



OG-01-020

March 8, 2001

Domestic Members

AmerenUE
Callaway
American Electric Power Co.
D.C. Cook 1 & 2
Carolina Power & Light Co.
H.B. Robinson 2
Shearon Harris
Consolidated Edison
Company of NY, Inc.
Indian Point 2
Duke Power Company
Catawba 1 & 2
McGuire 1 & 2
Entergy Nuclear Operations Inc.
Indian Point 3
Exelon
Braidwood 1 & 2
Byron 1 & 2
First Energy Nuclear
Operating Co.
Beaver Valley 1 & 2
Florida Power & Light Co.
Turkey Point 3 & 4
Northeast Utilities
Seabrook
Millstone 3
Nuclear Management Co.
Point Beach 1 & 2
Prairie Island 1 & 2
Kewaunee
Pacific Gas & Electric Co.
Diablo Canyon 1 & 2
PSEG - Nuclear
Salem 1 & 2
Rochester Gas & Electric Co.
R.E. Ginna
South Carolina Electric
& Gas Co.
V.C. Summer
STP Nuclear Operating Co.
South Texas Project 1 & 2
Southern Nuclear
Operating Co.
J.M. Farley 1 & 2
A.W. Vogtle 1 & 2
Tennessee Valley Authority
Sequoyah 1 & 2
Watts Bar 1
TXU Electric
Commanche Peak 1 & 2
Virginia Electric & Power Co.
(Dominion)
North Anna 1 & 2
Surry 1 & 2
Wolf Creek Nuclear
Operating Corp.
Wolf Creek

International Members

Electrabel
Doel 1, 2, 4
Tihange 1, 3
Kansai Electric Power Co.
Mihama 1
Takahama 1
Ohi 1 & 2
Korea Electric Power Co.
Kori 1 - 4
Yonggwang 1 & 2
Nuclear Electric plc
Sizewell B
Nuklearna Elektrarna Krsko
Krsko
Spanish Utilities
Asco 1 & 2
Vandellos 2
Almaraz 1 & 2
Vattenfall AB
Ringhals 2 - 4
Taiwan Power Co.
Maanshan 1 & 2

Dr. Brian W. Sheron
Associate Director for Project Licensing and Technical Analysis
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Westinghouse Owners Group

**NRC's Interpretation of the Weld Inspection Requirements for the RI-ISI
Program as Described in WCAP-14572 and Its Associated Safety Evaluation
Report**

References:

1. Letter from Mr. Thomas H. Essig, Acting Chief, Generic Issues and Environmental Branch, U.S. Nuclear Regulatory Commission to Mr. Lou Liberatori, Chairman, Westinghouse Owners Group, *Safety Evaluation of Topical Report WCAP-14572, Revision 1, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report,"* December 15, 1998.
2. WCAP-14572, Revision 1-NP-A, *Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report,* February 1999.

Dear Dr. Sheron:

The Westinghouse Owners Group (WOG) has become aware of the NRC Staff's effort to impose a requirement to examine a minimum of 10% of Class 1 butt welds in recently submitted risk-informed inservice inspection (ISI) programs using the WOG methodology. This requirement is not supported by the risk-informed process that was submitted via WCAP-14572, Reference 2. The requirement goes beyond the conditions described in the NRC safety evaluation report (Reference 1) granting approval of WCAP-14572. This type of requirement is not discussed in either NRC Regulatory Guide 1.178 or NRC Standard Review Plan Chapter 3.9.8.

It is estimated that the additional required inspections would result in an additional 300R-400R in radiation exposure to plant workers, with no additional safety benefit. It is particularly burdensome to licensees with newer reactors since the newer designs typically have a larger number of Class 1 butt welds.

Therefore, the WOG considers this new requirement to be an unwarranted and unnecessary regulatory burden. Attachment 1 outlines our technical concerns with this matter and highlights the additional unnecessary regulatory burden that would be imposed.

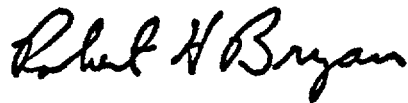
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(RSC)
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The WOG requests the NRC Staff to evaluate current and future submittals consistent with the conditions of the safety evaluation that was issued in 1998 for the WOG Topical Report, which remains the licensing basis for the risk-informed ISI program submittals. Since the 10% minimum sample size for Class 1 piping was not part of the approved safety evaluation, the WOG does not support this new condition for an acceptable RI-ISI submittal.

We appreciate your consideration of this request, and we would be pleased to further discuss this matter with you by telecon or by meeting, as required. Please direct any questions to me at 423-751-8201.

Very truly yours,

A handwritten signature in black ink, reading "Robert H. Bryan". The signature is written in a cursive, flowing style.

Robert Bryan, Jr., Chairman
Westinghouse Owners Group

attachment

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All receive 1L, 1A

cc: Mr. Samuel J. Collins
Mr. Joseph Callan
Dr. Goutam Bagchi
Dr. Syed Ali
Mr. Gary Holahan
Mr. Ashok Thadani
Mr. Ted Sullivan
Mr. Stephen Dinsmore
Mr. Ronald M. Scroggins
Mr. Ray Wharton, NRC WOG Project Manager
Mr. Ralph Beedle, NEI
Mr. Tony Pietrangelo, NEI
Mr. Biff Bradley, NEI
Mr. H. Brew Barron, Duke Energy, EC Chairman
Mr. Chris Bakken, AEP, EC Vice Chairman
Mr. Richard Berneir, APS, CEOG Chairman
Mr. Howard Crawford, AMERGEN, B&WOG Chairman
Mr. Jim Kenny, PPL, BWROG Chairman
Mr. Andrew Drake, Westinghouse
WOG Primary Representatives
WOG Steering Committee
WOG Materials Subcommittee
WOG Risk-Based Technology Working Group
WOG Risk-Informed ISI Subgroup

Attachment 1

WOG Concern with NRC's Interpretation of the Weld Inspection Requirements for the RI-ISI Program as described in WCAP-14572 and its associated Safety Evaluation Report

Background

The Westinghouse Owners Group (WOG) has become aware of the NRC Staff's recent efforts to impose through the regulatory approval process a defacto requirement to examine a minimum of 10% of Class 1 butt welds in recently submitted risk-informed inservice inspection (ISI) programs using the WOG method. This document outlines our technical concerns with this matter and highlights the additional unnecessary regulatory burden imposed by this defacto requirement, which goes beyond the explicit conditions described in the NRC safety evaluation report for the approved WOG Risk-Informed ISI Topical Report.

In the cover letter of the NRC safety evaluation (Reference 1) for the approved WOG Topical Report, WCAP-14572, Revision 1-NP-A, for risk-informed ISI (Reference 2), it is stated that –

“The staff has found that this report is acceptable for referencing in licensing applications to the extent specified and under the limitations delineated in the report and the associated NRC safety evaluation, which is enclosed. The safety evaluation defines the basis for acceptance of the report.”

Nowhere in the safety evaluation, which is acceptable for full or partial scope options, is there a condition or limitation specified that examination of a minimum of 10% of Class 1 butt welds is required for a risk-informed ISI piping program. In fact, on pages 22 and 23 of the safety evaluation, it is stated that –

“The staff finds the methodology to determine the number of elements selected for examination to be acceptable since, all HSS (high safety significant) segments with known degradation mechanisms will be subject to 100% examination, HSS segments with no known degradation mechanism will be sampled for examination on a sound statistical basis to ensure that a specified target leak frequency is not exceeded at the pre-specified confidence level of 95%, LSS (low safety significant) segments with known degradation mechanisms will be subject to examination in accordance with the licensees defined program, and the final scope of examination will result in a change in risk consistent with RG (Regulatory Guide) 1.174 guidelines.”

And on page 25 under 4.0 Conclusions of the safety evaluation, it states:

“ The staff concludes that the proposed RI-ISI program as describe in WCAP -14572,Revision 1, conditioned upon the changes to be incorporated as discussed in Ref.8, will provide an acceptable level of quality and safety pursuant to 10 CFR 50.55a for the proposed alternative to the piping ISI requirements with regard to the number of inspections, locations of inspections, and methods of inspections.”

The statistical basis mentioned above and used in the WOG method was developed at the request of NRC senior management in 1996 to address a valid question related to assuring that piping reliability is maintained after examinations have been reduced, changed, or eliminated using risk-informed processes.

It was requested that a statistical basis be provided such that the piping reliability and performance is maintained at a level equivalent to that associated with current ISI practices. Application of this NRC-approved statistical evaluation to define the minimum examination sample helps the industry to move away from the use of a prescribed minimum examination sample size simply based on judgement or gentlemen's agreement. The latter approach has been the basis for the current ASME 25% and 7-1/2% sample sizes for Class 1 and Class 2 piping butt welds, respectively.

The above technical approach is also consistent with the requirements provided in NRC Regulatory Guide 1.178 and NRC Standard Review Plan Chapter 3.9.8.

WOG Perspective on Origination of 10% Sample Size Selection For Class 1 Butt Welds and Relation to Other Processes

It appears to the WOG that the defacto 10% minimum sample requirement first emerged after NRC completed their review and approval of the EPRI Risk-Informed ISI Topical Report, which was about a year after the Staff issued the safety evaluations for the WOG Topical Report and Surry Unit 1 submittal. In discussions on plant-specific program WOG methodology submittals, the Staff has also referenced the 10% minimum sample requirement for ASME Code Case N-560, which applies to Class 1 Category B-J butt welds.

The WOG method was adopted from an earlier ASME Research methodology that was later used to support the 10% sample requirement in N-560. Although there was a common background, there was a divergence in methodologies. Code Case N-560 was originally developed to reflect the latest inservice inspection experience, which strongly supported a sample size much less than the current 25% criterion. However, some safety quantification was needed to substantiate a new criterion. Early ASME Research risk-informed ISI investigations using a few systems at Surry Unit 1, in which NRC Research was a key contributor, showed that a 7% value could be readily justified for Class 1 piping. The project leaders for ASME Code Case N-560 stated that they would set the sample size criterion to 10% to add conservatism since they were going to recommend a qualitative risk process that also used engineering judgement to support the new selections.

The EPRI risk-informed ISI process emerged from the same philosophy that was used to develop Code Case N-560, and it also uses the 10% value for medium risk category components and a 25% value for high risk category components. The WOG method continued to use a more quantitative approach to justify the risk ranking of segments. The element selection process was also more quantitative and more fully justified. It specified a 100% sample rate for high safety significant (HSS) piping locations with active degradation mechanisms. There is no dispute over the appropriateness of requiring a substantial examination sample size for piping with active degradation mechanisms. Where an active degradation mechanism is present, ISI examination is an effective monitoring method to prevent leaks and increase safety. The issue at hand is the sampling of piping with no technical or experience basis for assuming an active degradation mechanism. The statistical sampling of such relatively uniform elements is well established and requires no fixed percentage rate.

For such HSS segments or portions of segments with no active degradation mechanisms, the WOG process specifies a statistical evaluation to define the sample size. No overall minimum criterion was defined because the results are quite plant dependent, although a minimum one exam per HSS segment was added after discussion with the NRC staff. This WOG selection process for inspection locations was approved in the NRC safety evaluation of the WOG Topical Report; the relevant paragraph was quoted above.

From this discussion, it is clear that the WOG process is distinct and has a more fully qualified element selection process than others, so it is not valid to apply a review acceptance criteria from another process to the WOG process. Furthermore, the ASME has recognized this distinction. Revision 2 of Code Case N-560 will apply only to Method B (EPRI Method) and has been approved by ASME. Also, Code Case N-577 was revised (Revision 1) and approved by ASME to be applicable for both full and partial scope applications using Method A (WOG Method), and it is exactly consistent with the NRC-approved WOG Topical Report. Thus, the NRC application of a 10% requirement to WOG process submittals for Class 1 piping would now also be inconsistent with an approved consensus standard.

Surry Unit 1 Approved Program

When the Surry-1 risk-informed ISI program was developed and submitted for the plant piping systems in 1996-1997 and was approved by the NRC in 1998 to complement the WOG Topical Report, the following process was used to define the examination locations:

- | | | |
|---|---------------------|--------------------|
| ▪ Risk evaluation, expert panel review,
structural element selection matrix,
statistical evaluation | 108 HSS Segments | 120 Exam Locations |
| ▪ Change-in-risk evaluation | No new HSS Segments | 10 Locations Added |
| ▪ Defense-in-depth consideration | No new HSS Segments | 6 Locations Added |

These 136 examination locations that are defined by the NRC-approved WOG method represent about a 65% reduction in the number of exam locations previously performed per ASME Section XI, and the resulting examination sample size for the Surry-1 Class 1 butt welds is about 7%.

In the cover letter of the NRC safety evaluation for Surry-1 (Reference 3), it is stated that –

“The results of our review indicate that you have provided an acceptable alternative to the requirements of ASME Code Section XI and have shown that implementation of the program would result in an insignificant change in risk even with fewer inspections, because the inspections will take place where degradation mechanisms are more likely to occur, and procedures and personnel will target these locations using improved techniques and expanded volumes. We have determined that the alternative method described in your proposal provides equivalent or better examination criteria than those provided by the current Section XI requirements.”

“We therefore conclude that authorization of your proposed alternative would provide an acceptable level of quality and safety.”

Once again, nowhere in the NRC safety evaluation for Surry-1 is there a condition or limitation specified that examination of a minimum of 10% of Class 1 butt welds is required for the acceptable risk-informed ISI program.

Turkey Point Unit 3 Approved Program

During 1999-2000, Florida Power and Light (FPL) provided a Class 1 risk-informed ISI submittal to the NRC for Turkey Point Unit 3 as a WOG lead plant for a partial scope application. Once again, the following process was used to define the examination locations:

- | | | |
|---|---------------------|--------------------|
| ▪ Risk evaluation, expert panel review,
structural element selection matrix,
statistical evaluation | 30 HSS Segments | 19 Exam Locations |
| ▪ Change-in-risk evaluation | No new HSS Segments | 7 Locations Added |
| ▪ Defense-in-depth consideration | No new HSS Segments | 10 Locations Added |

The above results are summarized in a Resubmittal of the Turkey Point Unit 3 Risk-Informed Inservice Inspection Program (Reference 4). On page 9 of this revised submittal, it is stated that –

“To further assure that ‘defense-in-depth’ is maintained under the new program requirements, 10 additional examination locations are being included within the safety injection system. Based on the safety significance of the 29 safety injection segments included in the program, no examinations were required however, these 10 locations are being added as an enhancement to the program.”

Nowhere in the FPL resubmittal is there a reference to adding these exams to meet a 10% minimum examination requirement of the Class 1 butt welds. In fact, the resubmittal states that –

“The proposed revisions to the current ISI Program for Class 1 piping only are based on the risk-informed process described in Westinghouse Owners Group (WOG) WCAP-14572, Revision 1-NP-A,…”

The resulting 10 additional exams brought the final Class 1 B-F and B-J Class 1 butt weld sample size to 10%. Thus, the approved WOG process provided a technical basis for a 10% sample size for Turkey Point Unit 3 on its own merits without arbitrarily adding exam locations to satisfy a prescribed 10% minimum value.

The NRC states on page 6 in the Turkey Point safety evaluation (Reference 5), that –

“When the WCAP-14572 relative ranking method is used, segments with dominant contributions to risk are ranked as HSS and segments with other degradation mechanisms, having relatively small contributions, are ranked as LSS. The staff was aware that a relative ranking evaluation could be dominated by a small subset of high failure rate segments and stated in the WCAP-14572 SER that,”

‘...although a reduction in the number of welds inspected is anticipated, it is expected that there will be reasonable assurance that the program will provide a substantive ongoing assessment of piping condition’

The NRC Staff continues in the Turkey Point SER to infer that the above statement in the SER for the WOG Topical now means that 10% of the Class 1 B-F and B-J butt welds must now be selected for volumetric examination. This recently issued interpretation now infers a new prescribed minimum limit to be associated with the above generalized statement in the earlier NRC SER for the WOG generic risk-informed ISI method without a documented technical justification.

Surry Unit 2 Approved Program

Virginia Electric and Power Company recently received safety evaluation from the NRC for the use of an alternative risk-informed ISI program for Class 1 piping systems at Surry Unit 2 (Reference 6). In

applying the WOG method in the same manner as previously completed and accepted by the NRC for Surry Unit 1, the process yielded 50 Class 1 B-F and B-J butt welds to be selected for examination, which represents approximately 10.5% of the butt weld population. Given this result, the NRC did not have to raise the new interpretation of a 10% minimum examination sample as was done for Turkey Point Unit 3. What the Surry Unit 2 results demonstrate is that, once again, the WOG method will yield an appropriate risk-informed inspection selection for the plant specific features and it is not tied to a prescribed sample size, such as 10%. The WOG has always argued that a licensee has to accept the results of the process and they will vary from plant-to-plant, as exemplified in the next application.

Millstone Unit 3 Submittal Under Review

As a final example, Northeast Nuclear Energy submitted a risk-informed ISI program plan for the Class 1 piping at Millstone Unit 3 (Reference 7). The following process was used to define the exam locations:

- | | | |
|---|---------------------|--------------------|
| ▪ Risk evaluation, expert panel review, structural element selection matrix, statistical evaluation | 62 HSS Segments | 79 Exam Locations |
| ▪ Change-in-risk evaluation | No new HSS Segments | No Locations Added |
| ▪ Defense-in-depth consideration | Adequately Covered | No Locations Added |

These 79 examination locations that were selected by the NRC-approved WOG method represent about a 76% reduction in the number of exam locations previously performed per ASME Section XI, and the resulting examination sample size for the Millstone Unit 3 Class 1 butt welds is about 6.5%. This sample rate is smaller than that determined for the Turkey Point and Surry Units, although in absolute number it is substantially larger. Millstone Unit 3 was designed to ASME Section III (versus B31.1 for the earlier vintage plants) and very few socket welds were used in the construction of the Class 1 piping systems as compared to the early units. As such it has a large number of butt welds, many of them located in Low Safety Significant segments which do not require volumetric examination under any RI-ISI process.

Northeast Nuclear Energy applied the WOG risk-informed ISI method per WCAP-14572, Revision 1-NP-A, including the NRC safety evaluation, and no exceptions to the methodology were taken. They quantitatively show an equivalent level of safety between their current ASME Section program and the proposed risk-informed ISI program per the methods in the NRC-approved Topical Report. In recent discussions between Northeast Nuclear Energy and the NRC regarding the submittal, the Staff has suggested that the licensee needs to add a number of volumetric exams so as to achieve the defacto 10% inspection rate for Class 1 butt welds. For Millstone this number would entail approximately 40 additional volumetric exams over the 79 already included in the submittal. Adding these exams will have little or no additional safety benefit while exposing the workers to an additional 25R of radiation dose over the remaining license.

Additional Unnecessary Burden to WOG Members

The WOG expects a number of risk-informed ISI programs to be submitted in the near future for at least 15 additional nuclear units that will show results similar to Millstone Unit 3. Application of a 10% minimum sample requirement for Class 1 butt welds is estimated to result in an additional 300R-400R (~15 reactors @25R per reactor) in radiation exposure to plant workers with no additional safety benefit for these units. Given this information, the WOG views the 10% minimum sample requirement to be an unwarranted and unnecessary regulatory burden.

Potential Impact of Recent V.C. Summer Event

The WOG is aware of the potential impact of the recent event at the V.C. Summer plant, related to cracking in the main coolant loop hot leg to reactor pressure vessel nozzle weld, on risk-informed ISI programs. As the industry and NRC evaluate the results of the root cause analysis to determine whether any generic implications are found, the licensees who have risk-informed ISI programs developed, submitted or approved stand ready to take appropriate action consistent with the "living process" requirements of the approved WOG methodology. If incorporation of new relevant information shows that additional welds need to be examined, the licensee will adopt the results that emerge from the approved process, whether they be less than, equal to, or greater than 10%.

Summary

In summary, the WOG views the NRC Staff's effort to impose a requirement to examine a minimum of 10% of Class 1 butt welds in recently submitted risk-informed inservice inspection (ISI) programs using the WOG methodology to be outside of the explicit bases stated in the NRC safety evaluation for the WOG Topical Report. Furthermore, the WOG views this suggested criterion to be an unwarranted and unnecessary regulatory burden. It is estimated that an additional 300R-400R in radiation exposure to plant workers will result through end of current license with no additional safety benefit for the aggregate of licensees, particularly for those with later reactor designs who are planning to submit risk-informed ISI programs using the WOG method. To this end, the WOG requests the NRC Staff to review current and new WOG topical submittals using criteria consistent with the explicit conditions of the safety evaluation that was issued in 1998 for the WOG Topical Report which remains the licensing basis for the risk-informed ISI program submittals. Since the minimum sample size for Class 1 piping was not part of the approved evaluation the WOG does not support this new condition for an acceptable RI-ISI submittal.

References:

1. Letter from Mr. Thomas H. Essig, Acting Chief, Generic Issues and Environmental Branch, U.S. Nuclear Regulatory Commission to Mr. Lou Liberatori, Chairman, Westinghouse Owners Group, *Safety Evaluation of Topical Report WCAP-14572, Revision 1, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report,"* December 15, 1998.
2. WCAP-14572, Revision 1-NP-A, *Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report*, February 1999.
3. Letter from Mr. Herbert N. Berkow, Director, Project Directorate II-2, U.S. Nuclear Regulatory Commission to Mr. J. P. O'Hanlon, Senior Vice President – Nuclear, Virginia Electric and Power Company, *Request to Use Code Case N-577 as an Alternative to the Requirements of ASME Code Section XI at Surry Unit 1 (TAC No. MA 0125)*, December 16, 1998.
4. Letter from Mr. R. J. Hovey, Vice President, Turkey Point Plant to U.S. Nuclear Regulatory Commission, Document Control Desk, *Resubmittal of Risk-Informed Inservice Inspection Program*, Turkey Point Unit 3, Docket No. 50-250, July 13, 2000.

5. Letter from Mr. Richard P. Correia, Chief, Section 2, Project Directorate II, U.S. Nuclear Regulatory Commission to Mr. Thomas F. Plunkett, President – Nuclear Division, Florida Power and Light Company, *Turkey Point Plant, Unit 3 –Relief Request Regarding Safety Evaluation of Risk-Informed Inservice Inspection Program (TAC No. MA8111)*, November 30, 2000.
6. Letter from Mr. Richard L. Emch, Jr., Chief, Section 1, Project Directorate II, U.S. Nuclear Regulatory Commission to Mr. David A. Christian, Senior Vice President – Nuclear, Virginia Electric and Power Company, *Request to Use Alternative Risk-Informed Inservice Inspection (RI-ISI) Program at Surry Unit 2 (TAC No. MA8835)*, January 26, 2001.
7. Letter from Mr. Stephen E. Scace, Director, Northeast Nuclear Energy, to U.S. Nuclear Regulatory Commission, Document Control Desk, *Millstone Nuclear Power Station, Unit No. 3 Risk-Informed Inservice Inspection Program Plan Request For Relief From ASME Section XI*, Docket No. 50-423, B18104, July 25, 2000.