the liner installer.

#### **Pressure Testing**

As per CSA Z662, following liner insertion, the lined pipeline shall be given a 4 hour leak test at 100% of the maximum operating pressure. Where such leak test is above 2.0 MPa, the pressure shall be lowered to 2.0 MPa and held for an additional 4 hours. The test at 2.0 MPa is in addition to the 4 hour leak test pressure at 100% of the maximum operating pressure.

For liners installed in new steel pipelines that have passed field pressure tests in accordance with clause 8, the 4 hour liner leak test may be performed with air in accordance with a test procedure approved by the company.

During the pressure test, the annulus vents shall be periodically opened and monitored for pressure build-up or flow of liquids. Note that typically a small pressure build-up or flow of liquids occurs at the liner annulus vents until the liner has fully expanded.

Liners that leak during leak testing shall be repaired, and retested in accordance with the requirements of CSA Z662 clause 13.2.7. Any pressure-test fluids that accumulate in the carrier pipe when a liner fails during pressure testing shall be completely removed prior to reinsertion of the liner.



#### Venting

The annulus of expanded liner pipelines shall be routinely checked by Operations for pressure build-up or leakage at a recommended frequency of every month, and checks shall not exceed an interval of 3 months at the most. In order to prevent collapse of the liner, liner vents should not be opened while the liner is under vacuum conditions, and the liner annulus pressure should not exceed the pipeline operating pressure. Where pressure build-up exceeds 25% of the operating pressure, the pipeline shall be investigated for liner leakage.

Pipeline liner vents must be checked and documented on the Pipeline Liner Vent Check record form, in order to determine if there is any permeation of process gas in the annular space.

NOTE: If there is significant gas present during vent checks, the frequency of venting should be increased, and a pressure gauge should be installed prior to venting in order to establish the details regarding maximum pressure obtained and the pressure build up period

The pressure in the annulus should not be allowed to reach operating pressure of the pipeline. If this occurs further investigation into the integrity of the liner is required. A daily check to determine the pressure build up period is recommended if this is encountered. Consultation with the Pipeline Integrity Vendor is required to develop a specific action plan for the line. If there is ever liquid present during liner vent check activities, immediate notification to the Field Superintendent and Pipeline Integrity Vendor is required.

#### Change in Service

Where there are changes in service, the liner should be compatible with the new service fluid. The operating company shall ensure that fluids or operating conditions that are detrimental to the design life of the liner, as determined in accordance with CSA Z662 Clauses 13.2.2.1 to 13.2.2.3, are not introduced without assessment of their effect.

#### **Procedures**

Refer to the Abbey Resources IMP Procedure for Pipeline Expanded Liners document for the recommended steps to follow for the commissioning, operation, pigging and depressurizing of pipelines with expanded liners installed in steel pipelines.

#### **Chemical Additions to Lined Pipelines**

Caution: HDPE liners are susceptible to attack from strong hydrocarbon solvents such as benzene, toluene or xylene (BTX) if in high concentrations. These are often present in wax solvent chemicals. Therefore, these solvents should not be introduced to the pipeline without owner and the liner manufacturer's approval.

Hydrate prevention chemicals such as methanol should be applied on a batch basis only. These typically will be added at a maximum volume of 1 barrel and left to dissolve hydrate plugs over 1 to 4 days. Use of these products in lined pipelines should only be performed with owner approval.

#### **Bolting and Unbolting of Lined Pipelines**



Lined sections of pipe that have been bolted together with flanges may be unbolted and re-bolted if required. However, quite often, a narrower than standard retaining ring is required between the flanges to obtain adequate recompression on the stub ends and in effect a leak free connection. Current United Pipeline recommendations are:

- Liner to liner flanges require the retainer ring to be machined 0.003"
- Liner flange to unlined steel flange require the retainer ring to be machined 0.0015".

Prior to unbolting a lined flange, the liner installation contractor should be called to obtain a correctly sized retaining ring.

*Note:* A lined flange connection may eventually require new stub ends if the bolting/unbolting procedure has to be done repeatedly. This has to be done by the liner installation contractor.

#### 3.20.5 Record Keeping

Liner Vent Check Record forms are located in the Abbey Resources electronic filing system. Complete and document required liner vent checks every 3 months at a minimum, if not more frequently. All record keeping should be completed in accordance with Section 2.5.1 of the PIM.



# Section 3.21

# **Hot Oiling**

3.21.1	Scope	
	3.21.1.1	Purpose
	3.21.1.2	Safety Precautions
	3.21.1.2	Safety Precautio

3.21.2 Procedural References



#### 3.21 Hot Oiling

#### 3.21.1 Scope

A hot oil pump truck has the same basic pump and associated equipment as a high pressure pumping unit with the addition of a heater. The term "hot oiler" is misleading since the unit is capable of heating any liquid it pumps. The heater has a diesel fired burner directed on a heating coil. The fluid being pumped is circulated through the heated coils if heat is desired. Temperature is controlled by manually adjusting the fuel flow to the burner and by the rate of circulation.

#### 3.21.1.1Purpose

Hot Oiling is performed to clean the pipeline prior to smart pig inspections and for removal of waxes during normal operations. Water should be used as the heating medium as the higher specific heat capacity will allow for improved cleaning results without excessive temperatures.

#### 3.21.2 Procedural References

The following guidelines for temperature considerations should be followed to minimize the likelihood of pipeline degradation due to excessive heat.

- Steel Lines
  - The maximum temperature during normal procedures should not exceed 60°C.
  - At no time should liquids greater than 75°C be allowed to enter the pipeline system, unless external coating systems are known to be designed for higher temperatures.
- Non-Metallic Lines
  - Manufacturer's recommendations must be adhered to as there is significant variability in the ability to withstand heat.
  - At no time should liquids greater than 60°C be allowed to enter the pipeline system, unless material specifications are known to be designed for higher temperatures.

These are generalized guidelines for normal design temperature pipelines. Both steel and non-metallic pipeline manufactures have some products rated for higher temperature service which can be exposed to higher temperatures during hot oiling activities. The Pipeline Integrity Vendor can provide further guidance related to specific application situations.



# Section 3.22

# Depth of Cover Water Crossing Management

- 3.22.1 Scope
  - 3.22.1.1 Purpose
  - 3.22.1.2 Definitions
  - 3.22.1.3 Safety Precautions
- 3.22.2 Regulatory Requirements and References
- 3.22.3 Engineering Guidelines
- 3.22.4 Procedural References
  - 3.22.4.1 High Flow Advisory Monitoring of Exposed and Severely Shallow Crossings
  - 3.22.4.2 Mitigation Methods for Exposed Pipeline Crossings
  - 3.22.4.3 Field Monitoring of Exposed and Severely Shallow Pipeline Crossings
- 3.22.5 Record Keeping



#### **3.22** Depth of Cover Water Crossing Management

#### 3.22.1 Scope

This operations section provides the corporate protocol with regards to pipeline watercourse crossing depthof-cover inspection, watercourse crossing monitoring and design of pipeline watercourse crossings making specific reference to applicable regulations, standards and generally accepted industry practices.

#### 3.22.1.1Purpose

The purpose of depth-of-cover water crossing management is to ensure public safety and environmental safeguarding at pipeline watercourse crossings, the immediate area of such crossings and downstream of the crossing within the associated watercourse.

#### 3.22.1.2 Definitions

1:1,000,000 Crossing	Watercourse that exists at a mapping scale where each unit of measure in real life 1,000,000 times larger than its depiction on the map.
1:250,000 Crossing	Watercourse that exists at a mapping scale where each unit of measure in real life 250,000 times larger than its depiction on the map.
Thalweg	Line of lowest elevation within a valley or watercourse.
Waterbody (Watercourse)	Hydrological feature having defined bed and banks, whether water is continuously present or not.

#### 3.22.1.3Safety Precautions

During inspection and monitoring practices there is potential for Abbey Resources employees or third-party Vendor representatives to become submerged within large, fast moving water bodies or to become submerged in a "breakthrough" event occurring on insufficient ice cover. Mandatory tethering shall take place on 1:1,000,000 scale crossings with spans exceeding 5 m, additionally when such sites are visited working alone is not permitted.



#### 3.22.2 Regulatory Requirements and References

#### <u>CSA Z662</u>

CSA Z662 Section 10.6.4.2 requires that underwater crossings be inspected periodically for adequacy of cover, accumulation of debris, and other conditions that can affect the safety or integrity of the crossing.

#### 3.22.3 Engineering Guidelines

Acceptable engineering guidelines are detailed in the ESRD document: Code of Practice for Pipelines and Telecommunication Lines Crossing a Waterbody. CAPP also has a reference document titled: Pipeline Associated Watercourse Crossings which details industry generally accepted practices and should be referred to.

#### 3.22.4 Procedural References

Refer to the Abbey Resources IMP Procedure for Pipeline Depth-of-Cover Inspections document for the recommended steps to follow for completing depth of cover inspections on pipelines at water body crossings.

#### 3.22.4.1 High Flow Advisory Monitoring of Exposed and Severely Shallow Crossings

During times of High Flow Advisory, additional mitigation methods should be considered to prevent further scour, and/or protect the public and wildlife from hazardous exposure features. This should be treated as an interim risk management plan however until remediation can be completed on the exposed or severely shallow crossing.

Monitoring shall be conducted during High Flow Advisories to ensure that the effects of high flow are noted and changes to exposed or nearly exposed crossing are identified and addressed immediately if actions are deemed necessary. The Mitigation methods and High Flow Advisory Monitoring procedure are detailed further below. Both mitigation and monitoring shall remain in place for operating exposures until such time that the crossing is remediated or taken out of operating service. Out of service exposures that pose a threat to public or wildlife shall remain fenced at a minimum until such time that the crossing is remediated or removed.

#### **Operating Exposed Pipelines:**

Monitoring during high flow advisories is mandatory. Shut-in is required when critical flow is breached.

#### **Out of Service Exposed Pipelines:**

Monitoring during high flow advisories may be deemed necessary if the crossing is prone to changes, but not mandatory.

#### 3.22.4.2 Mitigation Methods for Exposed Pipeline Crossings

The following options shall be implemented as required:

• Temporary fencing to restrict access.



- Protective berm construction on and upstream of the exposed pipe using sandbags to prevent further scour and protect the pipe from debris.
- Methods of support for free-spanning pipe.
- Shut-in of operating pipelines if critical flow rates are occurring.

#### 3.22.4.3 Field Monitoring of Exposed and Severely Shallow a Pipeline Crossings

Monitoring practices shall be conducted during any time in which High Flow Advisories are in place or risk of high flow conditions exist; this includes spring run-off (breakup), periods of abnormally high amounts of rain, or at crossings that fall downstream of beaver dams (washout may occur if the dam is breached).

For operating pipelines, the required Hydrological Assessment will have determined the scour analysis and critical flow rates associated at the nearest Water Survey of Canada (WSC) Stations. Stations can be monitored at <u>http://www.ec.gc.ca/rhc-wsc/</u>.

Operating exposed pipelines must have a daily field visit by a Field Operator *when high flow advisories are in effect.* Specific attention to the flow characteristics and changes to the crossing shall be recorded and pictures taken for internal records. Operations should consider the use of a hand-held flow meter to verify if flow is at or above critical value (for scouring) determined within the Hydrological Assessment, use of this method will have to be a viable option based upon crossing characteristics and accessibility.

#### 3.22.5 Record Keeping

All record keeping should be completed in accordance with Section 2.5.1 of the PIM. Any observations or concerns should be disclosed to the Pipeline Integrity Vendor to determine if any follow up action is required.

**THIS IS EXHIBIT** "**M**" referred to in the Affidavit of **Jim Gettis** SWORN BEFORE ME this <u>25th</u> day of <u>February</u>, 2022.

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**A COMMISSIONER FOR OATHS** in and for the Province of Alberta.

### SPILL RESPONSE S.O.P. – INITIAL NOTIFICATION

Upon initial discovery of the spill. Ensure the following steps are followed in order:

- 1. Is there an immediate threat to yourself? If so, stop work and call for HELP. If not, proceed.
- 2. Shut in source well/wells to stop the flow of free product.
  - Retain a vacuum truck to bleed down the line if free product is still coming to surface, and • recover fluid from the bell hole before it soaks in.
- 3. Contain the spill material.
  - If the spill is large enough to continue migrating, use a shovel or retain equipment (rubber-tire hoe) to create a berm to stop the migration of material.

Once the spill is shut in and contained, call Millennium Land Ltd. spill response line to notify them of the spill @ 1-844-778-4430.

#### \*\*IMMEDIATE notification to the MER field office, or the Emergency Support Line is required.

Following the phone call, email the following information to: <u>spills@mland.ca</u> as soon as possible. Millennium will require the below information to notify MER.

#### \*Use the Theodolite app to take a photo of the spill and attach to the email. The GPS tag on the photo will provide specific location of the spill.

#### Document the following information and provide in the email:

•	Date the spill was found?					
•	What is the legal surface location of the spill?					
•	What type of substance was released?					
•	Volume of product released?					
•	The action undertaken to mitigate the incident:					
	<ul> <li>Has the source been isolated?</li> </ul>					
	<ul> <li>Is the spill contained?</li> </ul>					
	<ul> <li>Has fluid been recovered? If yes, how much and where was it taken?:</li> </ul>					
•	Has an ERP been triggered?					
•	Have emergency services been notified or are en route?					
•	Are any injuries/fatalities known to have occurred in connection with the incident?					
•	Did it affect a significant water body (lake, river, stream, or slough)?					
•	Is the incident known to have impacted any wildlife?					
•	Has the incident occurred on First Nation reserve lands?					
•	Has the incident resulted in the evacuation or notification to residents to stay indoors?					
•	Does the incident involve fire of free phase product not yet contained?					
•	Is an incident command required?					
•	What was the cause of the spill?					
•	What type of facility is it?					
•	Was the spill a result of a line break?					
	<ul> <li>If so, where does the line initiate/type of facility?</li> </ul>					
	<ul> <li>If so, where does the line terminate/type of facility?</li> </ul>					
	<ul> <li>If so, what is the line made of?</li> </ul>					
•	What is the surface location (If different than source well)?					
•	Has the Landowner/Occupant been contacted (Who is it)?					

### SPILL RESPONSE S.O.P. – INITIAL RESPONSE

Following notification to Millennium, decide if free product needs recovery from surface. Any time where there is a pooling of material, which could cause further impacts if left on site, recovery by a vacuum truck should be completed.

\*Recovery of free product from surface should be completed as soon as possible. Leaving impacted material on surface can cause issues with further migration of impacts, as well as complications with landowner and wildlife.

#### Fluid Recovery not required



Fluid Recovery required

All recovered materials must be disposed of properly (ie. Secure Energy Services, or the 14-36-020-19 W3M compressor station). If you are unsure if material should be recovered, please ask Millennium personnel to make the judgement call based on the photo you provided.

\*You must keep track of how much material was recovered and where it was taken to. MER requires this information for the Reclamation Report.

#### **FENCING**

\*If recovery of material is required, and not immediately possible, a fence should be erected surrounding the material to ensure wildlife do not access the spill material.

MER does not like electric fences as they must be meticulously maintained to ensure cattle do not access. Use of panel or tech fence is preferred.

#### **ENVIRONMENTAL INITIAL RESPONSE**

Millennium personnel are required to respond to the spill right away to obtain proper documentation of the spill footprint, as well as sample the material. Proper documentation and sampling must be completed prior to excavating the spill area. Millennium personnel will also provide direction on whether any additional mitigation is required to contain the spill footprint.

### SPILL RESPONSE S.O.P. – EXCAVATION

#### SPILL MATERIAL RECOVERY

The first thing to consider is excavation and removal of impacted materials from Site:

- 1. A poly liner should be laid down to protect the soil beneath the stockpiled waste materials.
- 2. Visually impacted material should be excavated and stockpiled separately from the other material on the poly liner.
- 3. Millennium personnel will provide direction on segregation of impacted materials.

#### **FLOWLINE EXCAVATION**

Proper excavation procedures will ensure that reclamation of the project area goes much more smoothly.

- 1. Abbey personnel will coordinate all their own Ground Disturbance, but Millennium personnel will be onsite to aid in providing direction on segregation, backfill, and reclamation.
- 2. Following recovery and stockpilng of the impacted materials, topsoil must be stripped and stored separately from subsoil. Topsoil in many of the areas in which Abbey operates is extremely thin (specifically in pastureland), and losing or admixing topsoil can cause significant reclamation challenges.
- 3. Following stripping of available topsoil, the subsoil overburden can be excavated to expose the flowline.
- 4. Subsoil must be stored separately from topsoil.
- 5. Maintain a separation between stockpiles to avoid admixing.
- 6. While excavating the flowline for repair, any soils that appear impacted should be stockpiled with the previously excavated waste material on the poly liner.
- 7. Millennium will sample the walls and base of the excavation, as well as the stockpiled materials, to determine if impacts remain at site.

Flowline repair will be directed by Abbey personnel and will not require the supervision of Millennium.

\*Unless otherwise directed by the Ministry of Energy and Resources, the excavations <u>WILL REMAIN</u> <u>OPEN</u> until the analytical results are received. Open excavations will be fenced for safety, and to prevent wildlife and unauthorized personnel from entering the excavation. Sites which must be backfilled prior to receiving analytical will require approval on a site-by-site basis.

Following completion of the excavation, the waste material stockpile must be disposed of properly (ie. Secure Energy Services, or the 14-36-020-19 W3M compressor station). If it's assumed that additional material may require removal from site based on the analytical results, the disposal of the waste material may be completed during the backfill stage. If the material is to remain on site for an extended period, it <u>MUST</u> be situated on a poly liner to prevent further migration of impacts.

\*You must keep track of how much material was recovered, what type of material, and where it was taken to. MER requires this information for the Reclamation Report.

### SPILL RESPONSE S.O.P. – BACKFILL AND RECLAMATION

Once analytical result are received, Millennium will table and review the results to determine if impacts remain within the excavation which need additional removal. Based on the analytical results, it will be determined if the site can be backfilled.

Sites which demonstrate sample above criteria may require additional excavation and removal of materials. This will be determined by Millennium personnel.

If analytical results indicate that the site can be backfilled, subsoil must be placed back into the excavation first and packed to reduce subsidence. If more than one subsoil stockpile is present, the stockpile with the highest Chloride levels must be backfilled first.

Once the subsoil has been backfilled and compacted, the topsoil can be replaced over the excavation as evenly as possible. Contouring of the excavation should be consistent with background, while maintaining a slight crown to account for subsidence.

Additional reclamation should be completed to ensure the site is as close to background conditions as possible. If the site appears to be uneven or additional reclamation should be completed using a rototiller, rotospik, harrows, or other reclamation equipment suitable for the job. Millennium can help make the determination on what should be used.

#### **FENCING**

All open excavations must be fenced if being left open without direct supervision. This ensures that cattle/wildlife/people do not access the excavation and get hurt.

#### **EROSION CONTROL**

Following backfill of the excavation, erosion control measures may be requested by the landowner, or required based on the land use or soil type. Millennium will provide direction on erosion control which could include straw crimping over the excavated area, installing erosion control matting, or alternative measures.

**THIS IS EXHIBIT** "N" referred to in the Affidavit of **Jim Gettis** SWORN BEFORE ME this <u>25th</u> day of <u>February</u>, 2022.

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**A COMMISSIONER FOR OATHS** in and for the Province of Alberta.



### **Notice of Proposed Regulations**

#### Background

The Ministry of Energy and Resources (ER) is consulting with stakeholders on a draft regulatory package featuring new provisions and enhancements to strengthen Saskatchewan's oil and gas liability management system. The draft regulatory package includes:

- Proposed new regulations called *The Financial Security and Site Closure Regulations* (FSSCR); and
- An amendment to The Oil and Gas Conservation Regulations, 2012 (OGCR).

The changes featured in the draft regulatory package aim to reduce the prospect of new orphan oil and gas infrastructure in the future by ensuring that oil and gas companies are attending to and paying the full cost of their environmental liabilities, which has been a long-standing principle of ER's liability management programs.

#### **The Process**

Stakeholders are invited to review and provide written comment on the draft regulatory package until March 31, 2021. Upon conclusion of this consultation period, ER will review feedback received in the preparation of final drafts to be presented for consideration by the Lieutenant Governor in Council.

#### **Summary of Proposed Changes**

The draft regulatory package contains new regulatory provisions and enhancements to existing oil and gas liability management programs. The FSSCR, which replace provisions in the OGCR dealing with "end of life" obligations of oil and gas companies regarding wells, facilities and associated flowlines feature the following key elements:

- 1. <u>Inactive Liability Reduction Program</u>: a new results-based program for reducing liabilities held by oil and gas companies that will gradually bring down the percentage of inactive wells and facilities in the system through prescribed annual reduction targets;
- 2. <u>Enhanced LLR Program</u>: adjusting the existing Licensee Liability Rating (LLR) formula to better reflect a licensee's actual assets and liabilities in order to calculate security deposits more accurately; and
- 3. <u>Proportional Risk Assessments for Transfers</u>: codification in regulations of a highlyeffective methodology for determining the additional security required for transfers between licensees that involve a high percentage of inactive wells and facilities.

Additional details on these program elements are included in Appendix A.



The draft regulatory package also features an amendment to the OGCR to allow ER to consider certain risk factors in determining licensee eligibility, including the applicant's compliance track record, the history of its directors or shareholders or its experience in oil and gas operations.

#### **Review of Draft Regulations**

ER is seeking written comments on the draft regulatory package. Draft regulations are attached to this notice as Appendices B and C.

Please direct any written comments or questions about the proposed amendments to the ER Service Desk at <u>er.servicedesk@gov.sk.ca.</u>

Please also note that ER will be hosting two "town-hall" meetings in March 2021 to provide overviews of the draft regulations.

The deadline for submitting written comments is March 31, 2021.

#### APPENDIX A

# Enhanced Licensee Liability Rating (LLR)

The LLR program first began use in 2009 in Saskatchewan and has also been used in Alberta and BC. Stated mathematically, the model is simply the ratio of a licensee's asset value divided by its liabilities.

# $LLR = \frac{Asset \, Value}{Liabilities}$

If this ratio is less than 1, then the licensee's liabilities are greater than their assets, and correspondingly the licensee is required to submit a security deposit in the amount of the difference. Conceptually, the idea behind the LLR is sound, but the method for calculating asset value has been unreliable. Specifically, the current approach relies on industry average netbacks for determining the asset value of a licensee rather than the true corporate netback.

The netback is highly variable from one company to the next and as a result most company's netbacks are either significantly above or below the average, meaning that the model is usually not accurate in terms of identifying companies that may be struggling with cash flow. The consequence of this has been that over the years there have been many situations in which companies have gone into receivership or bankruptcy having an LLR greater than one, meaning that they had no security on account to help backstop the orphan costs.

To overcome the short comings of the current LLR calculation, ER has developed a much more accurate approach, which has been named the "Enhanced LLR", using financial data required to be submitted to ER under its various Acts and regulations. This information is maintained in ER's Integrated Resource Information System. The revised method is described below.

### Enhanced Licensee Liability Rating (LLR)

The enhanced LLR calculates the Asset Value by starting with the production value reported by licensees for royalty/tax purposes. The information reported includes monthly production at the individual well level and the actual price at the wellhead for the oil/gas sold. Summing this information over 12 months at the licensee level gives us the actual annual gross income for each licensee.

Then, total operating costs, transportation costs and freehold royalties/taxes are estimated based on assumptions input to the model. Crown royalties are known. The model calculates the Annual Net Income for each licensee by subtracting the above deductions from the actual gross income. This becomes the LLR asset value.

This approach then allows ER to calculate company specific netbacks that are highly accurate as compared to the industry average. Additionally, ER will be using actual expenditure data

#### APPENDIX A

for abandonment and reclamation under the ASCP to refine the deemed liability values used in the LLR program. Thus, the introduction of the enhanced LLR model will be a very significant improvement in terms of measuring solvency and potential risk to the orphan fund.

Stated mathematically, the asset value under the enhanced LLR program is calculated as:

Asset Value = ANI x Return Period

where:

**Return Period is:** 

- (a) three years;
- (b) the average payback period for a licensee's assets taking into consideration the expected rate of return and the production decline rate of the assets as determined by the minister;

ANI is the annual net income of a licensee calculated as:

ANI = GPV - OC - R - T

where:

ANI is the annual net income of a licensee;

GPV is the annual gross production value of sales reported for royalty or tax purposes pursuant to section 101 of the OGCR;

OC is the total annual operating cost that is attributable to the oil and gas infrastructure licensed to a licensee, as determined by the minister;

R is the total annual sum of Crown royalties and freehold production tax with respect to production attributable to a licensee's licensed oil and gas infrastructure, plus annual freehold royalties as determined by the minister; and

T is the total annual transportation cost in relation to production attributable to a licensee's licensed oil and gas infrastructure as determined by the minister;

#### **APPENDIX B**

(2) Notwithstanding subsection (1), the minister may provide liability information pertaining to unassessed problem sites, assessed problem sites or contaminated sites to a transferee with respect to a licence transfer.

#### PART 11 General

#### Applications

**11-1** An application pursuant to these regulations must be made in accordance with section 6 of *The Oil and Gas Conservation Regulations*, 2012.

#### Methods of payment

11-2 Any payment required to be paid pursuant to these regulations must be paid:

- (a) subject to clause (b), by one of the following methods directed by the minister:
  - (i) pre-authorized debit;
  - (ii) electronic transfer of funds;
  - (iii) cash or cash equivalent; or

(b) in the case of exceptional circumstances that, in the opinion of the minister, prevent payment by the method directed by the minister pursuant to clause (a), by any other method acceptable to the minister.

#### PART 12 Coming into Force

#### **Coming into force**

**12-1** (1) Subject to subsection (2), these regulations come into force on the day on which they are filed with the Registrar of Regulations.

(2) Part 5 of these regulations comes into force on January 1, 2023.

**THIS IS EXHIBIT** "**O**" referred to in the Affidavit of **Jim Gettis** SWORN BEFORE ME this <u>25th</u> day of <u>February</u>, 2022.

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**A COMMISSIONER FOR OATHS** in and for the Province of Alberta.

## Liability Management Rating

### Abbey Estimate

LMR	Assets	Liabilities	Remarks
1.51	\$46,348,102	\$30,717,500	Assets include existing deposit and equipment
1.35	\$41,348,102	\$30,717,500	Assets Include existing Deposit only

Assets							
Abbey Estimates	Year	No of LLR	Net back	Asset	Deposit	Salvage	Total
Marketable Sales Gas GJ/day	days	Years	\$/gj	Value	\$	Equipment \$	Assets
10,000	365	3	1.25	\$13,687,500	27,660,602	5,000,000	\$46,348,102
10,000	365	3	1.25	\$13,687,500	27,660,602	0	\$41,348,102
Liabilities Abbey Estimates							
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Wells	Abandon	Cut and Cap	Reclaim	Total/Unit	Total		
2075	\$3 <i>,</i> 600	\$1,800	\$5 <i>,</i> 500	\$10,900	\$22,617,500		
275				\$20,000	\$5,500,000 SCVF, New Technology		
Compressor Sites				\$2,600,000	\$2,600,000		
				Grand Total	\$30,717,500		