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UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

August 28, 2000

MEMORANDUM TO: T. Kress, Chairman, Severe Accident Management Subcommittee

FROM: P. Boehnert, Senior Staff Engineer

SUBJECT: NRC SAFETY EVALUATION RELATED TO WESTINGHOUSE AND COMBUSTION ENGINEERING OWNERS GROUPS TOPICAL REPORTS ON ELIMINATION OF POST-ACCIDENT SAMPLING SYSTEM (PASS) LICENSING REQUIREMENTS

The NRC staff has completed its reviews of the applications from the Westinghouse (WOG) and Combustion Engineering (CEOG) Owners Groups to eliminate the requirements associated with the Post-Accident Sampling System (PASS) from their respective plants' licensing basis. As noted below, this matter was extensively reviewed by the ACRS last year. Both the WOG and CEOG sought to eliminate the PASS requirements from plant licensing bases due to the lack of perceived need, the ability to obtain key accident parameters by use of other means, and the costs associated with maintaining an antiquated sampling system.

Background - The Committee initially reviewed this matter during its May 1999 Meeting. In its letter on this review (copy attached), the Committee recommended that the capability to measure the pH of containment sump water be maintained. Subsequently, the Committee corresponded with the EDO when it learned that the staff intended to allow deletion of pH containment sump water measurement capability. Besides disagreeing with the EDO's position, the Committee also recommended that consideration be given to requiring installation of gamma monitors in containment, tuned to gamma emissions of cesium and krypton, for early indications of core damage. Finally, in its October 8, 1999 letter summarizing its review of the CEOG request for PASS elimination from plant licensing requirements, the Committee repeated its recommendations regarding containment sump pH monitoring and post-accident measurement of in-containment fission products. Copies of the last two Committee letters are also attached.

Staff Review - In its SER pertaining to the WOG request, the staff specified four licensee required actions that a licensee must perform pursuant to use of the WCAP topical report. These actions are:

1. Establish a capability for classifying fuel damage events at the Alert level threshold.

2. Develop contingency plans for obtaining and analyzing highly radioactive samples of reactor coolant, containment sump, and containment atmosphere. As these are contingency plans, they do not have to be demonstrated; nor do these plans have to be carried out during emergency drills or exercises. They do, however, have to be available for use during an accident.

3. Licensees must determine that elimination of PASS will not result in a decrease in the effectiveness of plant emergency plans.

4. Licensees will maintain offsite capability to monitor radioactive iodides.

In addition to Item 2 above, the staff recommended that licensees maintain the capability to analyze the sump water for pH (see attached SER excerpt).

The SER for the CEOG plants includes the same requirements (see attached SER excerpt). Of note for this point, in 1993 the staff had allowed the CEOG to delete the PASS requirement to analyze containment sump samples. In effect, the above Requirement 2 could be labeled a "backfit". This is ameliorated however by the fact that the licensee only needs to develop contingency plans for this function. I understand that the CEOG didn't have any real problem with this requirement.

In order to ensure a more efficient processing of the WOG and CEOG plant license amendments for this item, NRR has issued a Notice for Public Comment on a Technical Specification Improvement to Eliminate PASS Requirements via use of the Consolidated Line Item Improvement Process (CLIIP). Basically, the CLIIP consists of both a model Safety Evaluation (SE) and No Significant Hazards Consideration (NSHC). Licensees can request amendments confirming the applicability of the SE and NSHC to their reactors, and provide the requested plant-specific verifications and commitments. A copy of the CLIIP Public Comment Notice is attached. Pages 14-16 contain the regulatory requirements referred to above.

I understand that this document has been issued for public comment on August 10, 2000. The public comment period will close on September 11, 2000.

Outcome - While not specifically noted in any of the documentation, the staff did take account of the Committee's concerns relative to this matter. The requirement to maintain

containment sump monitoring capability was included, with a recommendation that pH monitoring capability be sustained. Similarly, containment atmosphere monitoring capability will be required. The Committee's recommendation relative to installation of gamma monitors tuned to specific isotopic releases of krypton and cesium is under evaluation by the staff pursuant to the generic issue prioritization process.

Attachments: As Stated

cc: Balance of ACRS Members
R. Savio

cc w/o attach (via E-mail):
J. Larkins
H. Larson
ACRS Technical Staff & Fellows

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NUCLEAR REGULATORY COMMISSION

Notice of Opportunity to Comment on Model Safety Evaluation on
Technical Specification Improvement to
Eliminate Requirements on Post Accident Sampling Systems
Using the Consolidated Line Item Improvement Process

AGENCY: Nuclear Regulatory Commission.

ACTION: Request for comment.

SUMMARY: Notice is hereby given that the staff of the Nuclear Regulatory Commission (NRC) has prepared a model safety evaluation (SE) relating to the elimination of requirements on post accident sampling imposed on licensees through orders, license conditions, or technical specifications. The NRC staff has also prepared a model no significant hazards consideration (NSHC) determination relating to this matter. The purpose of these models is to permit the NRC to efficiently process amendments that propose to remove requirements for the Post Accident Sampling System (PASS). Licensees of nuclear power reactors to which the models apply could request amendments confirming the applicability of the SE and NSHC determination to their reactors and providing the requested plant-specific verifications and commitments. The NRC staff is requesting comments on the model SE and model NSHC determination prior to announcing their availability for referencing in license amendment applications.

DATES: The comment period expires (insert date 30 days from date of publication in the Federal Register). Comments received after this date will be considered if it is practical to do so, but the Commission is able to ensure consideration only for comments received on or before this date.

ADDRESSES: Comments may be submitted either electronically or via U.S. mail.

Submit written comments to: Chief, Rules and Directives Branch, Division of Administrative Services, Office of Administration, Mail Stop: T-6 D59, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

Hand deliver comments to: 11545 Rockville Pike, Rockville, Maryland, between 7:45 a.m. and 4:15 p.m. on Federal workdays.

Copies of comments received may be examined at the NRC's Public Document Room, 2120 L Street, NW (Lower Level), Washington, DC.

Comments may be submitted by electronic mail to CLIIP@nrc.gov.

FOR FURTHER INFORMATION CONTACT: William Reckley, Mail Stop: O-8E2, Division of Licensing Project Management, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, telephone 301-415-1323.

SUPPLEMENTARY INFORMATION:

BACKGROUND

Regulatory Issue Summary 2000-06, "Consolidated Line Item Improvement Process for Adopting Standard Technical Specification Changes for Power Reactors," was issued on March 20, 2000. The consolidated line item improvement process (CLIIP) is intended to improve the efficiency and transparency of NRC licensing processes. This is accomplished by processing proposed changes to the Standard Technical Specifications (STS) in a manner that supports subsequent license amendment applications. The CLIIP includes an opportunity for the public to comment on proposed changes to the STS following a preliminary assessment by the NRC staff and finding that the change will likely be offered for adoption by licensees. This notice is soliciting comment on a proposed change to the STS that removes requirements for the PASS. The CLIIP directs the NRC staff to evaluate any comments received for a proposed

change to the STS and to either reconsider the change or to proceed with announcing the availability of the change for proposed adoption by licensees. Those licensees opting to apply for the subject change to technical specifications are responsible for reviewing the staff's evaluation, referencing the applicable technical justifications, and providing any necessary plant-specific information. Each amendment application made in response to the notice of availability would be processed and noticed in accordance with applicable rules and NRC procedures.

This notice involves the elimination of requirements for PASS and related administrative controls in technical specifications. This proposed change was proposed for incorporation into the standard technical specifications by the Westinghouse Owners Group (WOG) and the Combustion Engineering Owners Group (CEOG) participants in the Technical Specification Task Force (TSTF) and is designated TSTF-366.

APPLICABILITY

This proposed change to remove requirements for PASS from technical specifications (and other elements of the licensing bases) is applicable to plants with Westinghouse and Combustion Engineering designs.

To efficiently process the incoming license amendment applications, the staff requests each licensee applying for the changes addressed by TSTF-366 using the CLIIP to address the following plant-specific verifications and regulatory commitments. The CLIIP does not prevent licensees from requesting an alternative approach or proposing the changes without the requested verifications and regulatory commitments. Variations from the approach recommended in this notice may, however, require additional review by the NRC staff and may increase the time and resources needed for the review. In making the requested regulatory commitments, each licensee should address: (1) that the subject capability exists (or will be developed) and will be maintained; (2) where the capability or procedure will be described (e.g.,

severe accident management guidelines, emergency operating procedures, emergency plan implementing procedures); and (3) a schedule for implementation. The amendment request need not provide details about designs or procedures.

Each licensee should verify that it has, and make a regulatory commitment to maintain (or make a regulatory commitment to develop and maintain):

a. contingency plans for obtaining and analyzing highly radioactive samples from the reactor coolant system, containment sump, and containment atmosphere;

b. a capability for classifying fuel damage events at the Alert level threshold (typically this is 300 μCi/ml dose equivalent iodine). This capability may use the normal sampling system and/or correlations of sampling or letdown line dose rates to coolant concentrations; and

c. the capability to monitor radioactive iodines that have been released to offsite environs.

PUBLIC NOTICES

The staff issued a *Federal Register* Notice (64 FR 66213, November 24, 1999) that requested public comment on the NRC's pending action to approve topical reports submitted by the WOG and the CEOG in which they proposed to eliminate regulatory requirements for PASS. In particular, the staff sought comment from offsite emergency response organizations so that any impact of the elimination of PASS on their response could be factored into the staff's evaluation. Appendices to the staff's safety evaluations for topical reports submitted by the CEOG and the WOG contain a synopsis of the public comments received and the staff's evaluation of the comments. The safety evaluations for the topical reports are available on the NRC website posting for this change (www.nrc.gov/NRR/sts/sts.htm) and the official record copies are available on the NRC's Agencywide Documents Access and Management System (ADAMS) (Accession Numbers ML003715250 dated May 16, 2000, for the CEOG topical report and ML003723268 dated June 14, 2000, for the WOG topical report).

This notice requests comments from interested members of the public within 30 days of the date of publication in the *Federal Register*. Following the staff's evaluation of comments received as a result of this notice, the staff may reconsider the proposed change or may proceed with announcing the availability of the change in a subsequent notice (perhaps with some changes to the safety evaluation or proposed no significant hazards consideration determination as a result of public comments). If the staff announces the availability of the change, licensees wishing to adopt the change will submit an application in accordance with applicable rules and other regulatory requirements. The staff will in turn issue for each application a notice of consideration of issuance of amendment to facility operating license(s), a proposed no significant hazards consideration determination, and an opportunity for a hearing. A notice of issuance of an amendment to operating license(s) will also be issued to announce the elimination of the PASS requirements for each plant that applies for and receives the requested change.

PROPOSED SAFETY EVALUATION

U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

Consolidated Line Item Improvement
Technical Specification Task Force (TSTF) Change TSTF-366
Elimination of Requirements for Post Accident Sampling System (PASS)

1.0 Introduction

In the aftermath of the accident at Three Mile Island (TMI), Unit 2, the Nuclear Regulatory Commission (NRC) imposed requirements on licensees for commercial nuclear power plants to install and maintain the capability to obtain and analyze post-accident samples of the reactor coolant and containment atmosphere. The desired capabilities of the Post Accident Sampling System (PASS) were described in NUREG-0737, "Clarification of TMI Action

Plan Requirements." The NRC issued orders to licensees with plants operating at the time of the TMI accident to confirm the installation of PASS capabilities (generally as they had been described in NUREG-0737). A requirement for PASS and related administrative controls was added to the technical specifications (TS) of the operating plants and was included in the initial TS for plants licensed during the 1980s and 90s. Additional expectations regarding PASS capabilities were included in Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants To Assess Plant and Environs Conditions During and Following an Accident."

Significant improvements have been achieved since the TMI accident in the areas of understanding risks associated with nuclear plant operations and developing better strategies for managing the response to potentially severe accidents at nuclear plants. Recent insights about plant risks and alternate severe accident assessment tools have led the NRC staff to conclude that some TMI Action Plan items can be revised without reducing the ability of licensees to respond to severe accidents. The NRC's efforts to oversee the risks associated with nuclear technology more effectively and to eliminate undue regulatory costs to licensees and the public have prompted the NRC to consider eliminating the requirements for PASS in TS and other parts of the licensing bases of operating reactors.

The staff has completed its review of the topical reports submitted by the Combustion Engineering Owners Group (CEOG) and the Westinghouse Owners Group (WOG) that proposed the elimination of PASS. The justifications for the proposed elimination of PASS requirements center on evaluations of the various radiological and chemical sampling and their potential usefulness in responding to a severe reactor accident or making decisions regarding actions to protect the public from possible releases of radioactive materials. As explained in more detail in the staff's safety evaluations for the two topical reports, the staff has reviewed the available sources of information for use by decision-makers in developing protective action

recommendations and assessing core damage. Based on this review, the staff found that the information provided by PASS is either unnecessary or is effectively provided by other indications of process parameters or measurement of radiation levels. The staff agrees, therefore, with the owners groups that licensees can remove the TS requirements for PASS, revise (as necessary) other elements of the licensing bases, and pursue possible design changes to alter or remove existing PASS equipment.

2.0 Background

In a letter dated May 5, 1999 (as supplemented by letter dated April 14, 2000), the CEOG submitted the topical report CE NPSD-1157, Revision 1, "Technical Justification for the Elimination of the Post-Accident Sampling System From the Plant Design and Licensing Bases for CEOG Utilities." A similar proposal was submitted on October 26, 1998 (as supplemented by letters dated April 28, 1999, April 10 and May 22, 2000), by the WOG in its topical report WCAP-14986, "Post Accident Sampling System Requirements: A Technical Basis." The reports provided evaluations of the information obtained from PASS samples to determine the contribution of the information to plant safety and accident recovery. The reports considered the progression and consequences of core damage accidents and assessed the accident progression with respect to plant abnormal and emergency operating procedures, severe accident management guidance, and emergency plans. The reports provided the owners groups' technical justifications for the elimination for the various PASS sampling requirements. The specific samples and the staff's findings are described in the following evaluation.

The NRC staff prepared this model safety evaluation (SE) relating to the elimination of requirements on post accident sampling and solicited public comment [FR] in accordance with the consolidated line item improvement process (CLIIP). The use of the CLIIP in this matter is intended to help the NRC to efficiently process amendments that propose to remove the PASS requirements from TS. Licensees of nuclear power reactors to which this model

apply were informed [FR] that they could request amendments confirming the applicability of the SE to their reactors and providing the requested plant-specific verifications and commitments.

3.0 Evaluation

The technical evaluations for the elimination of PASS sampling requirements are provided in the safety evaluations dated May 16, 2000, for the CEOG topical report CE NPSD-1157 and June 14, 2000, for the WOG topical report WCAP-14986. The NRC staff's safety evaluations approving the topical reports are located in the NRC's Agencywide Documents Access and Management System (ADAMS) (Accession Numbers ML003715250 for CE NPSD-1157 and ML003723268 for WCAP-14986).

The ways in which the requirements and recommendations for PASS were incorporated into the licensing bases of commercial nuclear power plants varied as a function of when plants were licensed. Plants that were operating at the time of the TMI accident are likely to have been the subject of confirmatory orders that imposed the PASS functions described in NUREG-0737 as obligations. The issuance of plant specific amendments to adopt this change, which would remove PASS and related administrative controls from TS, would also supercede the PASS specific requirements imposed by post-TMI confirmatory orders.

As described in its safety evaluations for the topical reports, the staff finds that the following PASS sampling requirements may be eliminated for plants of Combustion Engineering and Westinghouse designs:

1. reactor coolant dissolved gases
2. reactor coolant hydrogen
3. reactor coolant oxygen
4. reactor coolant pH
5. reactor coolant chlorides

6. reactor coolant boron

7. reactor coolant conductivity

8. reactor coolant radionuclides

9. containment atmosphere hydrogen concentration

10. containment oxygen

11. containment atmosphere radionuclides

12. containment sump pH

13. containment sump chlorides

14. containment sump boron

15. containment sump radionuclides

The staff agrees that sampling of radionuclides is not required to support emergency response decision making during the initial phases of an accident because the information provided by PASS is either unnecessary or is effectively provided by other indications of process parameters or measurement of radiation levels. Therefore, it is not necessary to have dedicated equipment to obtain this sample in a prompt manner.

The staff does, however, believe that there could be significant benefits to having information about the radionuclides existing post-accident in order to address public concerns and plan for long-term recovery operations. As stated in the safety evaluations for the topical reports, the staff has found that licensees could satisfy this function by developing contingency plans to describe existing sampling capabilities and what actions (e.g., assembling temporary shielding) may be necessary to obtain and analyze highly radioactive samples from the reactor coolant system (RCS), containment sump, and containment atmosphere. (See item 4.1 under Licensee Verifications and Commitments.) The contingency plans for obtaining samples from the RCS, containment sump, and containment atmosphere may also enable a licensee to derive information on parameters such as hydrogen concentrations in containment and boron

concentration and pH of water in the containment sump. The staff considers the sampling of the containment sump to be potentially useful in confirming calculations of pH and boron concentrations and confirming that potentially unaccounted for acid sources have been sufficiently neutralized. The use of the contingency plans for obtaining samples would depend on the plant conditions and the need for information by the decision-makers responsible for responding to the accident.

In addition, the staff considers radionuclide sampling information to be useful in classifying certain types of events (such as a reactivity excursion or mechanical damage) that could cause fuel damage without having an indication of overheating on core exit thermocouples. However, the staff agrees with the topical reports' contentions that other indicators of failed fuel, such as letdown radiation monitors (or normal sampling system), can be correlated to the degree of failed fuel. (See item 4.2 under Licensee Verifications and Commitments.)

In lieu of the information that would have been obtained from PASS, the staff believes that licensees should maintain or develop the capability to monitor radioactive iodines that have been released to offsite environs. Although this capability may not be needed to support the immediate protective action recommendations during an accident, the information would be useful for decision makers trying to limit the public's ingestion of radioactive materials. (See item 4.3 under Licensee Verifications and Commitments.)

The staff believes that the changes related to the elimination of PASS that are described in the topical reports, related safety evaluations and this proposed change to TS are unlikely to result in a decrease in the effectiveness of a licensee's emergency plan. Each licensee, however, must evaluate possible changes to its emergency plan in accordance with 10 CFR 50.54(q) to determine if the change decreases the effectiveness of its site-specific plan.

Evaluations and reporting of changes to emergency plans should be performed in accordance with applicable regulations and procedures.

The staff notes that redundant, safety-grade, containment hydrogen concentration monitors are required by 10 CFR 50.44(b)(1), are addressed in NUREG-0737 Item II.F.1 and Regulatory Guide 1.97, and are relied upon to meet the data reporting requirements of 10 CFR Part 50, Appendix E, Section VI.2.a.(i)(4). The staff concludes that during the early phases of an accident, the safety-grade hydrogen monitors provide an adequate capability for monitoring containment hydrogen concentration. The staff sees value in maintaining the capability to obtain grab samples for complementing the information from the hydrogen monitors in the long term (i.e., by confirming the indications from the monitors and providing hydrogen measurements for concentrations outside the range of the monitors). As previously mentioned, the licensee's contingency plan (see item 4.1) for obtaining highly radioactive samples will include sampling of the containment atmosphere and may, if deemed necessary and practical by the appropriate decision-makers, be used to supplement the safety-related hydrogen monitors.

[Note 1 - Each licensee should specify a desired implementation period for its specific amendment request. The implementation period would be that period necessary to develop and implement the items in 4.1 through 4.3 and, as necessary, to make other changes to documentation or equipment to support the elimination of PASS requirements. As an alternative, the licensee may choose to have a shorter implementation period and include the scheduling of items 4.1 through 4.3 as part of the regulatory commitments associated with this amendment request. Amendment requests that include commitments for implementation of the items in Section 4 within 6 months of the implementation of the revised TS will remain within the CLIIP.]

[Note 2 - There may be some collateral changes to the TS as a result of the removal of the administrative controls section for PASS. The following paragraphs address three potential changes that the staff is aware of (editorial changes, mention of PASS as a potential leakage source outside containment, and revision of the bases section for post accident monitoring instrumentation).

(A) The elimination of the TS and other regulatory requirements for PASS would result in additional changes to TS such as [e.g., the renumbering of sections or pages or the removal of references]. The changes are included in the licensee's application to revise the TS in order to take advantage of the CLIIP. The staff has reviewed the changes and agrees that the revisions are necessary due to the removal of the TS section on PASS. The changes do not revise technical requirements beyond that reviewed by the NRC staff in connection with the supporting topical reports or the preparation of the TS improvement incorporated into the CLIIP.

(B) The TS include an administrative requirement for a program to minimize to levels as low as practicable the leakage from those portions of systems outside containment that could contain highly radioactive fluids during a serious transient or accident. The program includes preventive maintenance, periodic inspections, and leak tests for the identified systems. PASS is specifically listed in TS [5.5.2] as falling under the scope of this requirement. The applicability of this specification depends on whether or not PASS is maintained as a system that is a potential leakage path. [Note that several options (see following) exist for handling the impact that eliminating PASS requirements would have on the specification for the program to control leakage outside containment]

(i) The licensee has stated that a plant change would be implemented such that PASS would not be a potential leakage path outside containment for highly radioactive fluids (e.g., the PASS piping that penetrates the containment would be cut and capped). The modification would be made during the implementation period for this amendment such that it is appropriate

to delete the reference to PASS in TS [5.5.2]. Requirements in NRC regulations (e.g., 10 CFR Part 50, Appendix J) and other TS provide adequate regulatory controls over the licensee's proposed modification to eliminate PASS as a potential leakage path.

(ii) The licensee has stated that a plant change might be implemented such that PASS would not be a potential leakage path outside containment for highly radioactive fluids (e.g., the PASS piping that penetrates the containment might be cut and capped). The modification would not be made during the implementation period for this amendment. The licensee has proposed to add the following phrase to the reference to PASS in TS [5.5.2]:

> "(until such time as a modification eliminates the PASS penetration as a potential leakage path)."

The above phrase would make clear that TS [5.5.2] remains applicable to the PASS as long as it is a possible leakage path and reflects that the actual modification of the piping system may be scheduled beyond the implementation period for this amendment. Requirements in NRC regulations (10 CFR Part 50, Appendix J) and other TS provide adequate regulatory controls over the licensee's modification to eliminate PASS as a potential leakage path. Following the modification to eliminate PASS as a potential leakage path, the licensee may elect (in order to maintain clarity and simplicity of the requirement) to revise TS [5.5.2] to remove the reference to PASS, including the phrase added by this amendment.

(iii) The licensee has stated that the configuration of the PASS will continue to be a potential leakage path outside containment for highly radioactive fluids (e.g., the PASS piping will penetrate the containment with valves or other components in the system from which highly radioactive fluid could leak). The licensee has [not proposed to change TS (5.5.2) or has changed TS (5.5.2) to revise the reference to this system from PASS to ( )]. The staff agrees [that TS 5.5.2 is not affected or that the change to revise the reference from PASS to ( )] is acceptable. A separate amendment request will be required if the licensee, subsequent to this

amendment, decides to modify the plant to eliminate this potential leakage path and proposes to change the requirements of TS [5.5.2].

(C) [Note-optional section if licensee provides markup of affected Bases pages] The elimination of PASS requires that the licensee revise the discussion in the Bases section for TS [3.3.3, "Post Accident Monitoring Instrumentation"]. The current Bases mention the capabilities of PASS as part of the justification for allowing both hydrogen monitor channels to be out of service for a period of up to 72 hours. Although the licensee's application included possible wording for the revised Bases discussion for TS [3.3.3], the licensee will formally address the change to the Bases in accordance with [the Bases Control Program or its administrative procedure for revising Bases]. The staff does not believe that the Bases change will require prior NRC approval when evaluated against the criteria in 10 CFR 50.59, "Changes, tests, and experiments," and, therefore, agrees that the revision of the Bases to TS [3.3.3] should be addressed separately from this amendment and should be included in a future update of the TS Bases in accordance with [the Bases Control Program or the licensee's administrative controls].

4.0 Verifications and Commitments

As requested by the staff in the notice of availability for this TS improvement, the licensee has addressed the following plant-specific verifications and commitments.

4.1 Each licensee should verify that it has, and make a regulatory commitment to maintain (or make a regulatory commitment to develop and maintain), contingency plans for obtaining and analyzing highly radioactive samples of reactor coolant, containment sump, and containment atmosphere.

The licensee has [verified that it has or made a regulatory commitment to develop] contingency plans for obtaining and analyzing highly radioactive samples from the RCS, containment sump, and containment atmosphere. The licensee has committed to maintain the

contingency plans within its [specified document or program]. The licensee has [implemented this commitment or will implement this commitment by (specified date)].

4.2 Each licensee should verify that it has, and make a regulatory commitment to maintain (or make a regulatory commitment to develop and maintain), a capability for classifying fuel damage events at the Alert level threshold (typically this is 300 μCi/ml dose equivalent iodine). This capability may utilize the normal sampling system and/or correlations of sampling or letdown line dose rates to coolant concentrations.

The licensee has [verified that it has or made a regulatory commitment to develop] a capability for classifying fuel damage events at the Alert level threshold. The licensee has committed to maintain the capability for the Alert classification within its [specified document or program]. The licensee has [implemented this commitment or will implement this commitment by (specified date)].

4.3 Each licensee should verify that it has, and make a regulatory commitment to maintain (or make a regulatory commitment to develop and maintain), the capability to monitor radioactive iodines that have been released to offsite environs.

The licensee has [verified that it has or made a regulatory commitment to develop] the capability to monitor radioactive iodines that have been released to offsite environs. The licensee has committed to maintain the capability for monitoring iodines within its [specified document or program]. The licensee has [implemented this commitment or will implement this commitment by (specified date)].

The NRC staff finds that reasonable controls for the implementation and for subsequent evaluation of proposed changes pertaining to the above regulatory commitments are provided by the licensee's administrative processes, including its commitment management program.

Should the licensee choose to incorporate a regulatory commitment into the emergency plan, final safety analysis report, or other document with established regulatory controls, the associated regulations would define the appropriate change-control and reporting requirements. The staff has determined that the commitments do not warrant the creation of regulatory requirements (items requiring prior NRC approval of subsequent changes). The NRC staff has agreed that NEI 99-04, Revision 0, "Guidelines for Managing NRC Commitment Changes," provides reasonable guidance for the control of regulatory commitments made to the NRC staff. (See letter dated March 31, 2000 from S. Collins, Director of NRC's Office of Nuclear Reactor Regulation to to R. Beedle, Nuclear Energy Institute (ADAMS Accession Number ML003696998)) The commitments should be controlled in accordance with the industry guidance or comparable criteria employed by a specific licensee. The staff may choose to verify the implementation and maintenance of these commitments in a future inspection or audit.

5.0 State Consultation

In accordance with the Commission's regulations, the [ ] State official was notified of the proposed issuance of the amendments. The State official had [(1) no comments or (2) the following comments - with subsequent disposition by the staff].

6.0 Environmental Consideration

The amendments change a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and change surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no

public comment on such finding (FR). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

7.0 Conclusion

The Commission has concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

PROPOSED NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Description of Amendment Request: The proposed amendments delete requirements from the Technical Specifications (and, as applicable, other elements of the licensing bases) to maintain a Post Accident Sampling System (PASS). Licensees were generally required to implement PASS upgrades as described in NUREG-0737, "Clarification of TMI [Three Mile Island] Action Plan Requirements," and Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident." Implementation of these upgrades was an outcome of the lessons learned from the accident that occurred at TMI, Unit 2. Requirements related to PASS were imposed by Order for many facilities and were added to or included in the technical specifications (TS) for nuclear power reactors currently licensed to operate. Lessons learned and improvements implemented over the last 20 years have shown that the information obtained from PASS can be readily obtained through other means or is of little use in the assessment and mitigation of accident conditions.

Basis for proposed no significant hazards consideration determination: As required by 10 CFR 50.91(a), an analysis of the issue of no significant hazards consideration is presented below:

Criterion 1 - The Proposed Change Does Not Involve a Significant Increase in the Probability or Consequences of an Accident Previously Evaluated.

The PASS was originally designed to perform many sampling and analysis functions. These functions were designed and intended to be used in post accident situations and were put into place as a result of the TMI-2 accident. The specific intent of the PASS was to provide a system that has the capability to obtain and analyze samples of plant fluids containing potentially high levels of radioactivity, without exceeding plant personnel radiation exposure limits. Analytical results of these samples would be used largely for verification purposes in aiding the plant staff in assessing the extent of core damage and subsequent offsite radiological dose projections. The system was not intended to and does not serve a function for preventing accidents and its elimination would not affect the probability of accidents previously evaluated.

In the 20 years since the TMI-2 accident and the consequential promulgation of post accident sampling requirements, operating experience has demonstrated that a PASS provides little actual benefit to post accident mitigation. Past experience has indicated that there exists in-plant instrumentation and methodologies available in lieu of a PASS for collecting and assimilating information needed to assess core damage following an accident. Furthermore, the implementation of Severe Accident Management Guidance (SAMG) emphasizes accident management strategies based on in-plant instruments. These strategies provide guidance to the plant staff for mitigation and recovery from a severe accident. Based on current severe accident management strategies and guidelines, it is determined that the PASS provides little benefit to the plant staff in coping with an accident.

The regulatory requirements for the PASS can be eliminated without degrading the plant emergency response. The emergency response, in this sense, refers to the methodologies used in ascertaining the condition of the reactor core, mitigating the consequences of an accident, assessing and projecting offsite releases of radioactivity, and establishing protective action recommendations to be communicated to offsite authorities. The elimination of the PASS will not prevent an accident management strategy that meets the initial intent of the post-TMI-2 accident guidance through the use of the SAMGs, the emergency plan (EP), the emergency operating procedures (EOP), and site survey monitoring that support modification of emergency plan protective action recommendations (PARs).

Therefore, the elimination of PASS requirements from Technical Specifications (TS) (and other elements of the licensing bases) does not involve a significant increase in the consequences of any accident previously evaluated.

Criterion 2 - The Proposed Change Does Not Create the Possibility of a New or Different Kind of Accident from any Previously Evaluated.

The elimination of PASS related requirements will not result in any failure mode not previously analyzed. The PASS was intended to allow for verification of the extent of reactor core damage and also to provide an input to offsite dose projection calculations. The PASS is not considered an accident precursor, nor does its existence or elimination have any adverse impact on the pre-accident state of the reactor core or post accident confinement of radionuclides within the containment building.

Therefore, this change does not create the possibility of a new or different kind of accident from any previously evaluated.

Criterion 3 - The Proposed Change Does Not Involve a Significant Reduction in the Margin of Safety.

The elimination of the PASS, in light of existing plant equipment, instrumentation, procedures, and programs that provide effective mitigation of and recovery from reactor accidents, results in a neutral impact to the margin of safety. Methodologies that are not reliant on PASS are designed to provide rapid assessment of current reactor core conditions and the direction of degradation while effectively responding to the event in order to mitigate the consequences of the accident. The use of a PASS is redundant and does not provide quick recognition of core events or rapid response to events in progress. The intent of the requirements established as a result of the TMI-2 accident can be adequately met without reliance on a PASS.

Therefore, this change does not involve a significant reduction in the margin of safety.

Based upon the reasoning presented above and the previous discussion of the amendment request, the requested change does not involve a significant hazards consideration.

Dated at Rockville, Maryland, this 7th day of August, 2000.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

William D. Beckner, Chief
Technical Specification Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D.C. 20555-0001

October 8, 1999

The Honorable Greta Joy Dicus
Chairman
U.S. Nuclear Regulatory Commission
Washington D.C. 20555

Dear Chairman Dicus:

SUBJECT: COMBUSTION ENGINEERING OWNERS GROUP (CEOG) APPLICATION TO ELIMINATE THE POST-ACCIDENT SAMPLING SYSTEM FROM THE PLANT DESIGN BASES FOR CEOG UTILITIES

During the 466th meeting of the Advisory Committee on Reactor Safeguards, September 30-October 2, 1999, we reviewed the CEOG proposal to eliminate the Post-Accident Sampling System (PASS) from the plant design and licensing bases for CEOG plants. Our Subcommittee on Severe Accident Management reviewed this matter during its September 16-17, 1999 meeting. During these meetings, we had benefit of discussions with representatives of the NRC staff, the CEOG, and of the documents referenced.

RECOMMENDATIONS

- The staff should approve the CEOG proposal to eliminate the PASS from the plant design and licensing bases.

- The staff should evaluate the need for new generic requirements on post-accident measurement of in-containment fission products and sump water pH.

DISCUSSION

The PASS regulatory requirements were established after the Three Mile Island, Unit 2 (TMI-2) accident and were provided in Section II.B.3 of NUREG-0737, in 10 CFR 50.34(f)(2)(viii), and in various Generic Letters (Generic Letter (GL) 82-05; GL 83-36; GL 83-37). Regulatory Guide 1.97 describes an acceptable method for compliance.

In general, the requirements stipulate that the licensee shall establish an onsite radiological and chemical analysis capability to provide quantification of the following within a 3-hour period:

- specific radionuclides in the reactor coolant and containment atmospheres,

- hydrogen concentration in the containment atmosphere,

- dissolved gases (e.g., hydrogen), chloride, and boron concentrations in liquids,
- pH in the reactor coolant system (RCS), and
- boron, pH, chlorides, and radionuclides in the containment sump.

In 1993, the staff reviewed and approved the deletion of certain PASS requirements for CEOG plants: (1) pH measurement in the containment sump, (2) hydrogen sampling of the containment atmosphere, (3) sampling for iodine, and (4) oxygen analysis of the reactor coolant. The current proposal is to eliminate the PASS from the plant design and licensing bases for CEOG plants.

In general, the PASS measurements have been required to provide post-accident information to guide decisionmaking with respect to:

- Possible void production due to noncondensable gases in the RCS (the measurement of RCS dissolved gases).
- Achieving cold shutdown (the measurement of RCS boron concentration).
- The needs for emergency response actions – including an estimate of the extent of core damage and fission product release (the measurement of hydrogen and fission products in RCS and containment).
- Re-evolution of gaseous iodine from containment sumps (the measurement of sump water pH).
- Post-accident stress corrosion cracking in the RCS (the measurement of RCS oxygen, chloride, and pH).
- Hydrogen deflagration in containment (measurement of hydrogen and oxygen in containment).
- Stress corrosion cracking of recirculation systems (measurement of containment sump chlorides).
- Assurance of subcriticality should sump water be used in the recirculation mode to cool the core (measurement of sump water boron concentration).

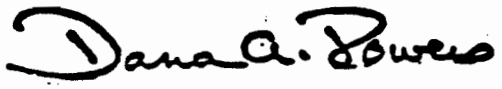
The CEOG has made a persuasive case that the PASS measurements are not needed and can be eliminated without undue increase in risk because each of the requirements is being satisfied by other information sources. We concur with this assessment. It is also our view, however, that the current post-accident sampling systems are poorly designed and poorly configured to provide the information for the needs listed above. This is the primary reason that other information sources are used for accident management and emergency response purposes.

We believe that there would be significant post-accident management benefit in having timely measurement of sump pH and fission product concentrations in the containment. Information on concentrations of krypton and cesium in containment can provide direct indications of fission product release and core damage that are difficult to infer from total radiation, temperature, and hydrogen concentration measurements.

We also believe that sump radiochemistry under post-accident conditions cannot be predicted to a level of accuracy that would provide the required assurance that buffered sumps will inhibit the re-evolution of gaseous species of iodine. The actual measurement of pH will be necessary to assess the pH status of sumps and to guide post-accident decisions related to the need for additional emergency response, accident management, containment venting, or ingress into containment in the long term.

We believe, however, that the value of these measurements does not warrant continuation of the current methods for implementation of the PASS requirements through grab sampling in the containment atmosphere and from the containment sump. On the other hand, we believe there is technology available with which this information could be obtained on a continuous basis by the use of tuned gamma monitors in containment and pH instrumentation in the sump. Therefore, we recommend that the staff evaluate the need for generic requirements for timely post-accident measurements of sump pH and fission product concentrations in the containment.

Sincerely,



Dana A. Powers,
Chairman

References:

1. U. S. Nuclear Regulatory Commission, "Safety Evaluation Report by the Office of Nuclear Reactor Regulation Related to the Technical Basis for Allowing Combustion Engineering Pressurized Water Reactors to Change Commitments Related to Post Accident Sampling," undated draft, received September 21, 1999.
2. Combustion Engineering Owners Group, CENPSD-1157, "Technical Justification for the Elimination of the Post-Accident Sampling System from the Plant Design and Licensing Bases for CEOG Utilities," dated May 1999.
3. U. S. Nuclear Regulatory Commission, "Safety Evaluation Report by the Office of Nuclear Reactor Regulation Related to the Technical Basis for Allowing Westinghouse Pressurized Water Reactors to Change Commitments Related to Post Accident Sampling," undated, draft.
4. U.S. Nuclear Regulatory Commission, NUREG-0737, "Clarification of TMI Action Plan Requirements," dated November 30, 1980.
5. U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Subject: NUREG-0737 Technical Specifications (Generic Letter No. 83-36), to all Boiling Water Reactor Licensees, dated November 1, 1983.

6. U.S. Nuclear Regulatory Commission, Subject: NUREG-0737 Technical Specifications (Generic Letter 83-37), to all Pressurized Water Reactor Licensees, dated November 1, 1983.
7. U.S. Nuclear Regulatory Commission, Generic Letter 82-05, Subject: Post-TMI Requirements, dated March 17, 1982.
8. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.97, "Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," Revision 3, dated May 1983.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D.C. 20555-0001

September 17, 1999

Dr. William D. Travers
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Dr. Travers:

SUBJECT: MODIFICATIONS PROPOSED BY THE WESTINGHOUSE OWNERS GROUP TO THE CORE DAMAGE ASSESSMENT GUIDELINES AND POST ACCIDENT SAMPLING SYSTEM (PASS) REQUIREMENTS

During the 464th and 465th meetings of the Advisory Committee on Reactor Safeguards, July 14-16 and September 1-3, 1999, respectively, we discussed your June 22, 1999 response to our May 19, 1999 letter on the subject matter. Your letter included the following comments:

(1) "The staff . . . intends to allow options other than PASS samples (such as the use of specific gamma monitors) to provide information regarding the disposition of fission products."

(2) ". . . the staff concludes that, for plants with passive pH control or that are not subject to contamination of the sump with brackish water, pH measurement is not needed because, in these plants, pH will either be maintained alkaline or could be estimated with a sufficient degree of accuracy."

Because we disagree with both of these positions, we are clarifying our original recommendations.

With respect to Comment (1) above, our view is that the Post Accident Sampling Systems implemented in the Westinghouse plants do not meet the intent of TMI Action Plan Requirement II.B.3, as specified in NUREG-0737, to have direct and timely information regarding "certain radionuclides in the reactor coolant and containment atmosphere that may be indicators of the degree of core damage. . . ." Such intent could be satisfied by the use of specific gamma monitors installed in containment that are tuned to the isotopic gamma emissions of cesium and krypton. If Requirement II.B.3 for timely and radionuclide-specific information is no longer necessary, it should be removed rather than circumvented. If this requirement is retained, then the staff should consider a compliance backfit for the installation of such gamma monitors.

With respect to Comment (2), we disagree with the assertions regarding assurance of maintenance of containment sump alkalinity by passive pH control. The sources of acidic materials during severe accidents are very uncertain and may not have all been identified. In addition, the evaluation of sump alkalinity would be complicated by the need to quantitatively assess complexation, adsorption, and precipitation of buffers by materials introduced into the sump water over the course of an accident. Passive pH control cannot be assessed with sufficient accuracy to assure that an adequate level of alkalinity is maintained over the desired period of time. A direct measurement is needed for appropriate post-accident decisionmaking. Therefore, we repeat our original recommendation that pH measurement continue to be required for all sumps.

Sincerely,

Dana A. Powers
Chairman

References:

1. Letter dated June 22, 1999, from William D. Travers, Executive Director for Operations, NRC, to Dana A. Powers, Chairman, ACRS, Subject: Modifications Proposed by the Westinghouse Owners Group to the Core Damage Assessment Guidance and the Post Accident Sampling System Requirements.
2. Letter dated May 19, 1999, from Dana A. Powers, Chairman, ACRS, to William D. Travers, Executive Director for Operations, NRC, Subject: Modifications Proposed by the Westinghouse Owners Group to the Core Damage Assessment Guidelines and the Post Accident Sampling System Requirements.
3. U. S. Nuclear Regulatory Commission, NUREG-0737, "Clarification of TMI Action Plan Requirements," dated November 30, 1980.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

May 19, 1999

Dr. William D. Travers
Executive Director for Operations
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Dr. Travers:

SUBJECT: MODIFICATIONS PROPOSED BY THE WESTINGHOUSE OWNERS GROUP TO THE CORE DAMAGE ASSESSMENT GUIDELINES AND POST ACCIDENT SAMPLING SYSTEM REQUIREMENTS

During the 462nd meeting of the Advisory Committee on Reactor Safeguards, May 5-8, 1999, we reviewed the modifications proposed by the Westinghouse Owners Group (WOG) to the Core Damage Assessment Guidelines (CDAG) and the Post Accident Sampling System (PASS) requirements. Our Subcommittee on Severe Accident Management also reviewed this matter on April 30, 1999. During our review, we had the benefit of discussions with representatives of the NRC staff and WOG, and of the documents referenced.

Background

With the promulgation of the "Three Mile Island-2 Requirements," licensees developed the CDAG for assessing the extent of core damage to help guide offsite radiological protective action decisions. The specifications for the PASS are included in NUREG-0737, "Clarification of TMI Action Plan Requirements," and Regulatory Guide 1.97, Revision 3, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident."

The specifications for the PASS are based substantially on guidelines developed around 1984 by the WOG for its member licensees. These guidelines relied primarily on sampling for radionuclide analysis and on confirming the results using indirect indicators including containment hydrogen concentration, core exit temperatures, reactor vessel level indication, and containment radiation monitoring. The regulatory requirements of the PASS for Westinghouse pressurized water reactors are to determine:

- from the reactor coolant system (RCS): dissolved gases, hydrogen, oxygen, pH, conductivity, chlorides, boron, and specific radionuclides,

- from the containment atmosphere: hydrogen, oxygen, and specific radionuclides, and
- from the containment sumps: pH, chlorides, boron, and specific radionuclides.

The licensees' experience with the PASS, derived from tests and emergency drills, has been that because of delays in acquiring and analyzing radionuclide samples the relevant information is not provided in a timely manner to guide short-term emergency response decisions. In practice, primary reliance is placed on the use of the indirect indicators to infer particular phases of core damage such as cladding damage, onset of significant hydrogen production, fuel overtemperature, and substantial core damage.

Based on this experience, the WOG has made a proposal outlined in its topical report (WCAP-14986-P) that broadly consists of:

1. Eliminating the PASS sampling requirements except for:
   - RCS boron concentration within 8 hours of obtaining a safe, stable state.
   - Containment hydrogen concentration within 30 minutes of core damage.
   - Containment sump pH only if all three of the following exist:
     - brackish water at the plant for cooling,
     - no passive pH control,
     - a single barrier only between the containment and the heat sink.
2. Retaining the capability to obtain PASS samples for long-term cleanup and recovery planning.
3. Relying primarily on core exit temperatures and containment high-range radiation monitoring as the primary indicators to be applied to the CDAG and using containment hydrogen concentration, reactor vessel level, source monitoring, and hot-leg temperature as secondary, confirmatory information.

Discussion

The WOG proposes to assess core damage based on information obtained from indirect measurements. This information and knowledge derived from calculations of accident progression, hydrogen generation, and fission product release and transport through the RCS and the containment will be used to make the core damage assessment.

We agree with the staff's preliminary review finding that the proposed modifications to the CDAG will provide information on a timely basis to support decisions regarding short-term emergency response.

With regard to the proposed modifications to the PASS requirements, it is our view that the intent of the regulations was to have direct information regarding the disposition of fission products and that this intent could have been easily met by a change to the sample measurements such as the addition of specific gamma monitors at the sampling station. Gamma monitors tuned to krypton and cesium, along with total gamma measurements, are all

that is necessary to infer the full source term on a timely, accurate basis. There would be no need for removing the sample and subjecting it to chemical analysis.

In addition, without pH control, materials generated during a severe accident can lower containment sump water pH. Consequently, to assess the potential for fission-product iodine revolatilization from such sumps, we believe that the sump pH should continue to be measured at all plants.

Recommendations

We recommend that the Commission approve the WOG proposals to modify the CDAG and the PASS requirements, but with the qualification that pH measurements in the sump continue to be required.

The staff should revise the regulatory requirements to make clear that the PASS samples are to be used to assist long-term post-accident decisions and recovery actions.

Sincerely,

Dana A. Powers

Dana A. Powers
Chairman

References:

1. Westinghouse Electric Corporation Topical Report, WCAP-14696, "Westinghouse Owners Group Core Damage Assessment Guidance," July 1996.
2. Westinghouse Electric Corporation Topical Report: WCAP-14986-P, Revision 1, "Westinghouse Owners Group Post Accident Sampling System Requirements: A Technical Basis," August 1998 (Proprietary).
3. U. S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation slides provided for ACRS Subcommittee meeting on April 30, 1999, "Background and NRR Staff Preliminary Evaluation of WCAP-14696, Westinghouse Owners Group Core Damage Assessment Guidance," April 19, 1999 (Predecisional).
4. U. S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation slides provided for ACRS Subcommittee meeting on April 30, 1999, "Background and NRR Staff Preliminary Evaluation of WCAP-14986-P, Westinghouse Owners Group Post Accident Sampling System Requirements, A Technical Basis," April 21, 1999 (Predecisional).

EXCERPT FROM NRR SER ON WOG PASS ELIMINATION TOPICAL REPORT xviii

High concentration of chlorides in the containment sump can cause stress corrosion cracking of stainless steel components and affect retention of iodine in containment sump water. For plants with fresh water cooling systems, the problem is minimal; but for the plants with brackish water (with a single barrier between the cooling water and the containment and without pH control) it may be a significant issue. However, the volumes and chloride concentrations of the incoming water from different sources are known and the resulting concentration of chlorides in the sump water can be estimated with a sufficient degree of accuracy.

Based on the above, the staff concludes that the proposal to eliminate PASS sampling of containment sump chlorides is acceptable.

3.15 Eliminate Pass Sampling of Containment Sump Boron

Sump boron concentration sampling and measurement is specified in Regulatory Guide 1.97. This sampling was not addressed in SECY 93-087.

The purpose of measuring boron concentration in the containment sump is to assure reactor subcriticality should sump water be used in the recirculation mode to cool the core. The refueling water storage tank (RWST) and the accumulator water have sufficient boron concentration to assure subcriticality at any time in the fuel cycle. For ice condenser containment plants, there is sufficient boron added to the ice that the melt has the concentration of the RWST. However, in instances where unborated water is introduced in the containment for emergency core cooling, the sump boron density will be lower. However, the sump level (and the corresponding amount of water) is known. Therefore, knowing the source of the added water will allow the boron concentration to be estimated. Therefore, the staff concludes that elimination of boron sampling of the containment sump is acceptable.

Based on the above, the staff concludes that the proposal to eliminate PASS sampling of containment sump boron is acceptable.

4.0 SUMMARY

The staff concludes that WCAP-14986 provides a sufficient technical basis to eliminate the following PASS criteria specified in NUREG-0737 and Regulatory Guide 1.97:

1. RCS dissolved gases
2. RCS hydrogen
3. RCS oxygen
4. RCS chlorides
5. RCS pH
6. RCS boron
7. RCS conductivity
8. RCS radionuclides
9. Containment atmosphere hydrogen
10. Containment atmosphere oxygen
11. Containment atmosphere radionuclides
12. Containment sump radionuclides
13. Containment sump pH

- 13 -

14. Containment sump chlorides
15. Containment sump boron

4.1 Licensee Required Actions

The staff has identified the following licensee required actions (as discussed in the above sections) that must be fulfilled by a licensee that would eliminate PASS for sampling the above 15 parameters in accordance with WCAP-14986 and the safety evaluation:

1. Establish a capability for classifying fuel damage events at the Alert level threshold (typically this is 300 microcuries per ml dose equivalent iodine). This capability may utilize the normal sampling system or correlations of sampling or letdown line dose rates to coolant concentrations.

2. Develop contingency plans for obtaining and analyzing highly radioactive samples of reactor coolant, containment sump, and containment atmosphere. These plans should detail the plant's existing sampling capabilities and what actions (e.g., assembling temporary shielding) may be necessary to obtain and analyze highly radioactive samples. The contingency plans do not have to be demonstrated. Because these are contingency plans, the staff concludes that, in accordance with 10 CFR 50.47 and Appendix E to 10 CFR Part 50 for emergency plans, these contingency plans must be available to be used by the licensees during an accident; however, these contingency plans do not have to be carried out in emergency plan drills or exercises.

3. The staff does not consider that changes as discussed in this topical report will result in a decrease in the effectiveness of the emergency plan, however the licensee must determine for its own plant(s) that no decrease in the effectiveness of the emergency plans will result from the removal/downgrade of the PASS.

4. Licensees will maintain offsite capability to monitor radioactive iodines.

For containment hydrogen concentrations, containment hydrogen monitors required by 10 CFR 50.44(b)(1) may not be eliminated because they are required by the regulations. Although no longer a requirement, the staff recommends that licensees maintain the capability to analyze a containment atmosphere sample for hydrogen during the later stages of accident response in order to support SAMG. For containment sump pH, the staff also recommends that the licensees maintain the capability to analyze the sump water for pH. The licensees maintaining the capability to take a sample from the containment atmosphere and sump is LRA 2 above.

Because some licensees have the PASS in their emergency plans (EP) and may want to remove the system from the plan, the third licensee required action above concerns the effect of eliminating PASS on the effectiveness of the EP. Based on the safety evaluation, the staff concludes that eliminating the PASS for sampling the 15 parameters listed in the safety evaluation should not decrease the effectiveness of the EP; however, the licensee must also make an independent determination on its own as to the effect of eliminating the PASS on the effectiveness of the EP before the system may be removed from the plan. If a licensee should determine that the effectiveness of the EP is not decreased, then the removal of the PASS would not require staff approval in accordance with 10 CFR 50.54(q).

Some licensees have the PASS in their Technical Specifications (TSs). Removing PASS from the TSs is a license amendment that requires staff approval in accordance with 10 CFR 50.90. In submitting a license amendment, the licensees must address LRAs 1, 2, and 4, and describe how and when they will be implemented at the plants. The description is expected to be a reference to the applicable SAMG for the plant(s). The details may be reviewed by the staff in an inspection. The time to complete these LRAs would be included in (1) the time to implement the approved amendment with the implementation date specified in the license amendment or (2) regulatory commitments specifying the LRA implementation dates, in accordance with Nuclear Energy Institute (NEI), "Guidelines for Managing NRC Commitments," dated June 9, 1995, in which safety significant changes to such commitments to NRC are discussed with NRC before the change is made. (See the amendments for the application dated July 14, 1999, for Arkansas Nuclear One, Units 1 and 2, TAC Nos. MA6062 and MA6063, respectively, after it is issued.)

With licensees implementing the above LRAs, the staff concludes, based upon the justification provided in WCAP-14986, that there is reasonable assurance that the health and safety of the public will not be endangered by operation of Westinghouse NPP without PASS.

5.0 CORE DAMAGE ASSESSMENT METHODOLOGY

In the letter of November 22, 1996, the WOG submitted Topical Report WCAP-14696, "Westinghouse Owners Group Core Damage Assessment Guidance," for NRC review. In the topical report, a revised methodology was described that would be used by licensee emergency response organization staff for estimating the extent of core damage that may have occurred during an accident at a Westinghouse nuclear power plant. The revised methodology is a revised calculational technique for estimating core damage which relies on real-time plant indications rather than samples of plant fluids. The revised post-accident core damage assessment methodology (CDAM) in WCAP-14696 replaces the methodology approved by the staff in 1984. The 1984 methodology was revised for two major reasons: (1) the current methodology relies on radionuclide samples and does not effectively support emergency response decisionmaking due to the significant time delay in obtaining and analyzing these samples using the post-accident sampling system (PASS), and (2) the methodology does not reflect the latest understanding of fission product behavior, particularly the sequence-specific nature of fission product retention and hydrogen holdup in the RCS, and fission product deposition in the containment and sample lines.

In the staff's letter of September 2, 1999, the staff approved WCAP-14696 for use by Westinghouse plants for core damage assessment. Because the staff concludes above, based upon the justification provided in WCAP-14986, that there is reasonable assurance that the health and safety of the public will not be endangered by operation of Westinghouse NPP without PASS without also concluding that the implementation of WCAP-14696 was necessary, the staff concludes that it is acceptable for licensees to eliminate PASS from the licensing basis for the Westinghouse NPP without incorporating the core damage assessment methodology in WCAP-14696 into its procedures; however, the licensees should assess the impact of elimination of PASS on their existing CDAM.

EXCERPT FROM NRR SER ON CEOG PASS ELIMINATION TOPICAL REPORT

The purpose of measuring boron concentration in the containment sump is to assure the reactor would remain subcritical should sump water be used in the recirculation mode to cool the core. The water in the RWST and the accumulators have sufficient boron concentration to assure subcriticality at any time in the fuel cycle. Should unborated water be introduced in the containment sump for emergency core cooling, the sump boron concentration will be lower. However, the sump level (and the corresponding amount of water) and sump water temperature are known which allow an estimate to be made for the boron concentration.

Based on the above, the staff concludes that the proposal to eliminate PASS sampling of containment sump boron is acceptable.

3.15 Eliminate PASS Sampling of Containment Sump Radionuclides

This is discussed in Section 3.8.

4.0 SUMMARY AND CONCLUSIONS

The staff concludes that CEOG Topical Report CE NPSD-1157 provides a sufficient technical basis to allow for elimination of requirements made to obtain the following PASS samples specified in NUREG-0737 and Regulatory Guide 1.97:

1. RCS dissolved gases
2. RCS hydrogen
3. RCS oxygen
4 RCS pH
5. RCS chlorides
6. RCS boron
7. RCS conductivity
8. RCS radionuclides
9. Containment atmosphere hydrogen
10. Containment atmosphere oxygen
11. Containment atmosphere radionuclides
12. Containment sump pH
13. Containment sump chlorides
14. Containment sump boron
15. Containment sump radionuclides

4.1 Licensee Required Actions

The staff has identified the following actions which need to be taken by licensees seeking approval of elimination of the PASS utilizing the justification provided in this topical report:

1. Establish a capability for classifying fuel damage events at the Alert level threshold (typically this is 300 μCi/ml dose equivalent iodine). This capability may utilize the normal sampling system or correlations of sampling or letdown line dose rates to coolant concentrations.

2. Develop contingency plans for obtaining and analyzing highly radioactive samples of reactor coolant, containment sump, and containment atmosphere.

3. The staff does not consider that changes as discussed in this topical report will result in a decrease in the effectiveness of the emergency plan, however the licensee must determine that no decrease in the effectiveness of the emergency plans will result from the removal/downgrade of the PASS.

4. Containment hydrogen monitors required by 10 CFR 50.44(b)(1) may not be eliminated. The staff recommends that licensees maintain the capability to sample and analyze hydrogen in the containment atmosphere in order to support severe accident management guidelines.

5. Licensees will maintain offsite capability to monitor radioactive iodines.

The staff concludes, based upon the justification provided in this topical report, that there is reasonable assurance that the health and safety of the public will not be endangered by operation of Combustion Engineering designed nuclear power plants without PASS.

Attachment: Analysis of Public Comments

Principal Contributors: P. Milligan, DIPM
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L. Lois, DSSA
M. Snodderly, DSSA

Date: May 16, 2000