

NORTHERN STATES POWER COMPANY

DOCKET NO. 72-58

REQUEST FOR ADDITIONAL INFORMATION

RELATED TO EXEMPTION REQUEST FOR  
NONCONFORMING DRY SHIELDED CANISTER DYE PENETRANT EXAMINATIONS

By letter dated September 29, 2015, Northern States Power Company, doing business as Xcel Energy, submitted an application for an exemption request for nonconforming dry shielded canister (DSC) dye penetrant examinations.

This request for additional information (RAI) identifies additional information needed by the US Nuclear Regulatory staff in connection with its review of this exemption request. Each individual RAI describes information needed by the staff to complete its review of the application and to determine whether the applicant has demonstrated compliance with the regulatory requirements.

RAI #1: Regarding Exemption Request Enclosure 1, verify the page 38 description of the allowable flaw depth statement, “[F]or a 360° circumferential flaw, an allowable flaw depth of 0.10” could exist and the weld would still meet ASME weld stress limit.” Page 1 of Enclosure 2, “Allowable Flaw Size Evaluation in the Inner Top Cover Plate [ITCP] Closure Weld for DSC #16,” noted that an allowable flaw size of 0.15 inch is calculated for a 0.25 inch Inner Top Cover Plate weld in DSC #16.

This information is needed to complete the review in accordance with 10 CFR 72.236.

RAI #2: Regarding Exemption Request Enclosure 4, revise the limit load analyses for the determination of the internal pressure and side-drop collapse loads for the top cover plates-to-shell partial penetration welds of the dry shielded canister. The revised analysis should address the modeling anomalies, such as not considering the progressive weld material rupture associated with the linearly increased loading until the complete collapse of the weld. Specifically, two modeling attributes on weld performance should be considered: (1) the allowable elongation limit of 35% for the EX 308-xx filler metal, and (2) the removal of the ruptured weld from the finite element analysis (FEA) model as load bearing element(s). With revised collapse loads, also revise the Section 7, “Discussion and Conclusions,” descriptions, as appropriate, to recognize that the collapsed loads, and hence, the design margins, are much lower than those being reported could result.

In Section 4.4, for the collapse load determination, the applicant stated, “[T]he prescribed loads are applied to the model, and then are increased linearly until the solution fails to converge.” The staff finds that this load ramping approach relied solely on the numerical performance of the FEA solution algorithm and failed to consider the progressive weld material rupture in the

analysis model. As a result, large calculated equivalent plastic strains up to 194% in the weld region and corresponding cover plate displacement of about 11 inches, which are physically inadmissible, are reported in Figures 26 and 27, respectively.

Other justifiable approaches than the limited load analysis discussed above may also be used for demonstrating the weld performance.

This information is needed to complete the review in accordance with 10 CFR 72.236.

RAI #3: Regarding Exemption Request Enclosure 4, revise Table 6, "Summary of Load Cases and Results", to note that the design internal pressure of 10 psig was combined with the gravity load equivalent pressure of 22 psig to result in the listed "Required Design Pressure" of 32 psig for the analysis.

The use of the heading, "Required Design Pressure," which can be misleading, should properly be noted for the table.

This information is needed to complete the review in accordance with 10 CFR 72.236.

RAI #4: Provide the following technical reports referenced in the Non-Destructive Evaluation (NDE) Services Final Report Monticello, DSC-16, Phased Array UT [ultrasonic test] Examination Results of the Inner and Outer Top Cover Lid Welds Document Number: 180-9236027-000AREVA:

1. Technical Report Document 51-9234641-000 "Technical Report of the Demonstration of UT NDE Procedure 54-UT-114-000 – Phased Array Ultrasonic Examination of Dry Storage Canister Lid Welds"
2. AREVA Technical Justification Document 54-PQ-114-001 "Phased Array Ultrasonic Examination of Dry Storage Canister Lid Welds"

These reports should contain key information on the NDE examination procedure and demonstration so that staff can determine that the procedure was adequate to identify relevant indications for consideration in the structural evaluation of the closure lid welds.

This information is necessary to determine compliance with 10 CFR 72.158, 72.236.

RAI-#5: Provide a justification for using a stress allowable reduction factor of 1.0 for the evaluation of the inner and outer top lid closure welds on DSC-16. ISG-15 section X.5.2.3 for Austenitic Stainless and Nickel-Base alloy Steels Cask Design states:

- If using UT, the UT acceptance criteria are the same as those of NB-5332 for pre-service examination. In accordance with Code practice for supplementing volumetric examinations with a surface examination, UT examination must be performed in conjunction with a root pass and cover pass PT [liquid penetrant test] examination.
- If PT is specified (i.e., no volumetric inspection), a stress reduction factor of 0.8 must be applied to the weld design.

The examination performed on DSC-16 includes a volumetric phased array ultrasonic test (PAUT) of the entire inner top lid closure weld and a compliant PT of the final weld pass. The root pass PT was determined to be noncompliant. For the inner top lid closure weld, the NDE performed includes a volumetric PAUT examination of most of the weld except for the section of the weld around the siphon and vent port block. Both the root pass and final weld pass PT were determined to be noncompliant. It is also noted that for the inaccessible portion of the inner top lid closure plate weld around the siphon and vent port block the test was performed manually. Finally it is noted that UT methods including PAUT cannot be used to reliably identify indications in the root pass or near the toe of a weld because these areas have geometric reflectors that can mask relevant indications.

This information is necessary to determine compliance with 10 CFR 72.212(b)(3), 72.236 .

RAI #6: Clarify that the shortened helium leak calibration “stabilization period” for helium leak testing of certain DSC ITCP welds did not result in an inaccurate helium leak test measurement.

Appendix E of Enclosure 1 Exemption Request indicates that the DSC helium leak test calibration intervals of 27 seconds to 47 seconds were below the approved procedure’s 60 second stabilization period. Clarify that individuals qualified in writing helium leak testing procedures, such as an American Society of Nondestructive Testing (ASNT) Level III, determined that the change in procedure did not affect the helium leak test result.

This information is needed to determine compliance with 10 CFR 72.122, 72.126, 72.236.

RAI #7: Clarify that the subcontractor’s helium leak test procedure for helium leak testing of the siphon and vent port covers and the shell to ITCP weld did not result in an inaccurate helium leak test measurement.

Appendix E of Enclosure 1 Exemption Request indicates that a subcontractor’s helium leak test procedure was used for helium leak testing rather than the approved procedure. Clarify that individuals qualified in writing helium leak testing procedures, such as an ASNT Level III, approved the subcontractor’s helium leak test procedure.

This information is needed to determine compliance with 10 CFR 72.122, 72.126, 72.236.

RAI #8: Clarify whether or not additional controls will be provided for the transfer of DSC 16 to and into the horizontal storage module (HSM). If additional controls will be provided, please specify what those controls will be.

The applicant states in several places in Enclosure 1 that, “NSPM will provide additional controls to the transfer of DSC 16 to the HSM. These controls are added to increase the safety of the move,” and similar statements (pages 1, 22, 25, and 43). However, Section 3.1.3, on page 23 of Enclosure 1 reads, “no additional controls on the transfer of DSC 16 to the HSM are needed.” The statements are inconsistent.

This information is needed to determine compliance with 10 CFR 72.7.