

RULEMAKING ISSUE (Notation Vote)

July 7, 2004

SECY-04-0115

FOR: The Commissioners

FROM: Luis A. Reyes
Executive Director for Operations /RA/

SUBJECT: RULEMAKING PLAN TO INCORPORATE FIRST REVISED ORDER EA-03-009
REQUIREMENTS INTO 10 CFR 50.55a

PURPOSE:

To request Commission approval of a rulemaking plan to incorporate into 10 CFR 50.55a the reactor pressure vessel (RPV) head and associated head penetration inspection requirements contained in First Revised Order EA-03-009, dated February 20, 2004 (Order).

BACKGROUND:

All domestic pressurized water reactors (PWRs) have penetrations in the RPV head for control rod drive mechanisms and some have penetrations for instrumentation systems. Nickel-based alloys (e.g., Alloy 600) are used in the penetration nozzles and related welds. Primary coolant water and the environmental conditions within the reactor coolant system (RCS) can cause cracking of these nickel-based alloys via primary water stress corrosion cracking (PWSCC). In early 2001, inspections of the RPV head nozzles at Oconee Nuclear Station, Units 2 and 3, identified circumferential cracking of the nozzles above the J-groove weld, which joins the nozzle to the RPV head. Circumferential cracking above the J-groove weld is a safety concern because of the possibility of a nozzle ejection if the circumferential cracking is not detected and repaired. In early 2002, following inspection of leaking nozzle penetrations, the licensee for the Davis-Besse Nuclear Power Station reported finding a cavity in the RPV head on the downhill side of one of the nozzles. The cavity was apparently caused by boric acid erosion/corrosion resulting from leakage of reactor coolant from a crack in the nozzle. These events are significant because ejection of a nozzle or failure of the RPV boundary from head corrosion would challenge safety systems.

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The Nuclear Regulatory Commission (NRC) has taken several actions to address the issue of RPV head penetration leakage and the potential for degradation of the low-alloy steel head by boric acid corrosion. These actions include issuance of Bulletin 2001-01, on August 8, 2001; Bulletin 2002-01, on March 18, 2002; and Bulletin 2002-02, on August 9, 2002. Because current regulations do not adequately address the inspection of these components, the NRC issued Order EA-03-009 on February 11, 2003, and subsequently First Revised Order EA-03-009 (Order) on February 20, 2004. Order EA-03-009 as well as the First Revised Order required PWR licensees to determine the degradation susceptibility category of their reactor and, based on that susceptibility, to implement specific inspections of the RPV head and associated penetration nozzles. The Order provides reasonable assurance that cracks in the CRDM penetration welds will be detected before they can grow through-wall and significantly leak or grow to a length in which the pressure boundary is challenged, and that plant operations therefore do not pose an undue risk to public health and safety.

In the Order, the NRC established a means of ranking the susceptibility to PWSCC of the head and penetration nozzles. The ranking is determined by an empirical calculation based on effective full-power years of operation and the respective RPV head temperatures for those years of operation. To date, the susceptibility model in the Order has correlated well with operational data and it is considered to be an effective tool to prioritize inspection requirements and efficiently optimize the use of licensee and NRC inspection resources. Order EA-03-009 was issued as an interim measure until inspection requirements could be incorporated into NRC regulations.

DISCUSSION:

The NRC staff believes that the Order is not an appropriate regulatory tool for long-term regulation in this area and that the requirements of the Order should be codified into NRC regulations. The benefits of codifying the requirements contained in the Order are that they will be located in 10 CFR 50.55a along with similar requirements and thus will provide licensees with a single source of RPV head and head penetration inspection requirements. The rulemaking process will also provide an opportunity for stakeholder input on the inspection requirements of the Order and provide regulatory stability for long-term inspection management of these issues. Consequently, the staff is pursuing rulemaking activities to incorporate the inspection requirements of the Order into 10 CFR 50.55a.

The staff considers rulemaking to be the most expeditious route to codify the inspection requirements. However, because the existing requirements of the Order are considered adequate to protect public health and safety, the NRC could delay rulemaking pending development of additional information from operating experience, industry-developed analysis, or revision of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code. Coordinating with industry and the ASME could save staff resources but would extend the time before the inspection requirements are incorporated into NRC regulations.

In considering the various industry and staff efforts ongoing to resolve this issue, the staff developed three options for proceeding with rulemaking. These options are described in the following paragraphs.

Option 1: Codify the inspection requirements of the Order into 10 CFR 50.55a and continue to work with ASME in the longer-term.

The first option is to initiate rulemaking to incorporate the inspection requirements of the Order into 10 CFR 50.55a. Rulemaking would provide regulatory stability by codifying the Order and would allow stakeholder input on the inspection requirements of the Order. This option would implement the alternative of the high-priority recommendation of the Davis-Besse Lessons Learned Task Force Report, Item 3.3.4.(8). Item 3.3.4(8) recommended that the NRC encourage changes to the ASME Code requirements for inspection of the RPV head and penetrations of PWRs or, alternatively, revise 10 CFR 50.55a. The staff is coordinating with industry and the ASME to change the Code requirements for these components. Because the staff expects it will be a year before an ASME Code case is ready for staff review and agreement on appropriate inspection requirements based on ASME and industry information may not be reached in a timely manner, this option is considered to be the most expeditious means of codifying the inspection requirements of the Order.

This option would be expected to be completed in March of 2006. If insights are gained from industry during the rulemaking process which cause the staff to change the technical basis for this rulemaking, the schedule could be revised.

Option 2: Work with industry to develop new inspection requirements suitable for incorporation into 10 CFR 50.55a.

The second option is to continue working with industry to develop inspection requirements that reflect the body of information developed by industry in coordination with ongoing research activities in the Office of Nuclear Regulatory Research (RES) and then incorporate a suitably revised set of inspection requirements into NRC regulations at a later time. RES has been coordinating with industry to evaluate the degradation susceptibility model, RPV penetration crack growth rates, and head degradation rates to determine realistic and conservative inspection requirements. In Materials Reliability Program document, MRP-110, submitted April 14, 2004, industry provided the staff with extensive information for this issue. Industry expects to provide their recommendations for inspection requirements by the end of Summer 2004. This option would be expected to be completed in February 2007.

This option might result in a more realistic set of inspection requirements and a reduction in the burden imposed by the inspection requirements in the Order that would be incorporated under Option 1. Because stakeholders would participate in the rulemaking process, public confidence would be increased. Additional time and agency resources will be needed to evaluate the industry-developed information, therefore, Option 2 results in a longer schedule than Option 1. However, Option 1, once complete, is anticipated to require changes subsequent to staff and industry agreement on a revised inspection plan.

Option 3: Evaluate RPV inspection requirements of an upcoming ASME Code Case or revision of the ASME Code for incorporation into 10 CFR 50.55a.

The third option is to wait until ASME publishes a Code Case or revises the ASME Code, evaluate the acceptability of the inspection requirements, and initiate rulemaking to incorporate the revised requirements into 10 CFR 50.55a. The staff expects that it will be approximately one year before ASME publishes a Code Case and longer for the ASME to revise the Code to include requirements for RPV head and penetration inspections. Additional time will be needed for the staff to review the acceptability of the ASME revisions and incorporate suitably revised requirements into NRC regulations. Option 3 would increase public confidence because the ASME Code is widely recognized as a consensus standard and has long been a part of NRC regulations and because the rulemaking process would allow public comment on incorporation of the Code requirements. Publishing of a Code Case is expected by July 2005 and rulemaking is expected to be complete in February 2007. It should be recognized that once a Code Case is complete, the NRC can approve use of it on an individual plant basis, thereby making it viable prior to completion of rulemaking. This option may obviate the need to revise the rule developed under Option 1 in order to later address industry-developed information but requires time before being implemented.

RECOMMENDATION:

Because of the need to provide regulatory stability for the inspection requirements of the RPV head and penetrations, the staff recommends Option 1. This option implements the alternative described in recommendation 3.3.4(8) of the Davis-Besse Lessons Learned Task Force Report.

Incorporating the inspection requirements of the Order into NRC regulations allows public comment on the inspection requirements and will codify NRC actions taken to address this issue in a timely manner. A rulemaking plan for this recommended option is attached.

RESOURCES:

NRR expects that 3.0 FTE will be needed over the period of late FY 2004 into FY 2006 for the rulemaking in accordance with the attached plan. These resources are included in NRR's budget.

COORDINATION:

The Office of the General Counsel has reviewed this Commission paper and has no legal objection.

The Office of the Chief Financial Officer has reviewed this Commission paper for resource implications and has no objection.

/RA/

Luis A. Reyes
Executive Director
for Operations

Attachment: Rulemaking Plan

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The Office of the General Counsel has reviewed this Commission paper and has no legal objection.

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/RA/

Luis A. Reyes
Executive Director
for Operations

Attachment: Rulemaking Plan

Package Accession No. ML041610180
Commission Paper Accession No. ML041620301
Attachment Accession No. ML041610210

* See Previous Concurrence
** via e-mail

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