Westinghouse
Electric Corporation

Energy Systems

Nuclear Technology Division

Box 355
Pittsburgh Pennsylvania 15230-0355

May 26, 1995
CAW-95-830

Document Control Desk
US Nuclear Regulatory Commission
Washington, DC 20555

Attention: Mr. William Russell

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: "Westinghouse Setpoint Methodology for Protection Systems, Donald C. Cook Unit 2"
WCAP-13801 (Proprietary)

Dear Mr. Russell:

The proprietary information for which withholding is being requested is further identified in Affidavit CAW-95-830 signed by the owner of the proprietary information, Westinghouse Electric Corporation. 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 Service Corporation.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-95-830, and should be addressed to the undersigned.

Very truly yours,

N. J. Liparulo, Manager
Nuclear Safety Regulatory & Licensing Activities

RSL/bbp

Enclosures

cc: Kevin Bohrer/NRC (12H5)

Copyright Notice

Proprietary Information Notice

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.790 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) contained within parentheses located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.790(b)(1).

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 Corporation ("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
Henry A. Sepp, Manager
Regulatory and Licensing Initiatives

Sworn to and subscribed
before me this 6th day
of June, 1995

Denise K. Henderson
Notary Public

Notarial Seal
Denise K. Henderson, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires Oct. 28, 1996
Member, Pennsylvania Association of Notaries

(1) I am Manager, Regulatory and Licensing Initiatives, in the Nuclear Technology Division, of the Westinghouse Electric Corporation 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 the Westinghouse Energy Systems Business Unit.

(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 the Westinghouse Energy Systems Business Unit 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 the report entitled "Westinghouse Setpoint Methodology for Protection Systems: D. C. Cook Unit 2", WCAP-13801 (Proprietary), August, 1993, being transmitted by the American Electric Power Service Corporation letter and Application for Withholding Proprietary Information from Public Disclosure, to Document Control Desk, Attention Mr. William T. Russell. The proprietary information as submitted for use by American Electric Power Service Corporation is expected to be applicable in other licensee submittals in response to certain NRC requirements for justification of continued operation.

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

(a) Provide documentation of the methods for determination of reactor protection system setpoints.

(b) Establish applicable methods for treatment of uncertainties used in the development of reactor protection system setpoints.

(c) 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 documentation 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 determining uncertainties used in the development of reactor protection system setpoints.

Further the deponent sayeth not.

ATTACHMENT 3 TO AEP:NRC:1184H2

RESPONSE TO ITEMS 2 AND 3

WESTINGHOUSE LETTER AEP-95-120,
DATED JUNE 14, 1995

AEP-95-120

Westinghouse Electric Corporation

Energy Systems

Box 355
Pittsburgh Pennsylvania 15230-0355

NTD-NSRLA-OPL-95-295
June 14, 1995

Mr. Mark Ackerman
Nuclear Licensing and Fuels Section
American Electric Power Service Corporation
One Riverside Plaza
Columbus, OH 43216-6631

AMERICAN ELECTRIC POWER SERVICE CORPORATION
DONALD C. COOK NUCLEAR PLANT
Revised Response to NRC System Based I&C Audit

Dear Mr. Ackerman:

Attached for your information and use are the revised responses to two requests for additional information resulting from the NRC System Based I&C Audit of Donald C. Cook Nuclear Plant Units 1 and 2. Original responses were provided in AEP-95-091. The responses were revised to incorporate your comments. The requests are repeated below:

- "Provide a discussion on the exclusion of environmental allowances (pressure, temperature, and seismic) for those functional units/loops considered as back-up or secondary). For example; pressurizer pressure high reactor trip, low reactor trip, low safety injection, steam generator water level low, level low-low and level high-high, and main steam flow high/feedwater flow low mismatch. Inspection report item #3.1.1."
- "Discuss the use of containment pressure to detect a steamline break inside containment rather than steam line flow high and its conformance to IEEE 279-1968. Inspection report item #3.2.1b."

AEP-95-120
NTD-NSRLA-OPL-95-295
June 14, 1995

This work was performed under the Licensing and Engineering Blanket Order (AEPSC PO# 00684-040-5N) as Task #95-006. If you have any questions, please call Ms. Robin Lapides (412-374-5683) or me.

Very truly yours,

K. F. Matthews
Senior Sales Engineer
North American Field Sales

RSL/bbp
Attachment

cc: D. Malin - AEPSC
J. Kingseed - AEPSC
V. VanderBurg - AEPSC
S. Farlow - AEPSC
D. Schmader - AEPSC
B. Bastian - AEPSC
T. Georgantis - AEPSC
E. Lewis - AEPSC

AEPSC114/NSRLA281L

Donald C. Cook Nuclear Plant RAI

Question 2. Provide a discussion on the exclusion of environmental allowances (pressure, temperature and seismic) for those functional units/loops considered as back-up or secondary. For example; pressurizer pressure high reactor trip, low reactor trip, low safety injection, steam generator water level low, level low-low and level high-high, and main steam flow high/feedwater flow low mismatch. Inspection report item #3.1.1

Suggested Response:

1.0 Introduction

The Westinghouse philosophy with respect to protection systems is multi-level, placing emphasis on appropriate design and utilization of primary trip and actuation functions with inclusion, to the extent practical, of functional diversity, i.e., backup trip and actuation functions. It is Westinghouse practice to design the protection system with the primary trip and actuation functions meeting necessary and required design criteria, e.g., redundancy, equipment qualification and testability. Westinghouse verifies through various reviews and analyses that the primary trip and actuation functions provide the means of satisfying the appropriate criteria for termination and mitigation of Anticipated Operational Occurrences (AOO) and Design Basis Events (DBE) required as part of the normal plant licensing process. Westinghouse has determined to the extent practicable, for a postulated common mode failure of the primary trip or actuation function, that an appropriate and reasonable diverse backup trip and actuation function exists. However, as the regulations and NRC guidance on the requirements of diverse backup functions are vague, Westinghouse has applied a separate set of criteria on these functions.

2.0 Regulations and Reports

2.1 Regulations

The primary references cited for regulation in this area for the Donald C. Cook Nuclear Plant are the draft design criteria, noted as Appendix H of the UFSAR, Criterion 20 - Protection Systems Redundancy and Independence and Criterion 23 - Protection Against Multiple Disability for Protection Systems.

Criterion 20
"Redundancy and independence designed into protection systems shall be sufficient to assure that no single failure or removal from service of any component or channel of a system will result in loss of the protection function. The redundancy provided shall include, as a minimum, two channels of protection for each protection function to be served."

Criterion 23
"The effects of adverse conditions to which redundant channels or protection systems might be exposed in common, either under normal conditions or those of an accident, shall not result in loss of the protection function."

2.2 Regulatory Reports

A regulatory report issued by the NRC which notes some requirements on diversity design is NUREG-0493, "A Defense-in-Depth and Diversity Assessment of the RESAR-414 Integrated Protection System," issued as part of the review of the Westinghouse RESAR-414[1] design.

[1] Reference Safety Analysis Report - Westinghouse four loop, 3820 MWt NSSS design SAR submitted to the NRC for generic application and approval.

"Sufficient diversity should be provided in the design so that, for each anticipated operational occurrence in the design basis ... occurring in conjunction with each single CMF[2] postulated ..., the plant response calculated using conservative analyses should not result in a non-coolable geometry of the core or violation of the integrity of the primary coolant pressure boundary or violation of the integrity of the containment."

2.3 Westinghouse Documents

One of the principle Westinghouse documents supporting the design of the protection system is WCAP-7306, "Reactor Protection System Diversity in Westinghouse Pressurized Water Reactors." This WCAP was issued in 1969 and is a summary of the analysis that was performed as part of Westinghouse commitments made to the AEC and ACRS during meetings held in 1968 and 1969 on protection system design. This document demonstrates that the protection system design provides adequate functional diversity such that "failed fission product barriers" do not occur as a result of postulated initiating events even if the protection system primary trip or actuation function is not assumed to actuate during the course of the event. Demonstration of this capability was sufficient to convince the regulatory organization that total and physical separation of the control and protection systems were not required as part of the Westinghouse design.

3.0 Westinghouse Protection System Diversity Bases

Westinghouse utilizes five guidelines in determining the acceptability of the diversity in the protection system trip and actuation functions. It should be noted that as a general rule no specific protection function is designated as a primary function or a backup function. Instead, each protection function may be a primary actuator for some event or events and may be a backup actuator for other events. Thus all portions of the protection system are classified as 1E and

[2] Common Mode Failure

qualified for up to 103 °F (process racks) or 130 °F (sensor/transmitters) environmental and SSE seismic conditions. Where necessary as a primary trip or actuation function, sensor/transmitters are qualified for adverse (330 °F) environmental conditions.

a) Where technically feasible, each AOO and DBE should have a qualified primary and backup (diverse) protection function identified.

b) The diverse protection function is not required to meet the same licensing criteria as the primary protection function, i.e., a less conservative safety limit may be applied.

> As noted in NUREG-0493, "Sufficient diversity should be provided in the design so that, for each anticipated operational occurrence in the design basis ... occurring in conjunction with each single CMF[3] postulated ..., the plant response calculated using conservative analyses should not result in a non-coolable geometry of the core or violation of the integrity of the primary coolant pressure boundary or violation of the integrity of the containment."

> It is also noted in WCAP-7306, "... the second trip reached (the backup) generally does not prevent the design safety limit from being exceeded. In this context, the design safety limit ... is itself a highly conservative limit; exceeding this limit does not imply intolerable consequences."

c) Manual operator action may be assumed as a means of meeting the protection system diversity criteria. Various guidelines have been promulgated for this purpose. For operating plants, the reference cited most often is ANSI/ANS 58.8-1984, "Time Response Design Criteria for Nuclear Safety Related Operation Actions."

[3] Common Mode Failure

d) The protection functions identified as diverse protection functions are qualified as Class 1E systems for the environment they are nominally expected to perform in. Functions which are credited as primary actuators for adverse environmental conditions are qualified for that environment and EA terms included in the uncertainty calculations.

It should be noted that for a diverse protection function, Westinghouse generally attempts to utilize a function which is already qualified for the environmental conditions it may experience if it were the AOO/DBE primary trip or actuation function. Where this is not possible, evaluation may be utilized to estimate the time of trip or actuation on a best estimate basis which will result in less severe environmental conditions for the determination of acceptability of the diverse protection function.

e) The primary protection function inputs, to the extent feasible and practical, shall be derived from signals that are a direct measure of the desired variables. The primary protection function is defined as the first protection function whose setpoint is reached and is assumed to mitigate the postulated AOO or DBE.

The diverse protection function inputs may be derived from indirect measures of the desired viariables. A diverse protection function is defined as the protection function whose setpoint is reached but is not assumed as the primary mitigation function for the postulated AOO or DBE. This is consistent with the requirements stated in IEEE 279-1971 Section 4.8.

4.0 Summary

From the above, the following can be summarized,

1) Westinghouse has a primary and backup protection function for each AOO and DBE.

2) Diverse protection functions may not meet the same licensing acceptance criteria as the primary protection functions.
3) Manual operator action may be assumed as a means of meeting diversity criteria.
4) Diverse protection functions are qualified Class 1E systems for their nominal expected environmental conditions.
5) Diverse protection functions may be derived from indirect measures of the desired variables.

In general Westinghouse will attempt to utilize a backup protection function that is environmentally qualified. However, when this is not possible, the time of trip or actuation will be evaluated to determine the acceptability of the diverse protection function. The inclusion of adverse environmental condition allowances in diverse protection function setpoints is possible, but not considered necessary in Westinghouse setpoint uncertainty calculations.

Although inclusion of adverse environmental allowances is not required, Westinghouse has evaluated the AOOs and DBEs listed in Chapter 14 of the Donald C. Cook Nuclear Plant UFSAR with respect to primary and secondary system response versus the inclusion of EA_t terms. For each AOO or DBE whose primary system response is required to function in adverse environmental conditions, one of two evaluation conclusions has been reached:

1) There exists at least one diverse protection function which is environmentally qualified and includes an EA term (evaluated to be sufficient in magnitude) in the setpoint uncertainty calculation.

or

2) There exists at least one diverse protection function which is located outside of the adversely affected environs and thus does not require an EA term in the setpoint uncertainty calculation.

5.0 Evaluation of Donald C. Cook Nuclear Plant Protection Functions

Westinghouse has reviewed Chapter 14 of the Donald C. Cook Nuclear Plant UFSAR and has noted those AOOs and DBEs which generate potentially adverse environmental conditions in the plant regions about the sensor transmitters, impulse lines or instrument cabling. The guidelines used for this evaluation are noted below:

1) For those events that do not result in a release of primary or secondary side coolant, no elevated ambient temperatures are expected and thus Environmental Allowance (EA) terms are not required in the setpoint uncertainty calculations for either a primary or backup protection function.

2) For those events that result in the release of primary or secondary side coolant, elevated ambient temperatures may be expected and an EA term may be appropriate in the setpoint uncertainty calculations.

3) For secondary side breaks, no significant radiation is expected to be released and thus no radiation components are required in the EA terms.

4) For primary side breaks with significant radiation release potential, radiation components are included in the EA terms. Generally radiation terms are included for large break LOCA only.

5) Westinghouse does not perform AOO or DBE safety analyses in coincidence with a seismic event.

Table 1 notes the AOOs and DBEs listed in Chapter 14 of the Donald C. Cook Nuclear Plant UFSAR (Column 1) which were evaluated for primary and secondary system response and the expectation for adverse environmental conditions (Column 2). If adverse environmental

conditions are expected, then the primary trip or actuation function identified in the safety analyses is noted (Column 3). Appropriate pages in Chapter 14 of the UFSAR are referenced to provide where in the UFSAR the primary trip or actuation function is identified, or can be inferred from the limiting safety analyses reported. Possible diverse protection functions are identified in the event the primary function is disabled (Column 4). The location of the diverse protection function with respect to the presence of adverse environmental conditions is noted (Column 5). Finally, for each possible diverse protection function the presence (or absence) of an EA term in the uncertainty calculations is noted (Column 6).

TABLE 1

ANTICIPATED OPERATIONAL OCCURENCE / DESIGN BASIS EVENT (COLUMN 1)	ADVERSE CONDITIONS GENERATED? (COLUMN 2)	PRIMARY PROTECTION FUNCTION NOTED IN SAFETY ANALYSES (COLUMN 3)	DIVERSE PROTECTION FUNCTIONS AVAILABLE (COLUMN 4)	DIVERSE PROTECTION FUNCTION LOCATED IN ADVERSE ENVIRONMENT? (COLUMN 5)	EA TERM IN DIVERSE SETPOINT? (COLUMN 6)
RCCA Bank Withdrawal - Subcritical	NO				
RCCA Bank Withdrawal - at Power	NO				
RCCA Misalignment	NO				
Uncontrolled Boron Dilution	NO				
Loss of RCS Flow	NO				
Startup of an Inactive RCS Loop	NO				
Loss of External Load	NO				
Loss of Normal Feedwater	NO				
Feedwater System Malfunction	NO				
Excessive Load Increase	NO				
Loss of Offsite Power	NO				
Turbine-Generator Overspeed	NO				
Fuel Handling Accident	NO				
Waste Liquid Release	NO				
Waste Gas Release	NO				
Steam Generator Tube Rupture	NO				

ANTICIPATED OPERATIONAL OCCURENCE / DESIGN BASIS EVENT (COLUMN 1)	ADVERSE CONDITIONS GENERATED? (COLUMN 2)	PRIMARY PROTECTION FUNCTION NOTED IN SAFETY ANALYSES (COLUMN 3)	DIVERSE PROTECTION FUNCTIONS AVAILABLE (COLUMN 4)	DIVERSE PROTECTION FUNCTION LOCATED IN ADVERSE ENVIRONMENT? (COLUMN 5)	EA TERM IN DIVERSE SETPOINT? (COLUMN 6)
Steam Pipe Rupture (core response) - Inside Containment	YES	Steam Flow in Two Steamlines - High coincident with Low Steamline Pressure[4][5]	Differential Pressure Between Two Steamlines - High	NO	NO
			Steam Flow in Two Steamlines - High coincident with Tavg - Low-Low	YES YES	YES NO
			Pressurizer Pressure - Low Reactor Trip	YES	NO
			Pressurizer Pressure - Low SI	YES	YES
			Containment Pressure	NO	NO
			NIS Power Range - High	YES	NO
			Overtemperature ΔT	YES	NO

[4] Steam Flow in Two Steamlines - High coincident with Low Steamline Pressure generates Steamline Isolation and SI for Unit 1. Low Steamline Pressure by itself generates Steamline Isolation and SI for Unit 2.

[5] Unit 1 - see page 14.2.5-6, Results paragraph 3 of UFSAR. Unit 2 - see page 14.2.5-8, Results paragraph 3 of UFSAR.

ANTICIPATED OPERATIONAL OCCURENCE / DESIGN BASIS EVENT (COLUMN 1)	ADVERSE CONDITIONS GENERATED? (COLUMN 2)	PRIMARY PROTECTION FUNCTION NOTED IN SAFETY ANALYSES (COLUMN 3)	DIVERSE PROTECTION FUNCTIONS AVAILABLE (COLUMN 4)	DIVERSE PROTECTION FUNCTION LOCATED IN ADVERSE ENVIRONMENT? (COLUMN 5)	EA TERM IN DIVERSE SETPOINT? (COLUMN 6)
			Overpower ΔT	YES	NO
			Steam Flow/Feed Flow Mismatch coincident with Steam Generator Water Level - Low	YES/NO YES	NO/NO NO
Steam Pipe Rupture (core response) - Outside Containment	YES	Steam Flow in Two Steamlines - High coincident with Low Steamline Pressure[6][7]	Differential Pressure Between Two Steamlines - High	YES	NO
			Steam Flow in Two Steamlines - High coincident with Tavg - Low-Low	NO NO	YES NO
			Pressurizer Pressure - Low Reactor Trip	NO	NO

[6] Steam Flow in Two Steamlines - High coincident with Low Steamline Pressure generates Steamline Isolation and SI for Unit 1. Low Steamline Pressure by itself generates Steamline Isolation and SI for Unit 2.

[7] Unit 1 - see page 14.2.5-6, Results paragraph 3 of UFSAR. Unit 2 - see page 14.2.5-8, Results paragraph 3 of UFSAR.

ANTICIPATED OPERATIONAL OCCURENCE / DESIGN BASIS EVENT (COLUMN 1)	ADVERSE CONDITIONS GENERATED? (COLUMN 2)	PRIMARY PROTECTION FUNCTION NOTED IN SAFETY ANALYSES (COLUMN 3)	DIVERSE PROTECTION FUNCTIONS AVAILABLE (COLUMN 4)	DIVERSE PROTECTION FUNCTION LOCATED IN ADVERSE ENVIRONMENT? (COLUMN 5)	EA TERM IN DIVERSE SETPOINT? (COLUMN 6)
			Pressurizer Pressure - Low SI	NO	YES
			NIS Power Range - High	NO	NO
			Overtemperature ΔT	NO	NO
			Overpower ΔT	NO	NO
			Steam Flow/Feed Flow Mismatch coincident with Steam Generator Water Level - Low	NO/YES NO	NO/NO NO
CRDM Housing Failure - RCCA Ejection	YES[8]	NIS Power Range - High[9]	Overtemperature ΔT	YES	NO
			Overpower ΔT	YES	NO

[8] While the CRDM Housing Failure - RCCA Ejection results in some elevation of ambient temperatures, Westinghouse has evaluated the transient and has determined that the event power transient is terminated and reversed by doppler effects due to heating of the fuel in less than two seconds. The reactor trip noted is confirmatory in nature and occurs in less than two seconds. No significant elevation of ambient temperature occurs in the short time period of the power transient.

[9] Unit 1 - see page 14.2.6-3, Reactor Protection paragraph 1 of UFSAR. Unit 2 - see page 14.2.6-3, Reactor Protection paragraph 1 of UFSAR.

ANTICIPATED OPERATIONAL OCCURENCE / DESIGN BASIS EVENT (COLUMN 1)	ADVERSE CONDITIONS GENERATED? (COLUMN 2)	PRIMARY PROTECTION FUNCTION NOTED IN SAFETY ANALYSES (COLUMN 3)	DIVERSE PROTECTION FUNCTIONS AVAILABLE (COLUMN 4)	DIVERSE PROTECTION FUNCTION LOCATED IN ADVERSE ENVIRONMENT? (COLUMN 5)	EA TERM IN DIVERSE SETPOINT? (COLUMN 6)
			Pressurizer Pressure - Low Reactor Trip	YES	NO
			Pressurizer Pressure - Low SI	YES	YES
Feedwater Pipe Rupture - Inside Containment	YES	Steam Generator Water Level - Low-Low[10]	Pressurizer Pressure - High	YES	NO
			Overtemperature ΔT	YES	NO
			Pressurizer Pressure - Low Reactor Trip	YES	NO
			Pressurizer Pressure - Low SI	YES	YES
			Steam Flow/Feed Flow Mismatch coincident with Steam Generator Water Level - Low	YES/NO YES	NO/NO NO

[10] Unit 1 - see page 14.2.8-3, Method of Analysis item 7 of UFSAR. (Note Feedwater Pipe Rupture is not part of the licensing basis for Unit 1 and is provided for information purposes only.) Unit 2 - see page 14.2.8-4, Method of Analysis item G of UFSAR.

ANTICIPATED OPERATIONAL OCCURENCE / DESIGN BASIS EVENT (COLUMN 1)	ADVERSE CONDITIONS GENERATED? (COLUMN 2)	PRIMARY PROTECTION FUNCTION NOTED IN SAFETY ANALYSES (COLUMN 3)	DIVERSE PROTECTION FUNCTIONS AVAILABLE (COLUMN 4)	DIVERSE PROTECTION FUNCTION LOCATED IN ADVERSE ENVIRONMENT? (COLUMN 5)	EA TERM IN DIVERSE SETPOINT? (COLUMN 6)
			Differential Pressure Between Two Steamlines - High	NO	NO
			Steam Flow in Two Steamlines - High coincident with Low Steamline Pressure[11]	YES NO	YES YES
			Steam Flow in Two Steamlines - High coincident with Tavg - Low-Low	YES YES	YES NO
			Containment Pressure	NO	NO
Feedwater Pipe Rupture - Outside Containment	YES	Steam Generator Water Level - Low-Low[12]	Pressurizer Pressure - High	NO	NO
			Overtemperature ΔT	NO	NO

[11] See Note [4].

[12] Unit 1 - see page 14.2.8-3, Method of Analysis item 7 of UFSAR. (Note Feedwater Pipe Rupture is not part of the licensing basis for Unit 1 and is provided for information purposes only.) Unit 2 - see page 14.2.8-4, Method of Analysis item G of UFSAR.

ANTICIPATED OPERATIONAL OCCURENCE / DESIGN BASIS EVENT (COLUMN 1)	ADVERSE CONDITIONS GENERATED? (COLUMN 2)	PRIMARY PROTECTION FUNCTION NOTED IN SAFETY ANALYSES (COLUMN 3)	DIVERSE PROTECTION FUNCTIONS AVAILABLE (COLUMN 4)	DIVERSE PROTECTION FUNCTION LOCATED IN ADVERSE ENVIRONMENT? (COLUMN 5)	EA TERM IN DIVERSE SETPOINT? (COLUMN 6)
			Pressurizer Pressure - Low Reactor Trip	NO	NO
			Pressurizer Pressure - Low SI	NO	YES
			Steam Flow/Feed Flow Mismatch coincident with Steam Generator Water Level - Low	NO/YES NO	NO/NO NO
			Differential Pressure Between Two Steamlines - High	NO	NO
			Steam Flow in Two Steamlines - High coincident with Low Steamline Pressure[13]	NO NO	YES YES

[13] See note [4].

ANTICIPATED OPERATIONAL OCCURENCE / DESIGN BASIS EVENT (COLUMN 1)	ADVERSE CONDITIONS GENERATED? (COLUMN 2)	PRIMARY PROTECTION FUNCTION NOTED IN SAFETY ANALYSES (COLUMN 3)	DIVERSE PROTECTION FUNCTIONS AVAILABLE (COLUMN 4)	DIVERSE PROTECTION FUNCTION LOCATED IN ADVERSE ENVIRONMENT? (COLUMN 5)	EA TERM IN DIVERSE SETPOINT? (COLUMN 6)
			Steam Flow in Two Steamlines - High coincident with Tavg - Low-Low	NO NO	YES NO
Large Break LOCA	YES	Pressurizer Pressure - Low Reactor Trip[14]	Pressurizer Pressure - Low SI	YES	YES
			Overtemperature ΔT	YES	NO
		Pressurizer Pressure - Low SI[14]	Containment Pressure	NO	NO

[14] While reactor trip is noted, for reactivity purposes, the control rods are not assumed to fall in a Large Break LOCA. The reactor is shutdown on voids and remains shutdown based on the boron content of the coolant supplied by the ESFAS. Therefore, no EA term is necessary for reactor trip. Unit 1 - see page 14.3.1-2, paragraph 1 of UFSAR. Unit 2 - see page 14.3.1-3, paragraph 2 of UFSAR.

ANTICIPATED OPERATIONAL OCCURENCE / DESIGN BASIS EVENT (COLUMN 1)	ADVERSE CONDITIONS GENERATED? (COLUMN 2)	PRIMARY PROTECTION FUNCTION NOTED IN SAFETY ANALYSES (COLUMN 3)	DIVERSE PROTECTION FUNCTIONS AVAILABLE (COLUMN 4)	DIVERSE PROTECTION FUNCTION LOCATED IN ADVERSE ENVIRONMENT? (COLUMN 5)	EA TERM IN DIVERSE SETPOINT? (COLUMN 6)
Small Break LOCA	YES[15]	Pressurizer Pressure - Low Reactor Trip[16]	Pressurizer Pressure - Low SI	YES	YES
			Overtemperature ΔT	YES	NO
		Pressurizer Pressure - Low SI[16]	Containment Pressure	NO	NO

[15] While the Small Break LOCA results in some elevation of ambient temperatures, Westinghouse has evaluated the location of the Pressurizer Pressure transmitters inside containment and has determined that the expected ambient temperatures will not exceed 130 °F by the time of reactor trip initiation. Thus no EA term is included in the uncertainty calculation for the primary reactor trip function for this event.

[16] Unit 1 - see pages 14.3.2-11 and 13, Tables 14.3.2-4 and 6 respectively, and Figures 14.3.2-3, 11, 19, 25 and 33 of UFSAR. Unit 2 - see pages 14.3.2-9, 10, 11 and 15, Tables 14.3.2-1, 2, 3 and 7 respectively, and Figures 14.3.2-2, 11, 19, 27, 35, 43 and 51 of UFSAR.

6.0 Conclusion

A review of Table 1 will note that for those AOO/DBEs that generate adverse environmental conditions, there is at least one diverse protection function that is either; 1) qualified for that environment and includes an EA term in the uncertainty calculation for that function, or 2) is located in an area that is not affected by the event and thus does not experience elevated temperatures requiring the inclusion of an EA term for that event. Such a review would also note that for each event there is generally more than one diverse protection function available for backup. It is believed that the requirements of draft design criteria 20 and 23 as noted in Appendix H of the UFSAR and IEEE-279 are satisfied by the protection system and that adverse environmental allowance terms have been included in the protection function uncertainty calculations when appropriate.

B

ATTACHMENT 4 TO AEP:NRC:1184H2

RESPONSE TO ITEM 4

WESTINGHOUSE LETTER AEP-95-089,
DATED MAY 9, 1995

AEP-95-089

Westinghouse Electric Corporation

Energy Systems

Box 355
Pittsburgh Pennsylvania 15230-0355

Mr. Mark Ackerman
Nuclear Licensing and Fuels Section
American Electric and Power Service Corporation
One Riverside Plaza
Columbus, Ohio 43216-6631

NTD-NSRLA-OPL-95-218
May 9, 1995

AMERICAN ELECTRIC POWER SERVICE CORPORATION
DONALD C. COOK NUCLEAR PLANT UNITS 1 AND 2
Credit for Hi-1 and Hi-2 Containment Pressure for SLB M/E Release Calculations Inside Containment

Ref: 1. Letter from C. O. Thomas (USNRC) to E. P. Rahe (W), dated August 22, 1983, Subject: Acceptance for Referencing of Licensing Topical Report WCAP-8821 (P)/8859 (NP), "TRANFLO Steam Generator Code Description," and WCAP-8822 (P)/8860(NP), "Mass and Energy Release Following a Steam Line Rupture."

Dear Mr. Ackerman:

The purpose of this transmittal is to provide a response to a concern raised during an NRC System Based Instrumentation & Controls (SBIC) audit of Donald C. Cook Nuclear Plant Units 1 and 2. This work was performed under the Licensing and Engineering Blanket Order (AEPSC PO# 00684-040-5N) as Task #95-005. The NRC concern is repeated below:

> "The team was concerned that the use of containment pressure to detect a steam line break inside containment, rather than steam line high flow, did not conform to IEEE 279-1968, 'Criteria for Nuclear Power Plant Protection Systems.' Section 4.8, which requires that, 'to the extent feasible and practical, protection system inputs shall be derived from signals which are direct measures of the desired variables.' Since containment pressure is not a direct variable for steamline break accident inside containment (high steam flow in a single affected steam line is the direct variable), the team determined that there appeared to be some measure of feasibility and practicality for the licensee to use the direct variable to detect steamline break."

The above concern is valid if core protection is the criterion of interest. A secondary side process variable should be used for core protection following an assumed secondary line rupture. For a small steamline break, in which a secondary side process variable would not be actuated, a primary side process variable is used, e.g., safety injection actuation via a low pressurizer pressure signal. A primary side process variable, such as pressurizer pressure, can be assumed as the primary protective function, since demonstrating core protection is the goal. Containment pressure should be used as the diverse protection function (inside containment breaks only, obviously).

AEP-95-089
NTD-NSRLA-OPL-95-218
May 9, 1995

Steamline break mass and energy (M/E) releases to containment are calculated as input to evaluate the overpressurization of the containment. The high containment pressure functions are used to perform two basic functions, 1) prevent overpressurization of the containment (includes steamline isolation and feedwater isolation to limit mass releases), and 2) isolates containment (to prevent potential spread of radioactive nuclides). Since the goal of the evaluation is to demonstrate that the containment pressure boundary is protected, then the containment process variables can be assumed as the primary protective functions, e.g., pressure. That is totally consistent with IEEE 279 statement on most direct variable. Thus, the high containment pressure signal is a direct measure of the desired variable for a steamline break analysis for mass and energy releases inside containment.

Furthermore, Reference 1, which provided the initial NRC SER for the topical report on steamline break mass and energy releases inside containment (and prompted W to address superheated steam releases via Supplements 1 and 2 of WCAPs 8822(P) and 8860(non-P)), specifically acknowledges:

> "For small split breaks, coincidence of high steam flow and low steam pressure will not occur. Instead, steam and feedwater isolation will be initiated based on a higher containment pressure signal."

Therefore, it can be concluded that it is acceptable to credit the containment pressure high and high-high functions for the steamline break analysis for mass and energy releases inside containment.

If you have any questions, please call Ms. Robin Lapides (412-374-5683) or me.

Very truly yours,

Keith F. Matthews
Senior Sales Engineer
Power Systems Field Sales

RSL/bbp

cc: T. Georgantis - AEPSC
V. VanderBurg - AEPSC
E. Lewis - AEPSC
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B. Bastian - AEPSC

AEP089/NSRLA218L

ATTACHMENT 5 TO AEP:NRC:1184H2

RESPONSE TO ITEM 5

ATTACHMENT 5 TO AEP:NRC:1184H2

RESPONSE TO ITEM 5

The condensate storage tank level instruments are Foxboro Model N-E13DM differential pressure transmitters. The equipment qualification report for these transmitters is Foxboro/Wyle EQ Test Report 45592-4. This report shows that the model N-E13DM transmitters are restored to within their Reference Accuracy, ±0.5%, with extreme errors of +0.28%/-0.21% following a seismic event. A copy of Table VIII-3 from the test report is attached.

TABLE VIII-3

TRANSMITTER ERROR AND SPAN SHIFT GENERIC SEISMIC TESTS

I.D. NO.	% OF SPAN	PRE-* SEISMIC	5-OBE TESTS IN EACH AXIS UP	% ERROR	5-OBE TESTS DOWN	% ERROR	5-OBE TESTS AVERAGE	% ERROR AND SPAN SHIFT	1-SSE TEST IN EACH AXIS RUN 1 UP	% ERROR	1-SSE TEST RUN 1 DOWN	% ERROR	1-SSE TEST RUN 2 UP	% ERROR	1-SSE TEST RUN 2 DOWN	% ERROR	1-SSE TEST RUN 3 UP	% ERROR	1-SSE TEST RUN 3 DOWN	% ERROR	1-SSE TEST AVERAGE	% ERROR AND SPAN SHIFT
	0	0.962	0.970	0.20	0.963	0.02	0.967	0.12	0.964	0.05	0.959	-0.07	0.959	-0.07	0.969	0.17	0.969	0.17	0.964	0.05	0.964	0.05
	25	1.973	1.973	0.13	1.974	0.16	1.974	0.16	1.982	0.35	1.974	0.16	1.983	0.38	1.978	0.25	1.973	0.13	1.974	0.16	1.977	0.21
11	50	2.972	2.970	-0.09	2.972	-0.04	2.971	-0.06	2.976	0.06	2.978	0.11	2.977	0.09	2.976	0.06	2.977	0.09	2.980	0.16	2.977	0.09
	75	3.971	3.979	-0.01	3.961	-0.45	3.970	-0.23	3.978	-0.03	3.974	-0.13	3.976	-0.08	3.963	-0.40	3.973	-0.16	3.972	-0.18	3.973	-0.16
	100	4.985	4.986	0.02	-	-	4.986	0.02	4.996	0.27	-	-	4.986	0.02	-	-	4.989	0.10	-	-	4.990	0.12
	SPAN	4.023	-	-	-	-	4.019	-0.10	-	-	-	-	-	-	-	-	-	-	-	-	4.026	0.07
	0	1.003	0.999	-0.10	1.000	-0.08	1.000	-0.08	0.994	-0.23	0.993	-0.25	0.993	-0.25	0.992	-0.28	0.992	-0.28	0.993	-0.25	0.993	-0.25
	25	2.025	2.023	0.51	2.021	0.46	2.022	0.61	2.015	0.31	2.016	0.34	2.016	0.34	2.017	0.36	2.017	0.36	2.018	0.39	2.017	0.36
12	50	3.031	3.028	0.65	3.027	0.63	3.028	0.65	3.019	0.43	3.020	0.45	3.019	0.43	3.021	0.48	3.022	0.50	3.021	0.48	3.020	0.45
	75	4.021	4.020	0.46	4.017	0.39	4.019	0.44	4.012	0.26	4.011	0.24	4.009	0.19	4.010	0.21	4.010	0.21	4.011	0.24	4.011	0.24
	100	5.001	5.000	-0.03	-	-	5.000	-0.03	4.993	-0.20	-	-	4.990	-0.28	-	-	4.989	-0.30	-	-	4.991	-0.25
	SPAN	3.998	-	-	-	-	4.000	0.05	-	-	-	-	-	-	-	-	-	-	-	-	3.990	0.00
	0	0.996	0.996	0.00	0.985	0.28	0.996	0.00	0.996	0.00	0.997	-0.03	0.997	-0.03	0.996	0.00	0.996	0.00	0.997	-0.03	0.997	-0.03
	25	2.000	2.001	-0.21	2.000	-0.10	2.001	-0.21	2.001	-0.21	2.001	-0.21	2.001	-0.21	2.000	-0.18	2.001	-0.21	2.001	-0.21	2.001	-0.03
13	50	2.990	2.991	-0.04	2.990	-0.01	2.991	-0.04	2.992	-0.06	2.992	-0.06	2.993	-0.09	2.991	-0.04	2.992	-0.06	2.991	-0.04	2.992	-0.06
	75	3.983	3.984	0.06	3.983	0.08	3.984	0.06	3.985	0.03	3.985	0.03	3.985	0.03	3.985	0.03	3.985	0.03	3.984	0.06	3.985	0.03
	100	4.983	4.985	-0.05	-	-	4.985	-0.05	4.985	-0.05	-	-	4.985	-0.05	-	-	4.986	-0.08	-	-	4.985	-0.05
	SPAN	3.987	-	-	-	-	3.989	0.05	-	-	-	-	-	-	-	-	-	-	-	-	3.988	0.03
	0	0.998	0.993	-0.12	0.993	-0.12	0.993	-0.12	0.991	-0.17	0.991	0.17	0.991	-0.17	0.991	-0.17	0.991	-0.17	0.991	-0.17	0.991	-0.17
	25	2.004	2.000	0.04	2.000	0.04	2.000	0.04	1.998	-0.01	1.998	-0.01	1.999	0.02	1.998	-0.01	1.998	-0.01	1.998	-0.01	1.998	-0.01
14	50	3.010	3.007	0.21	3.006	0.19	3.007	0.21	3.004	0.14	3.003	0.11	3.005	0.16	3.003	0.11	3.004	0.14	3.003	0.11	3.004	0.14
	75	4.009	4.007	0.21	4.006	0.18	4.007	0.21	4.005	0.16	4.003	0.11	4.005	0.16	4.003	0.11	4.004	0.13	4.003	0.11	4.004	0.12
	100	4.999	4.996	-0.07	-	-	4.996	-0.07	4.993	-0.15	-	-	4.993	-0.15	-	-	4.993	-0.15	-	-	4.993	-0.15
	SPAN	4.001	-	-	-	-	4.003	0.05	-	-	-	-	-	-	-	-	-	-	-	-	4.002	0.02
	0	0.984	0.985	0.02	0.985	0.02	0.985	0.02	0.984	0.00	0.984	0.00	0.984	0.00	0.984	0.00	0.984	0.00	0.985	0.02	0.984	0.00
	25	2.000	2.002	0.28	2.000	0.23	2.001	0.25	2.004	0.33	2.001	0.25	2.004	0.33	2.001	0.25	2.004	0.33	2.002	0.28	2.003	0.30
15	50	3.011	3.015	0.43	3.012	0.36	3.014	0.41	3.018	0.51	3.015	0.43	3.018	0.51	3.015	0.43	3.019	0.53	3.015	0.43	3.017	0.48
	75	4.016	4.021	0.42	4.018	0.34	4.020	0.39	4.026	0.54	4.023	0.47	4.025	0.52	4.023	0.47	4.026	0.54	4.024	0.49	4.025	0.52
	100	5.011	5.016	0.12	-	-	5.016	0.12	5.022	0.27	-	-	5.022	0.27	-	-	5.023	0.30	-	-	5.022	0.27
	SPAN	4.027	-	-	-	-	4.031	0.10	-	-	-	-	-	-	-	-	-	-	-	-	4.030	0.27

NOTE: Outputs are in VDC.
% Error is % of calibrated span.

*All span point voltages are averaged from the 3-run calibration check.

ATTACHMENT 6 TO AEP:NRC:1184H2

RESPONSE TO ITEM 6.A

WESTINGHOUSE LETTER AEP-95-090,
DATED MAY 9, 1995

AEP-95-090

Westinghouse Electric Corporation

Energy Systems

Box 355
Pittsburgh Pennsylvania 15230-0355

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NTD-NSRLA-OPL-95-219
May 9, 1995

AMERICAN ELECTRIC POWER SERVICE CORPORATION
DONALD C. COOK NUCLEAR PLANT UNITS 1 AND 2
Environmental Allowance Errors for Outside Containment Instrumentation

Dear Mr. Ackerman:

The purpose of this transmittal is to provide a response to a request for additional information resulting from the NRC System Based Instrumentation & Controls (SBIC) audit of Donald C. Cook Nuclear Plant Units 1 and 2. This work was performed under the Licensing and Engineering Blanket Order (AEPSC PO# 00684-040-5N) as Task #95-005. The request is repeated below:

> "Discuss the lack of an environmental allowance for cable and transmitters located outside containment. It is noted that for post accident monitoring and emergency response guidelines an environmental allowance is included for instruments and cable associated with harsh environments inside containment only."

An inherent assumption in the Donald C. Cook Nuclear Plant safety analysis and licensing basis is the requirement that instrumentation environmental errors which are a direct result of a design basis event be specifically addressed in the safety system setpoints for reactor trip and safeguards actuation that are required to mitigate the consequences of that event. Consequently, the Westinghouse Setpoint Methodology for Protection Systems - Donald C. Cook Nuclear Plant Units 1 & 2 (WCAPS 13055 and 13801) incorporates transmitter environmental allowances (EA's) and insulation resistance (IR) degradation errors for all functions that are credited in the plant safety analysis for design basis events where the cables or transmitters could potentially be exposed to harsh environmental conditions, regardless of whether the instrumentation is located inside or outside containment.

In contrast to the above approach, for post accident monitoring in conjunction with the Westinghouse Owner's Group Emergency Response Guidelines (WOG ERGs), provisions are made to accommodate transmitter EA and IR degradation errors associated with harsh conditions <u>inside</u> containment only. The ERGs instruct the control room staff to use adverse containment setpoints when predefined limits on measured containment parameters (typically pressure and radiation) are exceeded. Thus, there is no provision in the ERGs to specifically account for the effect on instrument readings due to breaks outside containment.

This philosophy of accommodating EA terms for inside containment releases only was addressed by the WOG during the development of the ERGs. The safety benefit of including outside containment EA's was evaluated and weighed against the relative impracticality of identifying a mechanism to discriminate between normal and harsh conditions outside containment. The decision to not accommodate outside containment environmental errors was considered to be acceptable by the WOG and the NRC, as evidenced by their approval of the ERGs. The basis for this acceptability is discussed below.

Although it is recognized that additional instrument errors due to environmental effects may at times be present for outside containment variables, the impact on the utilization of the ERGs for accident mitigation is small based on three primary considerations:

1. If environmental uncertainties were to exist as a result of an outside containment release, there generally exists diverse instruments located inside containment which would be unaffected by environmental conditions outside containment. Examples include core exit thermocouples (inside) which are diverse to RVLIS (outside) for detecting inadequate core cooling, or steam generator water level (inside) which is diverse to auxiliary feedwater flow (outside) for assessing heat sink.

2. Since instrumentation located outside containment is generally not installed in a contained location, environmental errors due to outside containment releases are of a shorter duration compared to inside containment instrumentation and would tend to come and go during the course of an accident.

3. If outside containment variables are exposed to harsh conditions, the resulting errors are often small relative to their use in the ERGs for gross indication, trending, etc.

In summary, although transmitter or cable IR degradation environmental errors could potentially exist for instrumentation located outside containment, such errors have been evaluated on a generic basis with the conclusion that there is an insignificant impact on safety if they are not included in procedure setpoints.

If you have any questions, please call Ms. Robin Lapides (412-374-5683) or me.

Very truly yours,

Keith F. Matthews
Senior Sales Engineer
Power Systems Field Sales

RSL/bbp

cc:	T. Georgantis - AEPSC	V. VanderBurg - AEPSC	E. Lewis - AEPSC
	S. Farlow - AEPSC	B. Bastian - AEPSC	D. Schmader - AEPSC

AEP090/NSRLA219L

ATTACHMENT 7 TO AEP:NRC:1184H2

RESPONSE TO ITEM 7

WCAP 7306