

July 18, 2016

Alberta Utilities Commission  
5th Avenue Place  
400, 425 – 1st Street SW  
Calgary, Alberta  
T2P 3L8

**Attention: Brian Shand, P. Eng.**

**Re: ATCO Pipelines  
Radiographic Weld Inspection**

Please find attached, ATCO Pipelines' responses to the Alberta Utility Commission's information clarity request, received on June 27, 2016 regarding ATCO's radiographic weld inspections.

In addition, please find attached ATCO Pipelines' revision to one of the May 31, 2016 responses to the Alberta Utility Commission's information clarity request received on May 13, 2016 regarding ATCO's radiographic weld inspections.

Should the AUC request further clarification or desire further information on this matter, please contact the undersigned at 780-420-7225 or by email at [graeme.feltham@atco.com](mailto:graeme.feltham@atco.com).

Sincerely,



Graeme Feltham, P. Eng, MBA  
Vice President, Engineering & Construction  
ATCO Pipelines

**ATCO-AUC-2016MAY13-001 (REVISION)**

**Topic: Historic Operation**  
**Reference: May 3, 2016 ATCO Pipelines letter**

- (d) Please discuss how the 2008 through 2015 time frame for substandard inspections was determined and whether ATCO Pipelines considers prefabricated pipeline assemblies prepared prior to this time period to be at a similar risk.

Revised Response:

- (d) Through ATCO's ongoing investigation, it was determined that three radiography companies and two radiographers were responsible for the substandard inspections in the period 2008 through 2015. One of the radiographers performed radiographic services as a Level II radiographer for ATCO prior to that period; the other radiographer did not perform radiographic services as a Level II radiographer for ATCO prior to that period.

In addition to the review being conducted between 2008 and 2015, ATCO is also conducting a review of the work of the radiographer (who provided substandard inspections between 2008 and 2015) prior to 2008. It should be noted that the radiographic film prior to 2008 was disposed of previously.

**ATCO-AUC-2016JUN27-001**

**Reference:** May 3, 2016 ATCO Pipelines letter and May 31, 2016 information request responses

**Issue:** Nature of the deficiencies

**Quote:** In ATCO-AUC-2016MAY13-001, ATCO responded:

“(c) The specific nature of the deficiencies identified respecting the substandard radiographic inspections included the following:

- The radiograph produced through the radiographic inspection process was not of a sufficient quality that a proper evaluation of the weld could occur, or
- The presence of rejectable defects within pre-fabrication welds were not identified for remedial action.”

**Preamble:** Explanations of the specific nature of the deficiencies associated with the radiographic inspection films are requested.

Explanations of the specific nature of the deficiencies that are suspected or have been identified through re-inspections are requested. The Commission requires that information to assist in assessing the risk associated with any potential flaws associated with the welds.

**Request:**

- (a) Please clarify the specific deficiencies that have been identified with the radiographic films. Concerning radiographic quality, please provide a tabulation identifying weld numbers, date of original radiographic inspection and specific quality issues associated with each substandard radiograph for each weld. Examples of radiograph quality issues include: incorrect density range, incorrect image quality indicator (IQI), IQI not visible, IQI at wrong location, required sensitivity or definition not achieved, incomplete weld coverage, weld obscured by identification or location markers, processing marks, handling marks, wrong class or type of film, or required exposure technique not followed. Where radiograph quality does not permit a revised interpretation that should be indicated on the tabulation.
- (b) Please describe the specific weld deficiencies suspected or rejectable defects identified through examination of the original radiographic films or re-inspections conducted. Concerning weld defects, please provide a tabulation identifying weld numbers, dates of radiographic inspection (original and re-inspection), and weld defect types, locations, and dimensional characteristics associated with each rejectable weld. Weld defect types should be described using the terminology of CSA Z662 Clause 7. Weld defect locations should be described in terms of circumferential position, through-thickness (bead) location, if known, and upstream or downstream position (if known). Dimensional characteristics should be described in terms of the CSA Z662 Clause 7 acceptance criteria (e.g., the measured length, depth, width or diameter as applicable, for each weld defect). CSA Z662-15 clauses 4.1.10, 5.8 and 10.1 should be consulted for additional information that may be necessary for engineering assessment of each non-conformance (or group of technically similar non-conformances). As a matter of clarity, it was noted that the ATCO voluntary self-disclosure uses the phrase “engineering evaluation”, and does not specifically mention the CSA Z662 defined terms “engineering assessment” and “engineering critical assessment” which should be utilized in the descriptions of the engineering work.

**Response:**

(a) The following are the specific deficiencies identified:

- Not meeting standards of appropriate radiographic density;
- Not meeting standards required in relation to the image quality indicator ("IQI");
- Not meeting standards of appropriate sensitivity;
- Providing radiographs that were of poor quality due to poor processing and handling of the films;
- Providing radiographs where the location markers were poorly placed and the increments insufficient to provide traceability;
- Providing radiographs that were poorly identified and lacking traceability from the radiograph to the part that was to be the subject of the Radiography Work;
- Providing radiographs that lacked 100% coverage of the complete weld;
- Providing reports on the radiographs that were deficient;
- Not implementing proper techniques to obtain the required radiograph sensitivity or coverage;
- Providing radiographs of welds that were radiographically duplicated and not a true representation of the original weld;

As ATCO does not have internal resources that have the skills and qualifications to perform radiographic inspection and interpretation, Bennett Jones LLP, legal counsel for ATCO, retained an independent third-party to review a significant sample (approximately 13,000 radiographic inspections) of the radiographic work performed for ATCO. Please refer to ATCO-AUC-2016JUNE27-001(a) Attachment, for a tabulation of the radiographs with quality issues.

(b) The following are the specific deficiencies that have been identified through re-inspection:

- Incomplete Penetration
- Porosity
- Incomplete Fusion
- Slag

Please refer to ATCO-AUC-2016JUNE27-001(b) Attachment, for a tabulation of weld defects.

ATCO has also hired an independent engineering consultant to perform engineering assessments and engineering critical assessments in accordance with CSA Z662.

**ATCO-AUC-2016JUN27-002**

**Reference:** May 3, 2016 ATCO Pipelines letter and May 31, 2016 information request responses

**Issue:** Root cause factors

**Quote:** In ATCO-AUC-2016MAY13-001, ATCO responded:

“(b) Radiographic inspection and interpretation is a specialized skill, as a result, independent third-party radiography companies were hired through a competitive bid process to complete all radiographic weld inspections at the welding shop, using the third party radiography companies’ own equipment and employees. The third-party radiography companies were required to provide independent inspection, review, and evaluation of the welds. Following an investigation, it was determined that third-party contractors commissioned to provide radiographic inspection services for pre-fabrication welding were not fulfilling their contractual or professional obligations as accredited radiographers.”

**Preamble:** The AUC would like to identify the root cause factors that may have contributed to radiographic inspection deficiencies and would like to obtain more information with respect to the history of work execution and management processes to detect anything systemic that may have contributed to potentially substandard radiographic inspections from 2008 to 2015 including consideration of:

- method of managing welding and inspection work
- selecting welding procedures for joints
- assessing welder qualifications
- assigning welders to the work
- directing and monitoring welders
- coordinating radiographic inspection
- communicating radiographic inspection requirements
- reviewing qualifications and experience of radiographic service providers and radiographic technicians
- directing and monitoring radiographic inspection activities
- receiving and reviewing radiographic reports and film
- preparing repair lists
- documenting the status of completed welds

**Request:**

- (a) For radiographic technicians, including film interpreters, please describe the minimum ATCO requirements with respect to qualifications, training, and experience, including any training provided with respect to ATCO radiographic inspection requirements.
- (b) Please describe who approves the qualifications of radiographers and other inspectors (see CSA Z662 Clause 7.10.1.1).
- (c) Please describe who approves non-destructive inspection procedures (see CSA Z662 Clause 7.10.4.1).

- (d) For the period in question (2008 to 2015) please discuss if ATCO accepted radiographic inspection results as fully correct and compliant with CSA Z662 without further review or audit.
- (e) If radiographic inspection results were reviewed by ATCO, please describe the review process and provide any related procedures.
- (f) When weld repairs were identified, please describe how repair locations were identified on welds, and how repair completion was monitored and recorded.
- (g) The ATCO response implies that there was more than one radiography company and more than one radiographic technician. Please discuss how many radiographic companies, radiographic technicians, and film interpreters were involved with the radiographic deficiencies found between 2008 and 2015.
- (h) Please discuss what observations or conditions lead to investigation and discovery of the radiographic deficiencies.
- (i) Please discuss whether ATCO has audited any radiographic inspections prior to 2008 or after 2015 and the resultant observations.

**Response:**

- (a) Examiners shall have training and experience commensurate with the needs of the specific examinations. Examiners attest to their qualifications on the applicable "Radiographic Examination Report" and identify the specific code each weld is being interpreted to.
- (b) ATCO approved the level of qualification required from the radiographers and understood from the radiographic companies it hired that all radiographers had such level of qualification. ATCO relies upon third party radiographic companies to ensure that radiographers have appropriate qualifications as attested to in the weld inspection reports.
- (c) ATCO approves the non-destructive inspection procedure used.
- (d)(e) Radiographic inspection and interpretation is a specialized skill, as a result, independent, third-party, radiography companies were hired through a competitive bid process to complete all radiographic weld inspections at the welding shop, using the third party radiography companies' own equipment and employees. The third-party radiography companies were relied upon to provide independent inspection, review, and evaluation of the welds. It was not general industry practice to provide "double inspections" (i.e. inspecting an inspector) when the work being performed is regulated through accreditation, as is the case with radiography work and ATCO did not perform such "double inspections".
- (f) The repair locations would be identified in accordance with CSA Z662. There would be communication (verbal, written and/or by markings on the weld itself) between the radiographer and the welder on the type and location of the defect. Once the defect was repaired by the welder, the radiographer would re-inspect the weld to confirm that it was acceptable. This information would be documented on the radiographer's report and prefabrication drawings.

- (g) There are three radiography companies (CANADA INSPECTION ASSOCIATES LTD., ALL CAN INSPECTION SERVICES (2011) INC., and BUFFALO INSPECTION SERVICES (2005) INC.,) and two radiographers that worked for those companies between 2008 and 2015, that are involved in relation to this deficient radiographic work. One of those radiographers also did work for ATCO prior to 2008. Please also refer to the revised response to ATCO AUC-2016MAY13-001(d).
- (h) In 2015, during the detailed as-built process of a pipeline construction project where radiographs were being scanned and matched to the electronic asset record, a deficient radiographic film was discovered and a detailed investigation followed.
- (i) ATCO has hired auditors to conduct audits of radiographic inspection work that was completed in 2016. On the audits of Radiographic Inspection Company "A", some quality issues were determined with the radiographic film, however the interpretation was acceptable and any weld issues were well reported. On the audit of Radiographic Inspection Company "B", the radiographic inspection work was determined to be satisfactory. As noted in response ATCO-AUC-2016MAY13-001 (REVISION)-(d) above, radiographic film prior to 2008 is not available.

**ATCO-AUC-2016JUN27-003**

**Reference: May 3, 2016 ATCO Pipelines letter and May 31, 2016 information request responses**

**Issue: Results of re-inspections**

**Quote:** In ATCO-AUC-2016MAY13-002 ATCO provided a table with 378 locations where 24 locations had been re-inspected. The maximum operating pressure at each of the 24 locations was derated. In ATCO-AUC-2016MAY13-003, ATCO responded:

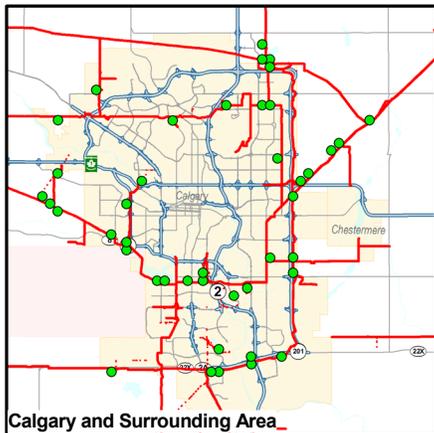
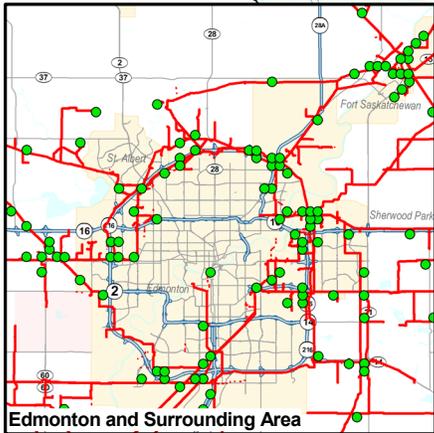
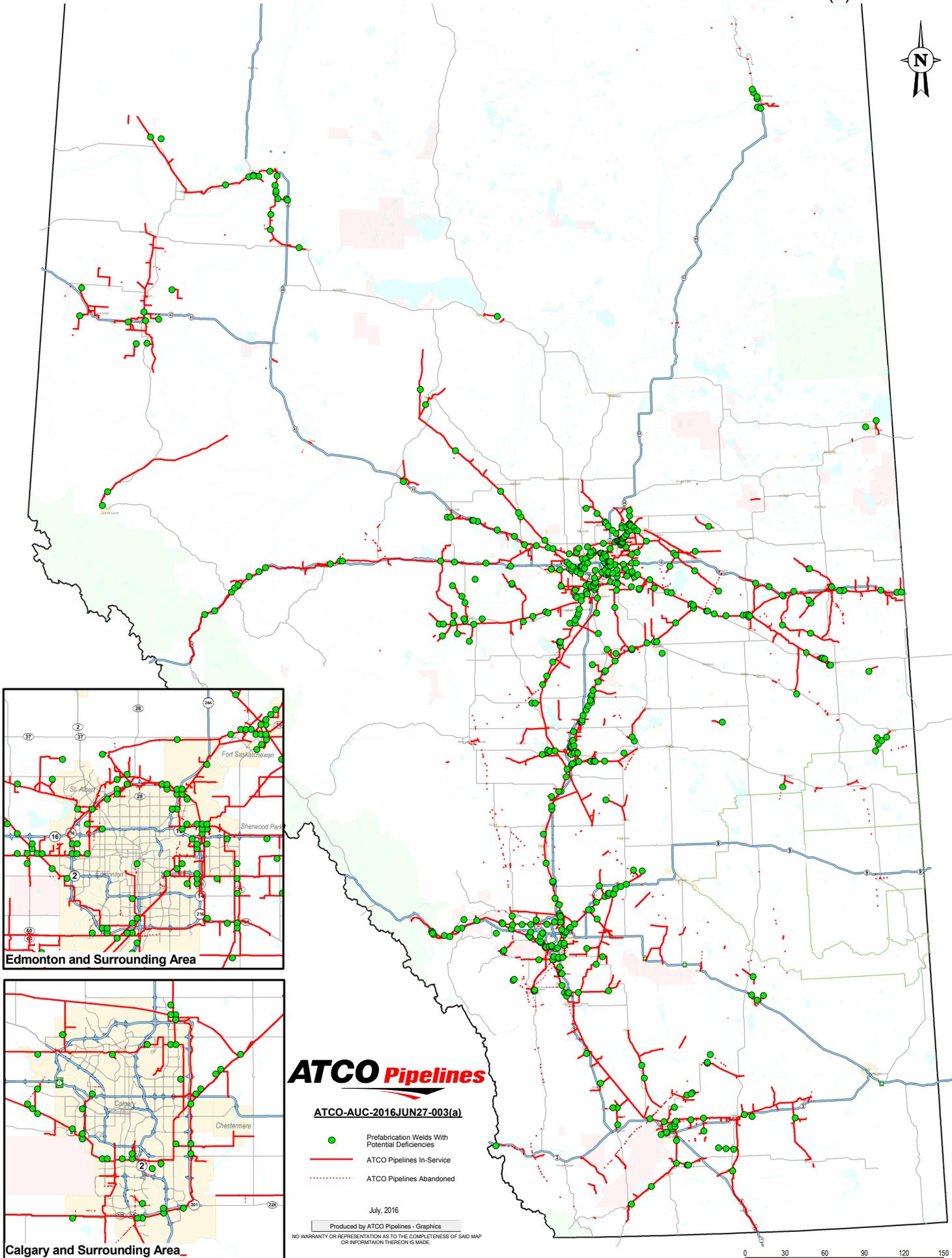
“(c) AP has prioritized the re-inspection of welds on a risk-based method that first targets large diameter welds in populated areas. As specific weld defects are identified during the re-inspection process, an analysis of the individual defect is completed and temporary pressure derations are placed, below the current Normal Operating Pressure (NOP), on the specific pipeline segment where the defect is determined to have the potential for pressure related risk at the NOP. Pressure derations are to be kept in place until either the specific defect is repaired or the weld is replaced.”

- (a) Please provide an ATCO system map indicating each of the 378 geographic locations having prefabrication welds with potential deficiencies.
- (b) Please provide an updated status on re-inspections that includes a complete listing of all affected pre-fabrication welds correlated to geographic location, with corresponding status (e.g., date assessed, assessment disposition and basis for decision, date re-inspected, re-inspection disposition, tentative repair date, repair status, final acceptance date).
- (c) Please explain whether the deration at all 24 of the re-inspected sites arose from weld defects identified at each of these locations or other factors.
- (d) Please explain the methodology utilized to analyze the individual defects.
- (e) Please explain the methodology utilized to establish the reduced operating pressure.

**Response:**

- (a) Please refer to ATCO-AUC-2016JUNE27-003(a) Attachment, which includes an ATCO system map indicating each of the 378 geographic locations having prefabrication welds with potential deficiencies.
- (b) Please refer to ATCO-AUC-2016JUNE27-001(b) Attachment.
- (c) To date, all pipeline derations at re-inspected sites arose from weld defects.
- (d) All defects are analyzed in accordance with CSA Z662. Please also refer to ATCO-AUC-2016JUNE27-003(a) and (b).
- (e) As specific weld defects are identified during the re-inspection process, an analysis of the individual defects is completed and where determined necessary, temporary pressure derations are put in place below the current Normal Operating Pressure (NOP), on the specific pipeline segment. Pipeline pressure is reduced to lower the overall combined stress the pipeline segment is subject to and reduced operating pressure limits are determined as

a function of the type of weld defect or feature discovered. Pressure derations are to be kept in place until either the specific defect is repaired or the weld is replaced.



### ATCO Pipelines

ATCO-AUC-2016JUN27-003(a)

- Prefabrication Welds With Potential Deficiencies
- ATCO Pipelines In-Service
- - - ATCO Pipelines Abandoned

July, 2016

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