Westinghouse Electric Company

Box 355
Pittsburgh Pennsylvania 15230-0355

August 4, 1999

CAW-99-1348

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Mr. Samuel J. Collins

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject "Control Rod Insertion Following a Cold Leg LBLOCA, D. C. Cook, Units 1 and 2," WCAP-15245 (Proprietary), May, 1999 and "Control Rod Insertion Following a Cold Leg LBLOCA, D. C. Cook, Units 1 and 2," WCAP-15246 (Non-Proprietary), May, 1999

Dear Mr. Collins:

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-99-1348 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.790 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying Affidavit by American Electric Power.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-99-1348 and should be addressed to the undersigned.

Very truly yours,

H. A. Sepp, Manager
Regulatory and Licensing Engineering

Enclosures

cc: T. Carter/NRC (5E7)

CAW-99-1348

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared Henry A. Sepp, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC ("Westinghouse"), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

Henry A. Sepp, Manager
Regulatory and Licensing Engineering

Sworn to and subscribed
before me this 4th day
of August, 1999

Notarial Seal
Janet A. Schwab, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires May 22, 2000
Member, Pennsylvania Association of Notaries

Notary Public

(1) I am Manager, Regulatory and Licensing Engineering, in the Nuclear Services Division, of the Westinghouse Electric Company LLC ("Westinghouse"), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rulemaking proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10CFR Section 2.790 of the Commission's regulations and in conjunction with the Westinghouse application for withholding accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse Electric Company LLC in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of

Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information which is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10CFR Section 2.790, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in "Control Rod Insertion Following a Cold Leg LBLOCA, D. C. Cook, Units 1 and 2.." WCAP-15245 (Proprietary), May, 1999 for the D. C. Cook Units 1 and 2 Nuclear Plant, being transmitted by American Electric Power letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk, Attention Mr. Samuel J. Collins. The proprietary information as submitted for use by American Electric Power for the D. C. Cook Nuclear Plant Units 1 and 2 is expected to be applicable in other licensee submittals in response to certain NRC requirements for justification of the use of Control Rod Insertion Following a Cold Leg LBLOCA.

This information is part of that which will enable Westinghouse to:

(a) Assist the customer to obtain NRC approval.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of similar information to its customers for purposes of meeting NRC requirements for licensing documentation.

(b) Westinghouse can sell support and defense of the technology to its customers in the licensing process.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar services and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended for developing testing and analytical methods and performing tests.

Further the deponent sayeth not.

ATTACHMENT 1 TO C0999-11

DESCRIPTION OF THE PROPOSED METHODOLOGY CHANGE

A. Summary of Proposed Changes

Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant (CNP), Units 1 and 2, proposes to amend Facility Operating Licenses DPR-58 and DPR-74. I&M proposes to allow credit in the applicable subcriticality analysis for the negative reactivity provided by insertion of the rod cluster control assemblies (RCCAs) during realignment from a cold leg recirculation to a hot leg recirculation configuration. This realignment, which is referred to as hot leg switchover (HLSO), is performed following a loss-of-coolant accident (LOCA). This methodology change requires NRC staff review and approval per the provisions of 10 CFR 50.90. The proposed change affects the Bases for Technical Specification (T/S) 3/4.5.5, "Refueling Water Storage Tank," and several sections of the Updated Final Safety Analysis Report (UFSAR).

The proposed changes are described in detail in Section E of this attachment. T/S pages that are marked to reflect the proposed methodology change are provided in Attachments 2A and 2B for Unit 1 and Unit 2, respectively. The proposed T/S pages, with these changes incorporated, are provided in Attachments 3A and 3B for Unit 1 and Unit 2, respectively.

B. Description of the Current Requirements

In the current LBLOCA analysis, as stated in UFSAR Section 14.3, "Reactor Coolant System Pipe Rupture (Loss of Coolant Accident)," an average reactor coolant system (RCS)/sump mixed boron concentration is calculated to ensure the core remains subcritical during long-term cooling following a LOCA. The insertion of control rods to provide any negative reactivity to the reactor core is not credited in the large break loss-of-coolant accident (LBLOCA) analyses. The emergency core cooling system (ECCS) has been designed to mitigate the effects of postulated LOCAs by providing a sufficient amount of borated water to protect the fuel in the reactor core. Unit 1 UFSAR Section 14.3.1 and Unit 2 UFSAR Section 14.3.1.1.2, "Sequence of Events and Systems Operations," states, in part, the following:

> "Criticality control is achieved by determining the RWST and accumulator concentrations necessary to maintain subcriticality without credit for RCCA insertion. The necessary RWST and accumulator concentrations are a function of each core design and are checked each cycle. The current Technical Specifications value is 2400 to 2600 ppm boron."

The Unit 2 UFSAR contains an additional clarification that the T/S range of 2400 to 2600 ppm boron applies to the RWST and the accumulators. The accumulators are conservatively modeled at 2300 ppm for the post-LOCA subcriticality analysis.

Similarly, T/S 3/4.5.5 Bases currently states, "Consistent with the applicable LOCA analyses, the limits on RWST minimum volume and boron concentration ensure that 1) when combined with water from melted ice, the RCS, and the accumulators, sufficient water is available within containment to permit recirculation cooling flow to the core, and 2) the reactor will remain subcritical in the cold condition following a LOCA assuming mixing of the RWST, RCS, ECCS water, and sources of water that may eventually reside in the sump, with all control rods assumed to be out."

C. Bases for the Current Requirements

The current LOCA analyses requirements are based upon the core remaining subcritical after shutdown following the occurrence of such an accident. The cycle-specific reload safety evaluations confirm that post-LOCA subcriticality requirements are met. The current post-LOCA subcriticality analysis methodology does not credit the negative reactivity that would be provided by the control rods following a cold leg LBLOCA.

D. Need for Revision of the Requirements

In June 1992, the NRC notified the Westinghouse Owners Group (WOG) of its concerns generic to pressurized water reactors regarding possible core re-criticality following a LBLOCA. In response to these concerns, Westinghouse Electric Company (WEC) reviewed portions of the accident with respect to the boron concentration in the injected ECCS liquid. WEC determined that for cold leg LBLOCAs, the buildup of high boron concentration in the reactor core could result in significant boron dilution in the sump. Consequently, a potential re-criticality condition could develop when switchover of the ECCS to hot leg recirculation was being performed. When a LBLOCA occurs, a buildup of boron in the vessel causes an associated boron dilution in the sump. At the time of switchover to hot leg recirculation, insufficiently borated containment sump water is introduced to the top of the core. The HLSO subcriticality analysis conservatively assumes that the diluted boron sump liquid completely displaces the more highly borated liquid during the transition from cold leg recirculation to hot leg recirculation. Therefore, if the sump liquid were calculated to be at or below the critical boron concentration, core re-criticality could be postulated.

To address this issue, the WOG contracted WEC to perform an ECCS hot leg recirculation elimination analysis. The objective of the analysis was to evaluate and, if possible, justify the elimination of ECCS hot leg recirculation following a LOCA. The resulting analysis, which was documented in WCAP-14486, "ECCS Hot Leg Recirculation Elimination for Westinghouse 3 and 4 Loop Design [Nuclear Steam Supply System] NSSS," modeled RCS flow through the gap between the core barrel and vessel at the hot leg nozzle. This hot leg nozzle gap flow was viewed as a way to offset the effects of boron concentrating in the reactor vessel and thereby eliminate the need for realignment to hot leg recirculation.

In the fall of 1997, CNP identified containment sump design issues on Units 1 and 2 that adversely affected the HLSO criticality calculation. As a result, the sump dilution effect associated with the partitioning of fluid between the active and inactive sump volumes was to be offset by taking credit for the borated coolant flow through hot leg nozzle gaps, as documented in WCAP-14486. This change in approach was presented in a letter from I&M to NRC, AEP:NRC:1260G4, "Confirmatory Action Letter (CAL) Supplemental Response," dated December 24, 1997.

During the summer and early fall of 1998, WEC concluded that concerns raised during the NRC review of WCAP-14486 made defense of the methodology impractical. WEC recommended that the WCAP be withdrawn. Following WOG concurrence, the WCAP was withdrawn in October 1998.

In late 1998, after the withdrawal of WCAP-14486, WEC assessed whether subcriticality at the time of switchover to hot leg recirculation for CNP could be assured without taking credit for the hot leg nozzle gaps. At that time, subcriticality could be ensured for Unit 1 (for the current fuel cycle) by taking credit for existing burnup of greater than 4000 megawatt days per metric tonne of initial uranium metal (MWD/MTU). However, subcriticality at the time of HLSO could not be demonstrated for Unit 2 since it has a fresh reactor core.

I&M met with the NRC on May 6, 1999, to outline a strategy for crediting the addition of negative reactivity through control rod insertion after a cold leg LBLOCA. During the meeting, the WEC analysis techniques and preliminary conclusions were presented to demonstrate acceptability of the control rod insertion approach. The resulting negative reactivity available to prevent re-criticality at the time of HLSO would be approximately 400 ppm or more (boron rod worth), depending upon plant design. The strategies outlined during the May 6, 1999, meeting have been analyzed and are addressed in Attachments 6 (WCAP-15245, "Control Rod Insertion Following a Cold Leg LBLOCA, D. C. Cook, Units 1 and 2," a proprietary version) and 7 (WCAP-15246, "Control Rod Insertion Following a Cold Leg LBLOCA, D. C. Cook, Units 1 and 2," a non-proprietary version) of this amendment request. In addition, several questions raised at the May 6, 1999, meeting that were not answered at the time are provided with responses in Attachment 8.

E. Description of the Proposed Changes

I&M proposes to credit RCCA negative reactivity, discounting the worth of the most reactive rod, following a postulated cold leg LBLOCA in the re-criticality analysis for HLSO. The proposed methodology change to credit RCCA insertion is supported by the Westinghouse analysis provided as Attachments 6 and 7. The Bases for Unit 1 and Unit 2 T/S 3/4.5.5 would be revised to allow credit for RCCA insertion as part of the basis for concluding that the reactor will remain subcritical in the cold condition following a cold leg LBLOCA when HLSO is performed. Similarly, the pertinent sections of the UFSAR would be revised to reflect the credit of RCCAs for criticality control following a cold leg LBLOCA at the time of HLSO.

F. Bases for the Proposed Changes

The proposed change modifies the methodology used in the post-LOCA subcriticality analysis during the realignment from cold leg recirculation to hot leg recirculation. The provisions of 10 CFR 50, Appendix K, allow control rods to be credited if their insertion is calculated to occur. Analyses demonstrating that the CNP control rods can be inserted following a cold leg LBLOCA have been prepared and are provided in Attachments 6 and 7. These analyses address reactor vessel component structural distortion in a LOCA environment coincident with a seismic event. Plant-specific seismic response spectra and plant-specific design parameters for the CNP were used. Based on Attachments 6 and 7, I&M has reached the following key conclusions:

1. For both Units 1 and 2, the RCCA upper internals guide tube calculated loads are within allowable limits, as established by tests performed by WEC, such that control rod insertion will not be precluded for either the limiting leak-before-break (LBB) criteria break locations or the design basis cold leg breaks.

2. Based upon calculated loads and measured grid load allowables, fuel assembly grid distortion will not inhibit control rod insertion for either LBB criteria break locations or the design basis cold leg breaks.

Based on the above conclusions it is acceptable to credit the negative reactivity associated with the insertion of the control rods in the post-LOCA HLSO subcriticality analysis for large cold leg breaks. The cycle-specific reload safety evaluations document the confirmation of post-LOCA subcriticality in compliance with the long-term cooling requirements of 10 CFR 50.46.

G. Probabilistic Risk Assessment of the Proposed Change

The HLSO evolution is not specifically modeled in the current CNP probabilistic risk assessment (PRA). However, it is estimated below that the probability of a cold leg RCS break large enough to result in sump dilution plus a failure of the RCCAs to insert is considerably less than 1.0 x 10-6 per year. This result is based on combining the probability of the spectrum of large RCS breaks, from the largest double-ended cold leg guillotine rupture down to a six-inch equivalent diameter hole in the RCS (5.0 x 10-6 per year from NUREG/CR-5499), with engineering judgement that the failure of multiple RCAAs to insert would be considerably less that 1.0 x 10-1 per year. This is supported by the WEC analysis contained in WCAP-15245 (Attachment 6) and WCAP-15246 (Attachment 7) that show that common mode failure of the RCAAs to insert due to cold leg LBLOCA and seismic forces is not credible.

H. Impact on Previous Submittals

No previous submittals are affected by the proposed change.

I. Impact on Emergency Operating Procedures

The CNP Emergency Operating Procedures (EOPs) related to LOCA response direct the operators to perform the switchover to hot leg recirculation. The maximum HLSO time is determined based on one of two issues. One is the need to prevent exceeding a boron concentration limit of 23.5 weight-percent in the core to preclude boron precipitation, and the other is the need to ensure no return to criticality as diluted sump liquid displaces the coolant in the reactor vessel. The current CNP EOPs, as well as the CNP UFSAR (Sections 6.2.2 and 14.3.1 for each unit), establish the maximum time allowed to transition to HLSO as based on boron precipitation concerns in the vessel being more limiting than re-criticality concerns.

Recent HLSO subcriticality analyses, which do not credit RCCA insertion, demonstrate that the time to perform the hot leg recirculation alignment must occur much sooner to preclude re-criticality. Credit for RCCA insertion, as requested in this submittal, would remove the re-criticality concern from being the basis for the maximum HLSO time. Thus, the allowed maximum time that HLSO must be performed will return to being based on the precipitation limits and will provide a larger operator time response window to perform realignment to hot leg recirculation.