

September 26, 2002

Mr. John L. Skolds, President  
Exelon Nuclear  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: BYRON STATION, UNITS 1 AND 2, AND BRAIDWOOD STATION, UNITS 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION REGARDING CONTROLLING UNFAVORABLE EXPOSURE TIME RELATED TO AN ATWS EVENT (TAC NOS. MB4671, MB4672, MB4669, AND MB4670)

Dear Mr. Skolds:

By letter dated March 28, 2002, Exelon Generation Company, LLC (Exelon) requested license amendments for Byron Station, Units 1 and 2, and Braidwood Station, Units 1 and 2, to revise the method of controlling the fuel cycle unfavorable exposure time related to an anticipated transient without scram event.

During the course of our review, we find that additional information is needed in order to complete our review of Exelon's request. Consequently, within 60 days of receipt of this letter, please provide a response to the enclosed Request for Additional Information (RAI). This schedule has been discussed with members of the Exelon staff.

Please note that because Exelon's response to the enclosed RAI is considered a supplement to the March 28, 2002, amendment application, we request that it be submitted under oath and affirmation in accordance with 10 CFR 50.90 and 10 CFR 50.30(b).

Please contact me if there are any questions regarding this RAI.

Sincerely,

*/RA/*

George F. Dick, Jr., Project Manager, Section 2  
Project Directorate III  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-454, STN 50-455,  
STN 50-456, and STN 50-457

Enclosure: Request for Additional Information

cc w/encl: See next page

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**ADAMS Accession Number: ML022470188**

OFFICE	PM:PD3-2	LA:PD3-2	PM:PD3-2	SC:SRXB	SC:SPSB	SC:PD 3-2
NAME	GDICK	CROSENBERG	MCHAWLA	FAKSTULEWICZ	MRUBIN	LRaghavan for AMENDIOLA
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REQUEST FOR ADDITIONAL INFORMATION  
RELATED TO CONTROLLING UNFAVORABLE EXPOSURE TIME  
ASSOCIATED WITH AN ATWS EVENT  
EXELON GENERATION COMPANY, LLC  
BYRON STATION, UNITS 1 AND 2  
BRAIDWOOD STATION, UNITS 1 AND 2  
DOCKET NOS. STN 50-454, STN 50-455, STN 50-456, AND STN 50-457

In an application dated March 28, 2002, Exelon Generation Company, LLC (the licensee) requested license amendments for Byron Station, Units 1 and 2 (Byron) and Braidwood Station, Units 1 and 2 (Braidwood). The application requested approval to modify the method of controlling unfavorable exposure time (UET) related to an anticipated transient without scram (ATWS) event. During review of the application, the staff identified a number of technical areas in which additional information is required in order for the staff to complete its review of the proposed license amendments.

1. The licensee's amendment request needs to be a stand alone and plant-specific submittal. The referenced WCAP-11992, "Joint Westinghouse Owners Group/Westinghouse Program: ATWS Rule Administration Process," has not been approved or accepted by the staff. As such, the staff has not approved the WCAP-11992 UET definition, methods, processes, analyses, assumptions, etc. Therefore:
  - a. The licensee needs to identify and justify, for Byron and Braidwood, the acceptability of these methodologies, computer codes, assumptions, etc., that are used in their analysis, as well as provide and describe their supporting detailed technical analyses and results.
  - b. The licensee needs to submit their plant-specific critical power trajectory calculations and associated curves for staff review.
2. In developing the ATWS equipment configuration management structure, the licensee needs to be explicit and specific regarding how this structure will be implemented and managed. The current description of this configuration management structure, which is proposed to be managed under the licensee's configuration risk management program (CRMP) as described at a very high level in Appendix T of the licensee's Technical Requirements Manual (TRM), does not adequately describe how it will be managed, controlled, and implemented such that the staff can determine if the structure would adequately address the complexities of ATWS events, including defense-in-depth and safety margins considerations. More specificity, the following information is needed:

ENCLOSURE

- a. The analyses that will be performed on a cycle-specific basis (i.e., the detailed technical analyses/methods to be performed to establish the UETs for the various ATWS equipment configurations) and how these analyses and results will be controlled and verified to be appropriate prior to, during, and following plant startup.
- b. The criteria or conditions under which the licensee may voluntarily enter into an UET, the controls and limitations on these entries, when these entries will be allowed or not allowed, how long specific entries will be allowed without taking compensatory actions and what actions will be taken in response to a prolonged or extended entry, and any other compensatory actions that will be implemented prior to and during any planned voluntary entries, etc. The staff believes voluntary entries into an UET must be kept to the minimum required activities. The examples provided in the submittal may already represent over 2 percent (11 days) of the cycle, assuming a 500-day cycle. The voluntary entries may not allow for as-found equipment unavailability conditions or emergent maintenance needs and still remain within the assumptions of the technical analyses supporting the ATWS Rule.
- c. The actions that will be taken whenever UET conditions arise that cannot be immediately alleviated, how long an UET condition will be allowed prior to taking compensatory response, how the response will be controlled and implemented, and any supporting analyses for the recommended response. An UET condition should not exist for any significant length of time and the submittal does not explicitly limit the time in this condition. Though the identified actions in the submittal might prevent a worse plant condition, they do not address the fact that the plant is already in an unacceptable configuration if an ATWS event occurs. Per the ATWS Rule (10 CFR 50.62) technical analysis, if a plant is operating in an UET condition and an ATWS occurs, core damage is assumed to occur. Thus, the time in an UET should be minimized, while recognizing that equipment failures can occur, equipment unavailability conditions can be found, and that the licensee may need to voluntarily enter an UET condition. For example, a compensatory response to such a situation may be to perform a power reduction to some set level that will preclude the UET condition. If such an action is taken under these conditions, the licensee needs to explicitly state this, how it is implemented (e.g., in the technical specifications (TSs), surveillance requirements, (SRs) core operating limit reports (COLRs), emergency operating procedures (EOPs,) etc.), and provide the analyses and results demonstrating the acceptability of that power level for not creating an UET.
- d. The equipment status considerations of the ATWS equipment configuration management structure. The staff believes that the management structure should address maintenance-related activities, which appear to be the primary focus under the current CRMP approach and, in addition should address any time these components/systems are out of service or in anyway unavailable or not in their expected state/condition (e.g., testing, discovery of inoperable or failed conditions, etc.) such that they are unable to perform their functional response to an ATWS event.

- e. The licensee needs to state explicitly how they will respond to conditions in which the ATWS-related equipment is unavailable, as identified above. The staff does not agree with the licensee statement that there will be no administrative requirements to shutdown the plant or extend an outage if an unplanned unavailability of an ATWS-related equipment/system function occurs, unless prompted by a TS requirement. Since it is not explicitly clear how the licensee will respond to these conditions, the staff cannot agree to these conditions.
  - f. The surveillance requirements that will be implemented in support of the ATWS equipment configuration management structure should be identified and justified as acceptable in periodically assuring that the availability and functionality of the ATWS-related equipment is consistent with the cycle-specific ATWS equipment configuration management structure matrix.
3. The current submittal does not contain any quantitative risk information (i.e., core damage frequency (CDF), large early relief frequency (LERF), change in CDF, or change in LERF), but throughout the submittal there are references to the licensee's "Configuration Risk Management Program," to "ATWS risk significant equipment," and other similar phrases. The licensee should clarify if they intend for this submittal to be treated as a risk-informed submittal or not. The staff believes the ATWS equipment configuration management structure could be developed primarily in a deterministic manner, supported solely by deterministic analyses.
- a. If this submittal is to be risk-informed, please address the Regulatory Guide 1.174 guidelines and process, or an equivalent approach. Please provide the plant-specific base CDF and LERF and the change in CDF and LERF due to the elimination of the current 5 percent limitation on UET and the implementation of the ATWS equipment configuration management structure. Please describe the risk analysis, results, and assumptions regarding the UET percentages under current plant conditions/controls and under the proposed ATWS equipment configuration management structure, including the consideration of higher enriched fuels, etc., for the proposed case. Please provide this information in sufficient detail to assure the staff they are properly analyzed and that the licensee's proposal does indeed result in a decrease in risk from ATWS events.
  - b. Even if the licensee indicates that this submittal is not risk-informed, the staff may pursue risk information if it is believed that "special circumstances" warrant the request, following the process laid out in Regulatory Issue Summary (RIS) 2001-02. In particular, the staff notes that the licensee's submittal states that they can meet their technical specification requirements and the ATWS Rule, while not meeting the ATWS Rule's underlying technical analyses and/or assumptions. The staff notes that the ATWS Rule technical bases include risk-related analyses and assumptions. The staff will specifically evaluate this condition to determine if it creates a "special circumstance." If it does or if for other reasons "special circumstances" are identified, the staff may seek risk information on this modification. Part of this evaluation would involve assuring that the technical bases, analyses, and related assumptions underlying the ATWS rule, which includes its risk-related analyses, are met by the licensee's implementation of the proposed modification.

4. It is stated in the submittal that "... the 95% fuel cycle life criteria for UET is equivalent to the UET risk-based acceptance criteria in the analyses forming the basis of the ATWS Rule." The ATWS Rule bases contain a finding regarding the projected time, in terms of percentage of fuel cycle, that Westinghouse plants were expected to be in an unfavorable condition. However, this observation does not constitute an acceptance criteria, but rather a recognition of a found condition that was input into the risk analyses that supported the ATWS Rule. It is incorrect and misleading to refer to this as an acceptance criteria or a fuel cycle life criteria. The licensee should revise the statement in the submittal accordingly.
5. The submittal assumes that there is at least one-minute of control rod insertion (i.e., 72 steps) if the rod control system is in automatic as opposed to manual. Please provide the technical basis supporting this assumption and discuss under what conditions (e.g., common cause failure of rod insertion due to mechanical, electrical, or actuation signal failure) this assumption would not be valid and how these conditions are addressed.
6. The submittal states that for a high reactivity core, "Although the time to RCS overpressure and the resultant loss of coolant accident (LOCA) may decrease, the consequences of the LOCA remain unchanged." Please describe if and how this reduction in time may affect any operator response actions, sequence progression, or equipment responses to the ATWS event.
7. The submittal states that the proposed method of controlling the UET continues to fully meet the requirements of the ATWS Rule. This statement is somewhat misleading in that UET is not mentioned in the ATWS Rule, but was a factor in the underlying technical analyses that supported the ATWS Rule. Please clarify this statement to properly reflect its role.
8. The analysis results presented in Tables 1 and 2 of Attachment A to the licensee's submittal do not address the potential for less than 50 percent auxiliary feedwater (AFW) availability (i.e., it does not address complete failure, 0 percent availability, of the AFW system). Though unlikely, such a condition is considered possible and should be evaluated, especially if this submittal is considered to be a deterministic-based, non-risk-informed, license application. Even if it is meant to be a risk-informed submittal, the licensee would need to provide a technical justification for not addressing conditions of less than 50 percent AFW availability.
9. The submittal states that the proposed approach is an interim approach that will eventually be superseded when the Westinghouse Owners Group (WOG) method is approved. Since the latest WOG method has not been submitted for staff review and past WOG methods have not been accepted by the staff, it cannot be assured if or when a WOG method will be approved. Thus, the submittal needs to either establish a time limitation for its application or request that this approach be approved independent of any future method approval.

10. Please provide a detailed plant-specific analysis demonstrating the ability of the Byron and Braidwood units to meet the basis for the ATWS Rule, 10 CFR 50.62. This analysis must use current and proposed operating conditions such as current power level, current fuel enrichment, and moderator temperature coefficient, for each of the units. Regarding the ATWS event, provide a matrix which includes information describing the operation of the power operated valves (PORV), availability of the auxiliary feed water system, and availability of the manually operated control rods, showing that the units will not exceed the ASME Stress Level C Limit of 3200 psig with technical specification operating limits during an ATWS event. Please include a discussion and applicable values of the unfavorable moderator temperature coefficient (MTC) for the Byron-Braidwood units.
11. Please provide a plot of the MTC as a function of continuous cycle time for the cycle in question.
12. Please provide a plot of the vessel pressure as a function of continuous cycle time for the cycle in question.
13. There are several overall comments regarding the submittal.
  - a. Throughout the submittal, reference is made to the definition of an UET, in which it is conditioned by a specific plant configuration. Though this conditional definition was used in WCAP-11992 and may have been allowed as part of the current method of calculating and controlling the UET, the staff does not believe this configuration condition is a valid aspect of the UET definition. An UET is any plant condition or configuration such that the reactor core reactivity feedback is not sufficient to prevent reactor coolant system (RCS) pressure from exceeding 3200 psig during an ATWS event. Therefore, to avoid confusion, whenever referring to the specific plant configuration consisting of 100 percent PORV capacity, 100 percent AFW system availability, no control rod insertion capability, and ATWS mitigating system actuation circuitry (AMSAC) availability, it should be identified as the "base case UET." It should also be recognized that this base case UET may be a small portion of the UET of a plant.
  - b. The submittal states that the licensee will reference this submittal in their updated final safety analysis report (UFSAR) to describe their methodology. However, as previously indicated, this submittal references sections of WCAP-11992 which has not been accepted by the staff. As a result of issues raised during review of this application, aspects of this license application may change, necessitating the reference to also be changed. It may be more appropriate for the licensee to provide an ATWS Management Program Plan that would contain the pertinent elements (e.g., methods, controls, implementation, etc.) of the information in their submittal, as revised during the review, which could then be controlled and referenced directly by the licensee.