

July 5, 2006

Mr. Joseph E. Conen, Chairman
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SUBJECT: DRAFT SAFETY EVALUATION FOR THE BOILING WATER REACTOR OWNERS' GROUP (BWROG) TOPICAL REPORT (TR) NEDO-33160, REGULATORY RELAXATION FOR THE POST ACCIDENT SRV [SAFETY RELIEF VALVE] POSITION INDICATION SYSTEM (TAC NO. MC5446)

Dear Mr. Conen:

By letter dated December 13, 2004, the BWROG submitted NEDO-33160, "Regulatory Relaxation for the Post Accident SRV Position Indication System" to the U.S. Nuclear Regulatory Commission (NRC) staff for review. Enclosed for the BWROG review and comment is a copy of the NRC staff's draft safety evaluation (SE) for the TR.

Twenty working days are provided to you to comment on any factual errors or clarity concerns contained in the SE. The final SE will be issued after making any necessary changes and will be made publicly available. The NRC staff's disposition of your comments on the draft SE will be discussed in the final SE.

To facilitate the NRC staff's review of your comments, please provide a marked-up copy of the draft SE showing proposed changes and provide a summary table of the proposed changes.

If you have any questions, please contact Michelle Honcharik at 301-415-1774.

Sincerely,

/RA/

Juan D. Peralta, Acting Chief
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Office of Nuclear Reactor Regulation

Project No. 691

Enclosure: Draft SE

cc w/encl: See next page

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ADAMS ACCESSION NO.: **ML061810262**

*No major changes to SE input.

NRR-106

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DRAFT SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

TOPICAL REPORT (TR) NEDO-33160

"REGULATORY RELAXATION FOR THE POST ACCIDENT

SRV [SAFETY RELIEF VALVE] POSITION INDICATION SYSTEM"

BOILING WATER REACTOR OWNERS' GROUP (BWROG)

PROJECT NO. 691

1 1.0 INTRODUCTION AND BACKGROUND
2

3 By letter dated December 13, 2004 (Agencywide Documents Access and Management System
4 (ADAMS) Accession No. ML043510165), the BWROG submitted TR NEDO-33160, "Regulatory
5 Relaxation for the Post Accident SRV Indication System," for U.S. Nuclear Regulatory
6 Commission (NRC) staff review. The TR requested a change in category for SRV position
7 indication instrumentation, for boiling water reactors (BWRs), as classified by Regulatory Guide
8 (RG) 1.97, Revision 3, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess
9 Plant and Environs Conditions During and Following an Accident." The BWROG submitted
10 supplemental material in response to the NRC staff's request for additional information, by letter
11 dated October 31, 2005 (ADAMS Accession No. ML053110138).
12

13 2.0 REGULATORY EVALUATION
14

15 The primary purpose of Accident Monitoring Instrumentation is to display plant variables that
16 provide information required by the control room operator during accident situations. This
17 information provides the necessary support for the operator to take manual actions to initiate
18 safety systems and other appropriate systems important to safety.
19

20 Criterion 13 of Appendix A to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50
21 requires operating reactor licensees to provide instrumentation to monitor variables and
22 systems over their anticipated ranges for accident conditions as appropriate to ensure adequate
23 safety.
24

25 Criterion 19 of Appendix A of 10 CFR Part 50 requires operating reactor licensees to provide a
26 control room from which actions can be taken to maintain the nuclear power unit in a safe
27 condition under accident conditions, including loss-of-coolant accidents.
28

29 Section 50.34(f)(2)(xi) of 10 CFR requires plants to provide direct indication of relief and safety
30 valve position (open or closed) in the control room.
31

32 NUREG-0737, "Clarification of TMI Action Plan Requirements," Item II.D.3 requires, "Reactor
33 coolant system relief and safety valves shall be provided with a positive indication in the control

1 room derived from a reliable valve-position detection device or a reliable indication of flow in the
2 discharge pipe."
3

4 RG 1.97 describes a method acceptable to the NRC staff for complying with the Commission's
5 regulations to provide instrumentation for monitoring plant variables and systems during and
6 after an accident. RG 1.97 groups these variables into five types, Types A, B, C, D, and E.
7 Type D variables provide the operator with information on the operation of individual safety
8 systems and other systems important to safety. Type D variables are to help the operator
9 make appropriate decisions in using the individual systems important to safety in mitigating the
10 consequences of an accident. For BWRs, RG 1.97 recommends that Type D key variables be
11 monitored by instrumentation that meets the Category 2 criteria. The Category 2 criteria
12 includes environmental qualification, augmented quality, and reliable power. In addition,
13 RG 1.97 recommends that Type D variables that provide backup information should meet the
14 Category 3 criteria. The Category 3 criteria includes high-quality commercial grade equipment
15 that is designed to withstand the specified service environment.
16

17 3.0 TECHNICAL EVALUATION 18

19 One of the RG 1.97 Type D systems is the main steam system. RG 1.97 recommends that
20 primary system SRV positions, including automatic depressurization system (ADS) or flow
21 through or pressure in valve lines (SRV position) is a key variable for providing detection of an
22 accident and boundary integrity indication for the main steam system and, therefore, should
23 meet the Category 2 criteria.
24

25 NEDO-33160 states that for BWRs, reactor pressure vessel (RPV) pressure and suppression
26 pool temperature instrumentation in combination with other instruments (e.g., RPV water level,
27 suppression pool level, containment pressure) satisfy the RG 1.97 accident detection and
28 boundary integrity indication purpose as specified in RG 1.97 for the SRV position variable.
29 This alternate instrumentation either meets or exceeds the Category 2 criteria. SRV position
30 indication instrumentation provides backup information and does not need to be classified as a
31 Category 2 variable. Therefore, NEDO-33160 recommends that, for BWRs, SRV position
32 indication should be reclassified as a Type D Category 3 variable.
33

34 NEDO-33160 states that the knowledge of SRV position is not used by the operator to make
35 appropriate decisions in using individual systems important to safety in mitigating the
36 consequences of an accident. SRVs are used as part of ADS whose successful indication of
37 performance of the safety function is the reduction of RPV pressure to enable use of low
38 pressure Emergency Core Cooling System (ECCS) to mitigate the consequences of an
39 accident. Other operator indications and requirements for ADS operation include an increase in
40 suppression pool water temperature, increase in suppression pool water level, and change in
41 RPV water level before the ADS will function. These other indications are included as RG 1.97
42 Category 1 or 2 variables, but the primary RG 1.97 variables are RPV pressure and
43 suppression pool water temperature. The operator would use SRV position indication as a
44 confirmation of SRV opening; however, this would be a backup to the main safety function for
45 ADS of reduction in RPV pressure to enable use of low pressure ECCS.
46

47 BWRs are specifically designed to depressurize the RPV during certain accident scenarios.
48 Depressurization allows the initiation of low pressure ECCS loops to provide core cooling. Low
49 pressure ECCS initiation and operation is independent of the causes for RPV depressurization

1 (e.g., line break or ADS actuation). ECCS initiation and operation are primarily based on RPV
2 water level, RPV dome pressure, containment pressure, and suppression pool temperature.
3 Knowledge of SRV position or its indication does not significantly affect automatic or manual
4 low pressure ECCS operation and thus does not affect short-term or long-term core cooling.
5

6 SRV position indication instrumentation provides direct indication of flow through a main steam
7 SRV. This can occur as a result of: (1) planned manual operation of the SRV under normal
8 operating conditions, (2) planned manual opening of the SRV under shutdown conditions
9 (i.e., pressure control), (3) primary reactor system pressure exceeding the SRV relief function
10 setpoint during power operation, (4) the effect of a system isolation and reactor shutdown,
11 (5) a spurious actuation of the valve while at power (i.e., stuck open SRV), or (6) manual or
12 automatic operation of the ADS function.
13

14 A review of the BWR Emergency Procedures Guidelines (EPGs) shows that suppression pool
15 temperature, not SRV position, is an entry condition for the EPGs.
16

17 Of the above six scenarios, only the usage of SRV position information, as it relates to
18 operation of the ADS function, is associated with an accident within the context of the guidance
19 of RG 1.97. The function of ADS is to provide the capability to reduce reactor pressure to allow
20 low pressure ECCS to function to provide core cooling.
21

22 While SRV position information provides positive indication of flow through SRVs, this
23 information is of secondary importance to the operator during ADS operation. Successful
24 indication of ADS actuation is provided by RPV pressure and suppression pool temperature.
25 Flow indication through SRVs does not provide the operator with a unique indication of ADS
26 actuation, a positive indication that an accident has occurred, or essential confirmation that an
27 accident mitigation has occurred.
28

29 Therefore, NEDO-33160 concludes that there is no event where SRV position indication is
30 relied upon for accident detection.
31

32 The NRC staff agrees with the NEDO-33160 conclusion that the RG 1.97 SRV position
33 indication does not perform or ensure a safety-related function. The purpose of SRV position
34 indication instrumentation is the detection of a stuck open SRV. This was the original intent of
35 the NUREG-0737 Item II.D.3 requirement for, "Reactor coolant system relief and safety relief
36 valves shall be provided with a positive indication in the control room derived from a reliable
37 valve-position detective device or a reliable indication of flow in the discharge pipe." Per the
38 requirements of NUREG-0737 Item II.D.3 and 10 CFR 50.34(f)(2)(xi), BWRs are required to
39 have instrumentation that will provide the operator with direct indication of SRV position.
40

41 Although licensees may reference NEDO-33160 as the basis for revising SRV position
42 indication from Type D Category 2 to Type D Category 3, they are still required to meet the
43 requirements of NUREG-0737 Item II.D.3 and 10 CFR 50.34(f)(2)(xi). Licensees will be
44 required to maintain SRV position indication in the control room consistent with these
45 requirements.

1 The reviewer's note in Technical Specification (TS) Table 3.3.3.1-1 of NUREG-1433 and
2 NUREG-1434 reads:

3
4 Table 3.3.3.1-1 shall be amended for each plant as necessary to list:

- 5
6 1. All Regulatory Guide 1.97, Type A instruments and
7 2. All Regulatory Guide 1.97, Category 1, non-Type A instruments specified in the
8 plant's Regulatory Guide 1.97, Safety Evaluation Report.
9

10 Therefore, if a BWR licensee has classified SRV position as a Type A variable, NEDO-33160,
11 would not be applicable for that plant and the licensee would be expected to maintain the TS
12 status of SRV position.
13

14 SRV position may be reclassified as a Type D Category 3 instrument provided there is alternate
15 instrumentation that provides the main steam system status for detection of an accident or
16 boundary integrity indication information.
17

18 For certain BWR plants the RG 1.97 SRV position information is provided by SRV discharge
19 pipe thermocouples. The information from SRV discharge pipe thermocouples can be used to
20 determine if an SRV is open or closed. Therefore, if the SRV discharge pipe thermocouples
21 meet the RG 1.97 Category 3 criteria, they may be used in lieu of SRV position indication to
22 meet the RG 1.97 function of SRV position indication.
23

24 4.0 CONCLUSION

25
26 Based on the above evaluation, the NRC staff concludes that the proposed change for SRV
27 position indication to Category 3 as detailed in NEDO-33160 is acceptable for BWR plants.
28 Licensees electing to adopt NEDO-33160 should perform a plant-specific review to determine
29 the applicability of NEDO-33160. This change in RG 1.97 category does not relieve licensees
30 from meeting the requirements of NUREG-0737 Item II.D.3 and 10 CFR 50.34(f)(2)(xi).
31

32 5.0 REFERENCES

- 33
34 1. Letter from K. S. Putnam (BWROG) to US NRC, "BWR Owners' Group Licensing
35 Topical Report NEDO-33160, Regulatory Relaxation for the Post Accident SRV Position
36 Indication System," dated December 13, 2004 (ADAMS Accession No. ML043510165).
37
38 2. Regulatory Guide 1.97, Revision 3, "Instrumentation for Light-Water-Cooled Nuclear
39 Power Plants to Assess Plant and Environs Conditions During and Following an
40 Accident," NRC Office of Nuclear Regulatory Research, dated May 1983 (ADAMS
41 Accession No. ML003740282).
42
43 3. Letter from J. E. Conen (BWROG) to US NRC, "BWR Owners' Group SRV Position
44 Indication Committee Response to NRC's Request for Additional Information Regarding
45 Licensing Topical Report NEDO-33160, Regulatory Relaxation for the Post Accident
46 SRV Position Indication System," dated October 31, 2005 (ADAMS Accession
47 No. ML053110138).
48
49 4. Part 50 of Title 10, Chapter 1 of the *Code of Federal Regulations*.

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- 5. NUREG-0737, "Clarification of TMI Action Plan Requirements," dated November 30, 1980 (ADAMS Accession No. ML051400209).
- 6. NUREG-1433, Rev. 3, "Standard Technical Specification General Electric Plants, BWR/4," dated June 2004 (ADAMS Accession No. ML041910194).
- 7. NUREG-1434, Rev. 3, "Standard Technical Specification General Electric Plants, BWR/6," dated June 2004 (ADAMS Accession No. ML041910204).

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Date: July 5, 2006