
**DEPARTMENT OF
TRANSPORTATION**
**Research and Special Programs
Administration**

[Docket No. 82-3W; Notice 2]

**Transportation of Natural and Other
Gas by Pipeline; Grant of Waiver**

The Northern Border Pipeline Company petitioned the Materials Transportation Bureau (MTB) by letter dated March 19, 1982, for a waiver from compliance with 49 CFR 192.245 with respect to repair of girth weld defects in approximately 635 miles of its 42-inch diameter pipeline in the States of Montana, North Dakota, South Dakota, Minnesota, and Iowa constructed during 1981, and with respect to possible repair of defects in approximately 188 miles to be constructed in 1982. Weld defects to be repaired are those that have been discovered in a post-construction audit of X-ray film that had been interpreted initially by the radiographic contractors as conforming to weld acceptability standards in 49 CFR 192.241(c) which incorporate by reference the criteria in Section 6.0 of API Standard 1104. Pipe containing the nonconforming welds had at the time of the audit, already been buried and the right-of-way restored.

Under the provisions of the waiver petition, Northern Border proposes to repair girth welds containing cracks and other nonconforming previously repaired welds that would otherwise, according to §192.245, require removal of entire welds. Unless the referenced regulations are waived, all of the nonconforming welds (estimated to be approximately 570) would have to be removed and replaced by new welds. It is stated in the petition that removal and replacement of a weld would require excavation, cutting out of a pipe section containing the weld, rebeveling the in-place pipe ends, and placement, lining up, clamping, and welding in of a new short pipe length, requiring two new girth welds.

As a result of the petition, the MTB issued Notice 1 (47 FR 16248, April 15, 1982), requesting public comment on whether the waiver should be granted. The comments received are discussed hereafter.

Northern Border presented four reasons in the petition to support weld repair rather than replacement. These were discussed in Notice 1 and include the

difficulties associated with cutting out and replacing welds; environmental impact; cost savings estimated to be \$12,500,000.00 that will benefit the U.S. consumer if the weld repair procedures are utilized; and detrimental effect to the U.S. consumer if welds are required to be replaced and service through the Northern Border pipeline is delayed.

In further support, weld repair tests have been conducted by Northern Border to qualify repair procedures that Northern Border proposes to use in actual field repair welding. These procedures are stated by Northern Border to be in full compliance with API Standard 1104, with supplemental Charpy impact toughness testing and weld and heat affected zone microhardness evaluation.

Based upon an initial review of the procedures and data submitted with the petition, the Office of Pipeline Safety Regulation (OPSR) described certain inadequacies in an April 2, 1982, letter to Northern Border and requested a clarifying response. The petition Notice 1, Docket No. 82-3W, enumerated 10 areas of concern of the MTB included in the OPSR letter of April 2, particularly relating to the 5 weld repair procedures that were proposed by Northern Border. Northern Border responded by letter dated April 20, 1982, addressing each area of concern listed in Notice 1 as follows:

1. Northern Border will comply with the applicable sections of the 15th edition of API Standard 1104 as required by Part 192, and will no longer list the 14th edition in their future construction and repair procedures documentation. As stated in Notice 1, the 14th edition has never been incorporated by reference in Part 192.

2. Northern Border stated that weld procedure qualification testing would be performed to conform to Section 2.0 of API Standard 1104, as requested, and in response to an OPSR telegraphic message of April 15, 1982. In that message, the OPSR advised that the welding procedures employed as a part of any weld repair procedure must meet the qualification requirements of §192.225 and API Standard 1104.

3. Northern Border agreed to revise the Charpy impact requirements in their procedures to 30 ft-lb minimum average (of 3 tests) and 20 ft-lb minimum of any one test at the minimum design temperature of 25 degrees F to be consistent with the original welding procedure. The requirement contained in

the procedures submitted with the petition was 25 ft-lb and 15 ft-lb respectively.

4. Northern Border provided pictorial locations of Charpy impact specimens, as requested, and an [sic] narrative description of all test results.

5. Northern Border advised that Procedure "C," a procedure which would have used no preheat nor radiography to confirm crack removal for the repair of cracks from the inside of the pipe in environmentally sensitive areas, would be withdrawn. It further advised that Procedure "A" for the removal of backweld cracks by grinding only, where confirmation of crack removal was by magnetic particle inspection only, would include confirmation of crack removal by radiography as requested.

6. Northern Border provided additional clarifying details as to the environmental and construction schedule impacts if the waiver were not granted, and itemized the projected cost savings to be achieved by repairing the questionable welds rather than replacing them.

7. Northern Border provided specification sheets containing required pipe properties, as requested, although abandoning reference to "pipe properties" other than tensile strength as a criterion for repaired weld properties in its revised Spec. No. 658. The required properties of the repaired welds relate to those required for the original qualified procedure.

8. The term "multiple repairs" as used in the Northern Border petition was clarified as meaning two repairs only, or only one repair of a previously repaired area.

9. Northern Border has clarified procedures, as requested, such that they are consistent with the regulations (except for 49 CFR 192.245) and with API Standard 1104.

10. Conditions under which the repair procedures will be applied in future construction were stated by Northern Border as " * * * only in the unlikely event that a defective weld has been buried."

Test data for the repair welding procedure qualification in accordance with Section 2.0 of API Standard 1104 requested in the OPSR telegraphic message of April 15 and revised procedures (Northern Border Spec. No. 658, Rev. 1) were transmitted to the OPSR by letter dated April 28, 1982. All test results were satisfactory, although a change in welding procedure was found necessary

for Northern Border Repair Procedure "D." The procedures are summarized as follows (complete copies of the corrected weld repair procedures together with the Northern Border test data for the procedure qualification testing are in the docket):

Procedure "A": Short, transverse shrinkage cracks in back-welds are proposed to be removed by grinding only, and the complete removal to be verified by magnetic particle inspection. Northern Border has asked that this procedure be a part of the waiver petition because of the possibility that the crack may extend into the root bead, which condition was in fact encountered in the qualification trials. For this reason, MTB requested in its telegraphic message of April 15 and Northern Border has agreed, to also inspect using radiography in accordance with API Standard 1104, Section 7.3, to assure that the repaired weld meets the acceptability standards of §192.241(c).

Procedure "B": Nonthrough wall (partial penetration) cracks are to be repaired by welding either from the inside or the outside of the pipe, using low hydrogen electrodes (AWS A 5.5-69 E8018-C3). A preheat of from 250° to 350°F is required, and the procedures shall conform with Section 7.0 of API Standard 1104. Acceptability shall be determined in accordance with §192.241(c) and Section 6.0 of API Standard 1104 by radiography.

Procedure "C": Procedure "C," originally proposed in the petition for the repair of defects from the inside of the pipe in environmentally sensitive areas, has been withdrawn by Northern Border. Repair or removal of defective welds in these areas shall comply with the requirements of Part 192 or with weld repair procedures A, B, D, or E, as appropriate.

Procedure "D": Through wall cracks are to be repaired by grinding, drilling holes at the extremities of the crack, sawing through to form a new root bead opening, and grinding to the final repair groove contour. The new root bead and hot pass are to be deposited using E8010-G electrodes, which are to be followed by successive passes using the E8018-C3 low hydrogen electrodes. This procedure will also require preheating from 250° to 350°F and must conform to Section 7.0 of API Standard 1104. Acceptability of the repaired welds shall be determined in accordance with §192.241(c) and Section 6.0 of API

Standard 1104 using radiography.

Procedure "E": Northern Border states that this procedure is to be used in multiple repair, but limits the number of repairs to two. The written procedure (Northern Border Pipeline Company Spec. No. 658, Rev. 1) states: "If the defect has not been removed and/or the multiple repair area does not meet API 1104, the weld shall be cut out as a cylinder [sic] and a replacement section installed." Other requirements of this procedure are the same as for Procedure "B," using only E8018-C3 electrodes and the same 250° to 350°F preheat.

All of the destructive tests performed as a part of qualification of the repair procedures submitted with the petition and in response to the telegraph of April 15 met the same requirements as for the original welding procedure with the exception of Charpy impact testing of a repair made in accordance with the original Procedure "D" submitted with the petition. An average of three specimens marginally failed to meet the specified minimum average impact toughness of 30 ft-lb (for full size specimens) when tested at 25°F. Northern Border retested remaining samples from the repair weld, and the retest results marginally met the requirement. Further impact testing of the revised weld repair procedure "D" in response to the telegraph of April 15 as reported on April 28 resulted in considerably higher toughness values, both for the original weld and for the repaired weld. The weld tested for the revised Procedure "D" was a weld made for the test rather than a field weld containing a crack as in the test results submitted with the petition. Charpy impact toughness was apparently increased as a result of the repair procedure modification (adding an E8010 hot pass). On this basis, MTB believes that favorable action on the petition is appropriate but should be conditional, as stated later in this notice.

After review and consideration of all of data submitted by Northern Border, MTB finds that a conditional waiver from the provisions of §192.245 for the welds in question is appropriate and consistent with pipeline safety for the following reasons:

1. Experience gained in the granting of previous weld repair waivers supports the conclusion that it is feasible to make an acceptable repair to a crack in a weld or to make acceptable multiple repairs on a weld if qualified repair procedures are used to assure the integrity of the weld.

2. Adequate repair procedures have been developed and documented by the Northern Border Pipeline Company which will produce sound, ductile welds when the repairs are completed.

3. Comprehensive tests including destructive tests meeting §192.225 have been performed to duplicate the actual repair conditions. The results of these tests demonstrate that the conditions under which the welds are repaired will provide welds having mechanical properties at least equal to the specified minimum mechanical properties required by the original welding procedure.

4. Field nondestructive testing of the repaired weld meeting the appropriate requirements of §192.243 will confirm that the completed repair meets the acceptability requirements of §192.241(c).

5. The Federal Inspector will monitor the repairs and enforce strict adherence to the documented procedures so as to assure sound, ductile weld repairs.

6. Removal of each weld containing the defect by cutout and replacing with a short section of pipe requiring two new girth welds to be made under difficult field conditions would not improve the quality of the weld integrity on the pipeline.

7. The cost of repairing the individual weld defects will be substantially less than the construction cost of replacing entire welds and that the savings will accrue to the consumer.

8. Delays in initiating service and environmental disruptions that would otherwise occur will be avoided.

9. Public safety will be best served by verification [sic] that all injurious weld defects have been identified and have been satisfactorily repaired in accordance with the terms and conditions of any waiver issued.

Three comments were received in response to the invitation to comment in Notice 1. Comments from the American Petroleum Institute and the Northern Natural Gas Company both were supportive of the granting of the waiver and did not state further reservations or conditions. The comment from the Iowa State Commerce Commission was supportive of granting the waiver, but stated:

A waiver of §192.245 to the extent necessary to permit repair by grinding instead of replacement and to eliminate the inapplicable preheating requirement appears appropriate. However, the re-

paired area should be subjected to radiographic inspection to determine final acceptability and Northern Border should be required to modify its proposed Appendix A procedure to include this.

In response to a request by MTB, Northern Border has agreed to confirm removal of the weld defect in Procedure "A" by radiographic inspection, and this is part of the waiver. The Iowa Commission also expressed concern about Appendix C internal weld crack repair for environmentally sensitive areas. Following the concern expressed by MTB as noted earlier, Northern Border has withdrawn Appendix C procedures.

The Iowa Commission also discussed some of its problems about Appendix D Weld crack repair procedure for complete pipe wall penetration. However, apparently information it obtained in personal communications between its staff and Northern Border has alleviated those concerns. In addition, the waiver conditions MTB is imposing upon Appendix D procedures should further answer the Iowa Commission's questions about that procedure.

Northern Border's petition requested that relief be granted on an expedited basis pursuant to Section 9 of the Alaska Natural Gas Transportation Act (ANGTA) (15 U.S.C. 719g). As MTB discussed in Notice 1, it would expedite its actions under the Natural Gas Pipeline Safety Act (NGPSA) by shortening the normal 30-day period for public comment to 15 days in view of the need for expeditious construction and initial operation of the pipeline. MTB's actions are consistent with assurances to the public that the pipeline welds containing defects will meet the acceptability standards of Part 192 when repair is completed.

In accordance with Section 102(c) of Reorganization Plan No. 1 of 1979, 44 FR 33663 (June 12, 1979), and Executive Order 12142, 44 FR 36927 (June 25, 1979), the terms and conditions for any waiver granted would be enforced by the Federal Inspector. This is true also for enforcement of all of 49 CFR Part 192 on pipelines subject to ANGTA. Accordingly, on April 26, 1982, the MTB Director wrote Federal Inspector John T. Rhett, requesting a description of how the Federal Inspector's "field organization will enforce the terms and conditions of any waiver granted in this matter. This description should include the number of personnel involved with enforce-

ment, the duties and responsibilities of these personnel, and a description of documentation which will be used to assure compliance." The Federal Inspector responded by a letter of April 30, 1982, to the MTB providing details of the enforcement procedures to be used to assure compliance with the terms and conditions of the waiver and the monitoring for compliance with Part 192 regulations. Copies of these letters are in the Docket.

Accordingly, effective immediately, the Northern Border Pipeline Company is hereby granted a waiver from compliance with 49 CFR 192.245 for the remedial weld program and the 1982 period of construction of the Northern Border pipeline subject to the following conditions.

1. Because of the wide difference in impact test results obtained in the first and second series of weld procedure qualification tests performed by Northern Border for Procedure "D," and because the effectiveness of the revised procedure (addition of a hot pass using the E8010-G electrode) has not been demonstrated in prior actual repair of cracks in X-70 grade pipe welds, MTB believes that additional precautionary nondestructive testing is necessary to assure that other unforeseen weld ductility problems will not occur when using this procedure. For this reason, additional verification through delayed radiography is made a condition of this waiver. In order to demonstrate the reliability of the procedure, each of the first 10 welds to be repaired by Procedure "D" shall be radiographically inspected in accordance with API Standard 1104 at least 24 hours after the repair has been completed in addition to the radiographic examination specified by Northern Border in Spec. No. 658, Rev. 1. If no cracking is detected by the second radiographic examination of the first 10 repair welds utilizing Procedure "D," no further delayed radiography is required. If, however, any cracking is revealed in the delayed radiography of the first 10 repair welds, all repairs made thereafter using Procedure "D" must be nondestructively tested by delayed radiography to be performed at least 24 hours after the repair has been completed.

2. Because of the possible wide variation in electrode properties and the limited number of destructive tests which have been performed, the electrodes used in any repair welding procedure under this waiver shall be identical as far as is

possible as to type, chemical composition, and mechanical properties requirements as the electrodes used in qualifying the repair welding procedure.

3. Northern Border has indicated in its April 20 letter that the repair procedures under this waiver would be used on 1982 construction only if a weld containing an unacceptable defect had been buried. Before any weld is repaired by one of the procedures herein, on a weld made during 1982 construction season, the Office of the Federal Inspector (OFI) must first be notified.

Copies of the Northern Border Pipeline Company Weld Repair Procedures "A," "B," "D," and "E" are contained in the docket file and have been provided to the OFI for surveillance and enforcement action.

(49 U.S.C. 1672; 49 CFR 1.53, Appendix A of Part 1)

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L. D. Santman,
Director, Materials Transportation Bureau.

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