

# **NRC Pre-Submittal Meeting**

## **Braidwood LAR for Removal of Unit 2 License Condition for Closure Stud Hole Location No. 35**

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# Agenda

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- Background
- Proposed Changes
- Evaluation for Proposed Change
- Timeline for Submittal
- Summary

## Background

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- Braidwood Unit 2 began commercial operation in the fall of 1988. In 1991, during the second Braidwood Unit 2 refueling outage, RPV head closure stud number 35 became stuck during RPV disassembly.
- From the fall of 1991 until the spring of 1994, Braidwood Unit 2 stud 35 was tensioned during plant operation and remained in the RPV flange during refueling outages. Throughout this time period, stud 35 and the associated stud hole were protected from borated water during refueling outages.

## Background

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- The protruding portion of stud 35 was an obstacle during refueling outage activities. An evaluation was developed that demonstrated the Braidwood Unit 2 RPV could be placed in service without stud 35 tensioned. Stud 35 was removed, and Braidwood Unit 2 started up from the refueling outage with 53 out of 54 studs tensioned.
- During the 2002 refueling outage the remaining portion of stud 35 was destructively removed from the RPV flange hole. Inspection of the RPV flange hole threads showed significant damage and it was concluded that the RPV flange hole could not be reused in this condition.
- A repair plan was abandoned due to vendor equipment malfunction and as a result Braidwood Unit 2 continues to operate with 53 studs tensioned during operation as previously evaluated. An engineering change was performed authorizing the new configuration of the RPV flange hole in stud location 35.

## Background

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- During the license renewal for Braidwood Unit 2, the NRC proposed incorporating commitment 48 for repairing the closure stud hole location into a License Condition.
- At the time, the methods of analysis in WCAP-16143, Revision 0, for the Pressure Temperature Limits Curves were based on the original plant configuration for the RPV closure flange assemblies and were not on the modified RPV closure assembly with one stud not fully tensioned.
- WCAP-16143, Revision 1, addresses the effect both the originally designed 54 RPV head stud configuration and the 53 RPV head stud configuration for all Braidwood and Byron units. The NRC had not approved the use of this revision as a methodology during or prior to the license renewal process.

## Background

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- EGC committed to the License Condition 2.C.(12)(d) for the repair of closure stud hole location No. 35.
- NUREG-2190, Safety Evaluation Report Related to the License Renewal of Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2 (ML15350A038/ML15350A041).

## Proposed Change

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- This proposed amendment request revises the Renewed Facility Operating License (RFOL) for Braidwood Station Unit 2 to remove license condition 2.C.(12)(d). The license condition is no longer applicable as the Pressure Temperature and Limits Curves have been updated for the Period of Extended Operations (PEO) and NRC approval of WCAP-16143, Revision 1.
- The revision addresses the 53 RPV head stud configuration for Braidwood Unit 2.

## Proposed Change

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- License Condition 2.C.(12)(d) currently states:
  - (d) The Braidwood Unit 2 reactor head closure stud hole location No. 35 will be repaired no later than June 18, 2027, or before the end of the last refueling outage prior to the period of extended operation (whichever occurs later), so that all 54 reactor head closure studs are operable and tensioned during the period of extended operation.
- The revised License Condition 2.C.(12)(d) will state:
  - (d) Deleted.



# Evaluation for Proposed Change

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## WCAP-16143-P Revision 1

- The results of the missing Reactor Pressure Vessel(RPV) head stud evaluation remain in agreement with the conclusions of WCAP-16143, Revision 0. It should be noted that WCAP-16143, Revision 1, addresses the effect of both the originally designed 54 RPV head stud configuration and the 53 RPV head stud configuration for all Braidwood and Byron units. The basis for elimination of the 10 CFR 50, Appendix G fracture toughness requirements was confirmed.
- Approved by the NRC Safety Evaluation on October 28, 2015 (ML15232A441).

# Evaluation for Proposed Change

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## Pressure and Temperature Limits Report

- Braidwood Technical Specification (TS) 5.6.6, “Reactor Coolant System (RCS) Pressure and Temperature Limits Report (PTLR),” was revised to include methodologies for determining RCS pressure-temperature limits that reflect the current configuration of Braidwood Unit 2 RPV with 53 studs tensioned.
- Approved by the NRC Safety Evaluation dated September 18, 2020 (ML20163A046).

# Evaluation for Proposed Change

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## Pressure and Temperature Limits Report

- On October 25, 2021, the Braidwood Unit 2 Pressure and Temperature Limits Report Revision 8 became the analysis of record. The new Pressure and Temperature Limit Curves are valid for 57 effective full power years; which, covers the current period of extended operation.
- Braidwood Unit 2 Pressure and Temperature Limits Report Revision 8 was sent to the NRC on October 27, 2021 (ML21300A076).

# Evaluation for Proposed Change

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## Aging Management

- Reactor Pressure Vessel disassembly and assembly procedures at Braidwood are periodically revised to ensure that best practices are utilized to eliminate or mitigate the potential causes for stud damage.
- All RPV Stud Threads and Nut Threads have been inspected for damage, galling, and corrosion. Degraded conditions have been entered into the Corrective Action Program as applicable or corrected during past refueling outages.

# Evaluation for Proposed Change

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## Aging Management

- The Reactor Pressure Vessel flange stud hole 35 is cleaned and inspected prior to reactor vessel flood-up. The reactor vessel flange stud hole 35 is cleaned, inspected, and borated water is removed after the reactor cavity is drained.
- Stud hole location 35 remains dry during the operating cycle of Braidwood Unit 2.

## Timeline for Submittal

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- Submittal of LAR for deletion of the License Condition 2.C.(12)(d) is planned for December 2021.

## Summary

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- The proposed change removes License Condition within the Braidwood Unit 2 Renewed Facility Operating License related to Reactor Pressure Vessel Stud 35.
  - WCAP-16143-P Revision 1 permits operation with 53 studs tensioned as opposed to 54 studs
  - Braidwood Unit 2 Pressure Temperature Limits Report has been updated
- Therefore, the License Condition is no longer applicable, and removes the need to execute a complex repair.