Domestic Members
AmerenUE
Callaway
American Electric Power Co.
D.C. Cook 1 & 2
Carolina Power & Light Co.
H.B. Robinson 2
Shearon Harris
Commonwealth Edison
Braidwood 1 & 2
Byron 1 & 2
Consolidated Edison Company of NY, Inc.
Indian Point 2
Duke Power Company
Catawba 1 & 2
McGuire 1 & 2
First Energy Nuclear Operating Co.
Beaver Valley 1 & 2
Florida Power & Light Co.
Turkey Point 3 & 4
New York Power Authority
Indian Point 3
Northeast Utilities
Seabrook
Millstone 3
Northern States Power Co.
Prairie Island 1 & 2
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
Comanche Peak 1 & 2
Virginia Power Co.
North Anna 1 & 2
Surry 1 & 2
Wisconsin Electric Power Co.
Point Beach 1 & 2
Wisconsin Public Service Corp.
Kewaunee
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

OG-00-126 Project Number 694

December 20, 2000

Document Control Desk
US Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: Mr. Farouk Eltawlia, Acting Director
Division of System Analysis and Regulatory Effectiveness
Office of Nuclear Regulatory Research
US Nuclear Regulatory Commission
Two White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Subject: Westinghouse Owners Group
Westinghouse Owners Group Response to Request for Public Comments on Draft Report "Regulatory Effectiveness of the Anticipated Transient without SCRAM Rule" (MUHP-4018)

Reference: Letter to K Jacobs, WOG Chairman, from F. Eltawila, NRC, October 18, 2000

The Westinghouse Owners Group (WOG) would like to thank you for this opportunity to comment on the Draft Report Regulatory Effectiveness of the Anticipated Transient Without SCRAM Rule.

The WOG believes peer review by the industry will help to strengthen these type activities and allows both the NRC and industry to benefit from the final documents. The attachment to this letter provides the WOG comments. Please include these comments in your review process prior to issuing a final report.

If you have any questions regarding these comments, please contact Mr. Gary Ament, Westinghouse, at (412) 374-4897, or myself at (412) 374-6207 or email at drake1ap@westinghouse.com.

Very truly yours,

Andrew P. Drake,
Project Manager
Westinghouse Owners Group

attachment

00og126.doc

OG-00-126
December 20, 2000

cc: W.S. Raughley, USNRC (1L, 1A)
Westinghouse Owners Group Primary Representatives (1L, 1A)
Licensing Subcommittee (1L, 1A)
Analysis Subcommittee (1L, 1A)
Steering Committee (1L, 1A)
D. Modeen, NEI (1L, 1A)
G. Ament, W (1L, 1A) ECE 427D

Westinghouse Owners Group Comments on
NRC Draft report
"Regulatory Effectiveness of the Anticipated Transient Without SCRAM Rule"
dated September 22, 2000.

General Comments

1. From a Westinghouse / WOG perspective, the term "Unfavorable Exposure Time" or UET represents the duration of a given fuel cycle, for a specific plant configuration, in which the total core reactivity feedback is insufficient to preclude exceeding a peak RCS pressure of 3200 psig following an ATWS event. UET was defined by the Westinghouse Owners Group (WOG) for use in a more detailed ATWS PRA model developed as part of the "Westinghouse / WOG ATWS Rule Administration Process," WCAP-11992. The concept of UET is also being applied in a revised Risk-Informed ATWS PRA model supporting an ongoing WOG ATWS PRA program.

   To determine the UET values used in this ATWS PRA model, the reactivity feedback required to just yield a peak RCS pressure of 3200 psig is first determined by specific ATWS transient analyses. The reactivity feedback conditions for a given reload core model are then compared to the transient reactivity feedback models to determine the value of UET for a given plant configuration. For the Westinghouse / WOG ATWS PRA model, a total of 12 UET values are typically determined and used.

   The term UET as defined and applied above was not a term directly used in the basis of the Final ATWS Rule as documented in SECY-83-293. In SECY-83-293, the terms "favorable MTC" and "unfavorable MTC" are applied in the discussion of the simplified ATWS PRA model. These terms are not the same as UET defined above. Hence, while Westinghouse and the WOG concur with and support the industry's use and correct application of this term in ATWS related discussions and documentation, it is requested that the use of the term UET in this Draft Report be replaced with "unfavorable MTC" to be consistent with the reference to SECY-83-293.

2. For Westinghouse PWRs, the discussions of ATWS events as they relate to RCS pressure, unfavorable MTC, and ATWS mitigation should be clearly defined and limited to only anticipated transients that result in a direct or consequential loss of main feedwater. The only ATWS events that potentially lead to high RCS pressures that challenge the ASME Service Level C Stress Limit (i.e., 3200 psig) are those events that result in a direct (i.e., Loss or Normal Feedwater ATWS) or consequential (i.e., Loss of Load ATWS) loss of main feedwater. The AMSAC system required by the Final ATWS Rule and installed at Westinghouse PWRs is designed to actuate a turbine trip and initiate the AFWS based only on detection of a condition representative of a loss of main feedwater. Other non-loss of feedwater related anticipated transients considered in the generic ATWS analyses

supporting the basis of the Final ATWS Rule do not lead to RCS overpressure concerns and, hence, have no ATWS related mitigation systems.

3. Drawing conclusions based on the continued use of the SECY-83-293 PRA approach is inappropriate and may result in misleading conclusions and recommendations. The SECY-83-293 model is too simplistic to assess the risk from ATWS events and does not account for a number of important considerations. One such consideration is the probability that the plant is operating in a configuration that corresponds to the UET (i.e., unfavorable MTC) continually cited in this report. The conditions for this referenced UET are no rod insertion, all auxiliary feedwater available, and no PORVs blocked, but this could be a low probability configuration.

4. The draft report frequently specifies and refers to a 1% UET (i.e., unfavorable MTC) as being applicable to Westinghouse PWRs. This is incorrect. A 1% unfavorable MTC was modeled in one of the SECY-83-293 simplified PRA models (Figure 11 in SECY-83-293) that represented what is called turbine trip transients in the PRA evaluation. As discussed in SECY-83-293, Section 5.5, Item 2 for Westinghouse plants, a 1% unfavorable MTC was assumed to exist for this turbine trip event since the pressure transient for this type ATWS is relatively mild. As earlier discussed in the same section of SECY-83-293, for non-turbine trip events that challenge the ASME Service Level C limit, a 10% unfavorable MTC was assumed (Figure 12 in SECY-83-293).

   Neither of these unfavorable MTC values is considered to be applicable for Westinghouse PWRs. The Westinghouse generic ATWS analyses performed in response to NUREG-0460 and which form the deterministic analysis basis for the Final ATWS Rule are documented in Westinghouse letter NS-TMA-2182, "ATWS Submittal," dated December 30, 1979. In these analyses, a full power MTC of -8 pcm/°F was used in the analyses and a sensitivity to a change in MTC to -7 pcm/°F was included. In 1979, these MTCs represented the values of MTC that Westinghouse PWRs would be more negative than for 95% and 99% of the cycle, respectively, as specified by NUREG-0460. The peak RCS pressures using these MTC values (without changes in any other assumptions) are shown in NS-TMA-2182 to be less than 3200 psig.

5. Operator actions to trip the plant are an important part of protecting the reactor and need to be considered in this report. The reactor protection system is a highly reliable system that is backed up by operator actions to trip the reactor. Plant operators are highly trained in this action and there is a high probability of success. Such operator actions need to be considered when drawing conclusions related the reactor protection system reliability and the risk from ATWS events. In fact, in the one ATWS event for a Westinghouse PWR (i.e., Salem), the reactor was tripped manually within 30 seconds after the reactor trip breakers did not open when demanded by the solid-state protection system.

6. In several locations within this draft report, it is stated that B&W and CE reactors are required by the ATWS Rule to have DSS as compensatory measures for higher UETs and Westinghouse reactors do not have this requirement due to a 1% UET. For this comment, the discussion above for General

Comments 1 and 4 first apply. Furthermore, the concept that B&W and CE require DSS due to higher UETs, i.e., higher unfavorable MTC, is misleading. In the 1979 baseline ATWS analyses, all NSSS vendor were subject to the use of the same MTC specifications as given in NUREG-0460 (see General Comment No. 4 above). The fact of the matter is that the pressure relief capacity of Westinghouse PWRs is significantly higher, and thus, significantly more favorable than that for the B&W and CE PWRs. The results of the generic deterministic ATWS analyses for Westinghouse PWRs showed a peak RCS pressure of less than 3200 psig when using the base case MTC of -8 pcm/°F as specified by NUREG-0460. The peak RCS pressures for the B&W and CE PWRs were significantly higher. As indicated in Table 6 of this draft report, the 1979 baseline peak RCS pressures for B&W and CE PWRs were 3464 psia and 4290 psia, respectively. It is recognized in SECY-83-293 that with the 1979 baseline MTCs for the B&W and CE plants, a peak pressure in excess of 3200 psig results 50% of the time. Hence, DSS was required for these plants since a change to more favorable MTC conditions was not a truly viable option from a plant operation versus reactor physics perspective. It should also be noted that on December 3, 1984, the Commission decided not to issue the proposed rule on ATWS that would have required a diverse scram system for Westinghouse plants.

7. Portions of this report and in particular, Section 3.2.5, include discussion on partial rod insertion events. The original concern identified and associated with ATWS is the potential for a common-mode failure of the reactor trip system following anticipated transients that rely on a reactor trip for event mitigation. For such a condition, the real concern is the potential for no automatic or timely rod insertion. In comparison with this potential scenario, the occurrence and consequences of the partial rod insertion events specified in Table 5 are far from being comparable to a common-mode failure of the entire reactor trip system. All plants' Technical Specifications have reactor trip scram time requirements and associated testing and surveillance requirements. The purposes of these tests are to specifically confirm reactor trip system and rod insertion characteristics to those assumed in plants' licensing basis safety analyses. The detection of slower than required rod insertion times as a result of these tests indicates a problem. Such problems are appropriately identified and addressed. In addition, only a portion of the total available rods is actually needed to obtain reactor control and shutdown. Hence, such instances of slow or partial rod insertion as listed in Table 5 should not be considered and classified as a precursor to ATWS events.

8. The report summarized its conclusions in the following manner:

   "The ATWS Rule was effective in reducing ATWS risk and that the cost of implementing the rule was reasonable. However, uncertainties in reactor protection system reliability and mitigative capability may warrant further attention to ensure the expected levels of safety are maintained."

   This assessment was based on several of factors for a PWR. One factor is that the RPS system has been shown to be extremely reliable. This contributes to the inability to quantify the PRA numbers for failure and was used in the justification for further attention. The inability to quantify the numbers for RPS reliability due to the extremely reliable nature of the system is not justification for

additional rulemaking. Since the system is so reliable that the numbers can not be accurately quantified, this is justification that rulemaking is not required.

Another factor cited is that the cost of modification implementation was less than expected due to reduction in the number of trips per year, which was a recommendation of the rule. It is not appropriate to include industry efforts to improve reliability and availability in the cost benefit of the rulemaking unless the modifications imposed by the rule can be shown to have resulted in that improved reliability. Efforts to reduce the number of trips were in place prior to the rulemaking. The actual cost of the modifications and their continuing costs for maintenance are not effected by the efforts of the utility to improve availability times. The imposed modifications clearly have not increased the availability times of any plant. Therefore, there is no "reduction" in cost as a result of the rulemaking.

The executive summary of the draft itself appropriately frames the current industry situation in that reliability requirements are so high and ATWS events are so rare that many years of operating experience are needed to generate sufficient system demands to reduce current estimates of the uncertainty. The frequency and number of industry events support that useful predictions can be made regarding future occurrences. Increasing the size of the sample or the number of observations may reduce the sampling error, but not any biases. In the absence of a large number of observations, related knowledge of the subject and scientific judgment must be relied upon in framing a course of action. Statistical "significance" or the absence of it by itself is not a rational basis for additional action.

Specific Comments

1. Section 2, Third Paragraph

See General Comment No. 6 as it relates to the last sentence of this paragraph.

2. Section 2.1, First Paragraph

This paragraph defines three factors that impact the likelihood of damage from an ATWS event. Left out of these factors is the ability of the operator to take actions to trip the reactor if the RPS fails (see General Comment No. 5). The operators are trained to trip the reactor from the control room within the time available. The operators can also take an action to trip the reactor by interrupting power from the motor-generators to the CRDMs (not all plants can do this from the control room, so all plants do not credit this action in their PRA model). It is important to include these operator actions since they are highly reliable and act as a diverse mechanism for reactor trip.

3. Section 2.1, Second Paragraph

The statement "P(ATWS) was defined as the annual frequency of an ATWS leading to plant conditions that exceed certain design parameters that can result in core melt, containment failure, and the release of radioactivity" is misleading. An ATWS event that results in core damage does not necessarily continue to containment failure and a release of radioactivity. Additional component failures are required, independent of the ATWS event, for containment failure to occur. This should be clarified in the report.

4. Section 2.1.2, Paragraphs 1 and 2

The last sentence in each paragraph is "For PWRs, it is likely that for an unmitigated ATWS, the core would melt prior to containment failure." This doesn't seem to fit at the end of the first paragraph. In addition, please recognize that exceeding the ASME Service Level C stress limit, i.e., 3200 psig, has conservatively been equated to resulting in core damage for the purposes of the ATWS PRA. It is not clear what mechanism is implicitly implied that would lead to containment failure. If the sentence is maintained, it is recommended that the sentence be revised to read "... Prior to any potential for containment failure."

5. Section 2.1.2, Paragraph 2

The discussion here describing the ATWS transient conditions only pertains to the condition with a loss of main feedwater. See General Comment No. 2 above. Also, the water temperature increase described in the analysis can not occur without the fuel temperature increase. Therefore, it is inappropriate to discount the fuel temperature increase and thus the effects of Doppler. It is also inaccurate to state that the water must heat prior to the fuel.

6. Section 2.1.2, Paragraph 4

A higher ASME service level was only considered for B&W and CE plants due the higher peak RCS pressures for these plants.

7. Section 2.1.2, Paragraph 5

The discussion in this paragraph regarding positive MTC below 100% power is only applicable to plants that have requested and received licensing amendments to permit operation under these conditions. Not all plants have licensed these conditions. The third sentence in this paragraph states that "...all subsequent mitigative functions are likely to be ineffective." This is not totally accurate. Manual rod insertion is a viable mitigative function that would be effective. Regarding the definition of "unfavorable exposure time" given in this paragraph, please see General Comment No. 1 above.

8. Section 2.2, Paragraph 2

The last sentence should read "... despite perceived high reliability, ..."

9. Section 2.2, Paragraph 4

The discussion in the last part of this paragraph appears open ended. It states an objective for 1985 and states values for 1980 and 1983. Was the 1985 objective met? Page 17 states an average of 0.5 trips / reactor year since 1997.

10. Section 3.1, Last paragraph

A review of the information in Appendix B indicates the need for the last sentence in this paragraph. Comments received from WOG utility representatives question the basis for some of the plant-specific numbers in Table B-1. It is recommended that a reference basis be included in the table for the plant-specific values. Otherwise, the validity of the conclusions drawn from the use of these values may be challenged.

11. Section 3.2, Table 1

The "UET<1%" in the "Expected Result" block for Westinghouse plants is not correct. See General Comment No. 4 above.

12. Section 3.2.1, Second paragraph and Table 2

The second paragraph states that Table 2 "was prepared to show the degree of defense-in-depth provided by the ATWS rule modifications that were intended to prevent an ATWS;...". It should also be noted on this table that the operator could trip the plant via the reactor trip switch in the control room. This provides a diverse means of reactor trip that is effective if the reactor trip signal failed due to failure of the analog channels or components in the logic cabinets. It should also be noted that at some plants the operators could also trip the reactor by interrupting power from the motor-generators to the CRDMs. This action is also taken from the control room and is effective if the reactor trip signal failed due to failure of the analog channels, logic cabinet components, or reactor trip breakers.

The "UET<1%" in the PWR Fuel Strategy block of Table 2 for Westinghouse plants is not correct. See General Comment No. 4 above. Also note that a December 3, 1984 letter from the Commission to Westinghouse clearly states that DSS is not required for Westinghouse PWRs. Hence, the "Current Outcomes" block of Table 2 for Westinghouse plants should state "DSS not required".

13. Section 3.2.1, Third paragraph, Item (2)

It is not obvious from the information provided in Table 2 how it is can be concluded that DSS appears to provide a compensation for higher UETs (up to 50%) for B&W and CE plants. Also, the discussion on 1% UET for Westinghouse plants is incorrect.

14. Section 3.2.2, Table 3

The "Outcome" RPS reliability for Westinghouse plants is given as 2.1E-05. This does not account for the backup operator actions as discussed in Comments 2 and 12. Including the operator action to trip the plant from the control room via the reactor trip switch reduces this value to 5.5E-06 (NUREG/CR-5500, Vol. 2, "Reliability Study: Westinghouse Reactor Protection System, 1984-1995", December 1998). This also does not account for tripping the reactor via power interruption from the motor-generators to the CRDMs. It is misleading to provide the reliability as 2.1E-05 without stating this does not include credit for the operator actions to trip the plant. Also, the paragraph following Table 3, second sentence, should read "Comparison of Table 3...."

15. Section 3.2.2, First paragraph under Item #2

The statement "These numbers were developed using a fault tree model of the RPS system that may not include all failure modes, a question of completeness for all PRA calculations" can be misleading. This may be true for a complex system with little or no operating history, but there is a significant amount of operating history on the RPS and operation of the RPS is well understood. It is suggested that the phrase "that may not include all failure modes" is either dropped from the report, or a discussion of why this statement is applicable to the RPS evaluation is included in the report. This discussion should address the quality of the fault trees and data used to determine the RPS reliability, and also how the fault trees and data were developed. This statement should make it clear that these fault trees were developed for an NRC program assessing the reliability of the Westinghouse RPS by NRC contractors, and that their development was done by personnel familiar with the RPS design and operation, and considered the past operating experience of the RPS.

16. Section 3.2.2, Item #3

This indicates that the unreliability of the mitigation systems for Westinghouse plants is controlled by the UET and that as the UET increases the mitigation unreliability increases proportionally. This is not true. The 5% UET referred to in the NRC report is associated with a plant operating configuration that will result in, given that an ATWS event occurs, 100% (all) auxiliary feedwater available, relief from all pressurizer safety valves and PORVs (no PORVs are blocked), and no control rod insertion. The statement in the report does not account for the probability, which may be very low, of the plant being in an operating configuration that results in these conditions. If a plant is operating with the rod control system in automatic, no PORVs blocked, and all auxiliary feedwater available, then the UET is 0, and significant increases to the UET for the first set of plant conditions may have no impact on the UET for

the second set of plant conditions. The unreliability of the mitigation systems (as defined in this report) and the UET is dependent on the plant operating configuration. The probability of being in each plant configuration needs to be taken into account.

It is also noted that the values for mitigation unreliability provided in Table 3 refer only to the situation when there is no credit for any control insertion, both PORVs are available, and all auxiliary feedwater is available. In addition to this configuration, there are eleven other configurations or conditions a plant can be operating in depending on the availability of the PORVs, auxiliary feedwater systems, and the ability for a limited amount of control rod insertion. There are UETs associated with each set of conditions. Referencing a UET for only one set of conditions does not provide the complete picture. Also see General Comment No. 1.

17. Section 3.2.3, Paragraph 5

The statement "The range of values of RPS reliability illustrates the difficulty of estimating reliability values in highly reliable systems" is true if you want to base the system reliability on total system failures. Fault tree methods that break the system down to the basic component level at which reliability data is collected is another approach that can be used to assess the reliability of highly reliable systems. The best reliability assessment from this table is that based on NUREG-5500 which uses the fault tree approach. This approach is a well-established and acceptable method of determining the reliability of highly reliable systems.

18. Section 3.2.3, Table 4

In the assessment of "W RPS Unreliability" corresponding to "SECY-83-293 baseline update to 1995" it is not appropriate to include the one RPS failure (Salem). Following the Salem RPS failure the reactor trip breakers were redesigned such that an automatic trip occurs by either an undervoltage trip or shunt coil trip. With the redesigned breaker, the automatic signal would have tripped the reactor at Salem.

19. Section 3.2.5, Item 1

With regard to the importance of common cause failures, it should be noted in this section that these importances are based on an RPS model that does not credit the operator action to trip the reactor. To get a more realistic assessment of the importance of common cause failures it is necessary to include the operator action to trip the reactor from the control room.

20. Section 3.2.5, Item 2

This is a very important point. A highly reliable operator action is available to back up a highly reliable system and this needs to be considered when drawing conclusions about the risk of ATWS events at Westinghouse plants. Also, see General Comment No. 7 regarding control rod insertion events.

21. Section 3.2.6, Paragraph 3

References 17, 18, and 19 should be References 16, 17, and 18.

22. Section 3.2.6, Table 6

The 1979 Baseline information for Westinghouse plants presented in Table 6 is misstated. As discussed in General Comment No. 4 above, in 1979 the 99% MTC value for Westinghouse plants was -7 pcm/°F (-0.7 10E-4 ΔK/°F) and the corresponding peak RCS pressure was below 3200 psig. Hence, the 1979 Baseline data block in Table 6 for Peak Pressure should read "> 3200 psig < 1% of the time." Also, no Westinghouse plants have a positive MTC at 100% power and not all Westinghouse plants are licensed to operate with positive MTC at part-power conditions. This should be reflected in the 1994 MTC survey block in Table 6.

23. Section 3.2.6, Paragraph 4

Reference 16 should be Reference 15. Also, the statement that HFP MTC values are less negative at HFP conditions than they were in 1979 is correct. These less negative MTC values at HFP are the result of changes in licensed allowable operation at part-power conditions associated with the implementation of positive MTC Technical Specifications. The need for positive MTC at part-power conditions is to support longer operating cycles. Not only are longer cycles an economic benefit, the reduction in the number of startups and shutdowns serve to reduce the potential number of reactor trip demands. In 1979 the TS MTC at full power was 0 pcm/°F, the same as it is today. Hence, the peak ATWS pressure at the HFP MTC limit remains unchanged.

24. Section 3.2.6, Paragraph 5

The statement that "WCAP-11992 described a risk based approach to justify increasing UETs from 1 percent to 37 percent" is incorrect. The intent of WCAP-11992 was to present a PRA methodology for demonstrating continued compliance with the risk-based PRA approach used in the basis of the Final ATWS Rule and to show that the value of P(ATWS) of 1.0E-05 for Westinghouse plants was still being met when considering changes in plant conditions (e.g., MTC, AFW, PORV availability) important to ATWS. As indicated in Comment # 16 above, there are UETs associated with different sets of conditions. Referencing a UET for only one set of conditions does not provide the complete picture.

25. Section 3.2.6, Paragraph 6

The statement "Since the UET is the percentage of the fuel cycle during which an ATWS is unmitigated, increasing the UET from 1 percent to 37 percent results in increasing P(ATWS) by a factor of 37 as calculated by the techniques of SECY-83-293" may be correct if the techniques of SECY-83-293 are correct. But SECY-83-293 is no longer an appropriate approach for this calculation. It does not account for the various configurations in which the plant may be operating and does not credit partial rod

insertion. Increasing the UET by a factor of 37 may have no impact on ATWS risk if the plant is operating in a configuration consistent with a 0 UET. The 37% UET referred to here is associated with a plant operating configuration that may not be the most probable operating configuration. As discussed above in General Comment No. 6, CE and B&W plants were required to install DSS and AMSAC due to limited pressure relief capacity relative to Westinghouse plants. An option of adding relief valves was also considered to reduce the peak pressure in CE and B&W plants but was eliminated due to the high cost associated with adding valves and the resulting low valve-impact ratio. Finally, the last two sentences in this paragraph appear to imply that the implementation of DSS would resolve any ATWS concerns for Westinghouse plants seeking significantly higher UETs. If this is true, this option should be more clearly described in the corresponding text for this section and in the Executive Summary and Conclusions sections of the report.

26. Section 3.3 , Paragraph 3

The first sentence should read ".... effects of the industry..... in 49FR26036." The last sentence should reflect 7140 trips. Also this sentence uses 20 years in determining the total number of trips but Table 7 reflects 30 years.

27. Section 3.3, Paragraph 4

The last sentence should read ".... the ATWS rule was cost effective."

28. Section 3.3 and Section 4, Second Bullet

It is not reasonable to claim the reactor trip frequency reduction is due entirely to the Commission's recommendation to reduce the number of scrams. A good percentage of this reduction would most likely have occurred anyway as utilities gained experience in plant operation, from changes to test and maintenance strategies, and due to economic pressures to keep the plants online.

29. Section 4, First and Eighth Bullets

See earlier discussions on the definition of UET and on the reference to 1% UET in lieu of DSS for Westinghouse plants. These apply here also.

30. Table B-1

As previously discussed in Comment #10, comments received from WOG utility representatives question the basis for some of the plant-specific numbers in Table B-1. It is recommended that a reference basis be included in the table for the plant-specific values to allow a cross-reference with the data source. Otherwise, the validity of the conclusions drawn from the use of these values may be questionable.

Since so much of the discussion in this report involves the plant type by NSSS vendor, it is suggested that a column be added to identify the NSSS vendor / plant type.

The units for the MTC should be provided in the last column title block. Many of the values given in this column are incorrect or misrepresented. For example, the TS MTC for the Byron, Braidwood, and V.C. Summer units is not just +7E-05. The TS MTC for these plants are the same as given for the Catawba units. The Robinson Unit 2 TS MTC (per TS 3.1.3 in Amendment #176) is +5E-05 below 50% RTP and 0 above 50% RTP. The South Texas units show a 0 MTC in Table B-1 but the TS MTC is the same as given for the Comanche Peak units.