DESIGN PRESSURE AND TEMPERATURE

5.2.2 The reactor containment building is designed and shall be maintained in accordance with the original design provisions contained in Section 5.2.2 of the FSAR.

PENETRATIONS

5.2.3 Penetrations through the reactor containment building are designed and shall be maintained in accordance with the original design provisions contained in Section 5.4 of the FSAR with allowance for normal degradation pursuant to the applicable Surveillance Requirements.

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 193 fuel assemblies with each fuel assembly containing 204 fuel rods clad with Zircaloy -4. Each fuel rod shall have a nominal active fuel length of 144 inches. The initial core loading shall have a maximum enrichment of 3.35 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment of 4.0 weight percent U-235.

CONTROL ROD ASSEMBLIES

5.3.2 The reactor core shall contain 53 full length and no part length control rod assemblies. The full length control rod assemblies shall contain a nominal 142 inches of absorber material. The nominal values of absorber material shall be 80 percent silver, 15 percent indium and 5 percent cadmium. All control rods shall be clad with stainless steel tubing.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 193 fuel assemblies with each fuel assembly containing 264 fuel rods clad with Zircaloy -4. Each fuel rod shall have a nominal active fuel length of 144 inches. The initial core loading shall have a maximum enrichment of 3.3 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment of 3.84 weight percent U-235.

CONTROL ROD ASSEMBLIES

5.3.2 The reactor core shall contain 53 full length and no part length control rod assemblies. The full length control rod assemblies shall contain a nominal 142 inches of absorber material. The nominal values of absorber material shall be 80 percent silver, 15 percent indium and 5 percent cadmium. All control rods shall be clad with stainless steel tubing.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

a. In accordance with the code requirements specified in Section 4.1.6 of the FSAR, with allowance for normal degradation pursuant to the applicable Surveillance Requirements.

b. For a pressure of 2485 psig, and

c. For a temperature of 650°F, except for the pressurizer which is 680°F.

Attachment 3 to AEP:NRC:1016

Westinghouse Electric Corporation Letter
Dated September 4, 1986

SEP 1 1 1986

Westinghouse Electric Corporation

Water Reactor Divisions

Nuclear Technology Division

Box 355
Pittsburgh Pennsylvania 15230-0355

AEP-86-676

September 4, 1986
NS-OPLS-OPL-II-86-184

Mr. M. P. Alexich, Vice President
and Director Nuclear Operations
American Electric Power Service Corporation
One Riverside Plaza
Columbus, Ohio 43216

AMERICAN ELECTRIC POWER SERVICE CORPORATION
D. C. COOK UNIT 1
SUPPORTING DOCUMENTATION FOR TECHNICAL SPECIFICATION DESIGN
FEATURE FUEL ASSEMBLY DELETION AND JUSTIFICATION
FOR CONTINUED OPERATION SAFETY EVALUATION

Dear Mr. Alexich:

The purpose of this letter is to confirm our telephone conversation informing you of an issue relating to the Technical Specifications on your Unit No. 1 and as manufactured fuel characteristics.

Westinghouse units employing Standardized Technical Specification format defined in Section 5.3.1 a maximum uranium weight per rod value. It has come to Westinghouse's attention that as-manufactured fuel rod uranium weight have exceeded this value for fuel which has been shipped to your plant site and is scheduled for future operation in an upcoming cycle or is in your current operating unit/cycle.

The subject technical specification value as stated in Section 5.3.1 was intended to be descriptive and representative of the fuel loading and has not been used as a direct input to any safety analysis. It is judged that the weight difference rod uranium weight may exceed the specified maximum uranium weight does not have a significant impact on the safety analyses. Other technical specifications cover more important fuel related parameters, therefore, deletion of the Design Features fuel rod weight limit is not significant to safe operation of the plant.

Westinghouse has provided a generic safety evaluation (see Attachment A) which may be applied to your unit in support of continued operation pending modification of tech specs for those plants which are known to have exceeded their specified fuel rod maximum uranium weight. Attachments B and C provide a Proposed Amendment and Basis for No Significant Hazards Determination in order to delete the tech spec fuel rod maximum uranium weight as specified in Section 5.3.1. The proposed change of Technical Specification Design Features Section 5.3.1 is provided in Attachment D. This is the only reference to fuel rod uranium weight in the technical specifications.

All Westinghouse fuel supplied has been manufactured within all appropriate specifications and related manufacturing controls. The Westinghouse Nuclear Fuel Division has been manufacturing fuel pellets with higher as built densities in order to reduce pellet hydrogen content and for some applications a chamferred pellet design with slightly higher pellet mass in order to enhance fuel performance. It is only during the last three years that rod-wise uranium weights instead of assembly weights have been supplied for Special Nuclear Material (SNM) accountability purposes due to more detailed accountability procedures at the manufacturing plant and not for the intent of confirming this tech spec. It is, however, by this accountability procedure that this issue has come to light. The data flow for these SNM considerations will be unaffected by this amendment. Westinghouse is reviewing all available manufacturing data to assure that all related cases of rod uranium weight are covered.

Westinghouse Nuclear Safety and Nuclear Fuel personnel will be available to answer any questions of this issue and to support your plant operation in any NRC related discussion or submittal required.

If you have any questions or comments, please contact the undersigned.

Very truly yours,

H. C. Walls, Project Manager
Projects Department

F. Scapellato/dmr

cc: M. P. Alexich
J. G. Feinstein
V. VanderBurg
J. Markowsky
S. H. Steinhart
D. R. Hafer
J. R. Jensen
R. W. Jurgensen
W. G. Smith
B. Svensson
M. J. Parvin, W

ATTACHMENT A

SAFETY EVALUATION JUSTIFYING CONTINUED OPERATION WITH URANIUM ROD WEIGHT DISCREPANCY

SECL 86-169
Customer Reference No(s).

Westinghouse Reference No(s).
(Change Control or RFQ As Applicable)

WESTINGHOUSE

NUCLEAR SAFETY EVALUATION CHECK LIST

1) NUCLEAR PLANT(S) GENERIC

2) CHECK LIST APPLICABLE TO: FUEL ROD URANIUM WEIGHT
(Subject of Change)

3) The written safety evaluation of the revised procedure, design change or modification required by 10CFR50.59 has been prepared to the extent required and is attached. If a safety evaluation is not required or is incomplete for any reason, explain on Page 2.

Parts A and B of this Safety Evaluation Check List are to be completed only on the basis of the safety evaluation performed.

CHECK LIST - PART A

(3.1) Yes ___ No _X_ A change to the plant as described in the FSAR?
(3.2) Yes ___ No _X_ A change to procedures as described in the FSAR?
(3.3) Yes ___ No _X_ A test or experiment not described in the FSAR?
(3.4) Yes _X_ No ___ A change to the plant technical specifications (Appendix A to the Operating License)?

4) CHECK LIST - PART B (Justification for Part B answers must be included on Page 2.)

(4.1) Yes ___ No _X_ Will the probability of an accident previously evaluated in the FSAR be increased?
(4.2) Yes ___ No _X_ Will the consequences of an accident previously evaluated in the FSAR be increased?
(4.3) Yes ___ No _X_ May the possibility of an accident which is different than any already evaluated in the FSAR be created?
(4.4) Yes ___ No _X_ Will the probability of a malfunction of equipment important to safety previously evaluated in the FSAR be increased?
(4.5) Yes ___ No _X_ Will the consequences of a malfunction of equipment important to safety previously evaluated in the FSAR be increased?
(4.6) Yes ___ No _X_ May the possibility of a malfunction of equipment important to safety different than any already evaluated in the FSAR be created?
(4.7) Yes ___ No _X_ Will the margin of safety as defined in the bases to any technical specification be reduced?

If the answers to any of the above questions are unknown, indicated under 5) REMARKS and explain below.

If the answer to any of the above questions in 4) cannot be answered in the negative, based on written safety evaluation, the change cannot be approved without an application for license amendment submitted to the NRC pursuant to 10CFR50.90

5) REMARKS:

None

The following summarizes the justification upon the written safety evaluation,[(1)] for answers given in Part B of the Safety Evaluation Check List:

See Attached Safety Evaluation

[(1)]Reference to document(s) containing written safety evaluation: __________

____

FOR FSAR UPDATE

Section:________ Page(s):__________ Table(s):__________ Figure(s):_______

Reason for/Description of Change:

Prepared by (Nuclear Safety): Kent S. Sault [signature] Date: 4/24/86

Coordinated with Engineer(s): [signatures] 4/24/86 4-24-86 Date: 4/23/86

Coordinating Group Manager(s): Edmond A. Dzenis [signature] Date: 4/29/86

Nuclear Safety Group Manager: [signature] Date: 4/26/86

SAFETY EVALUATION JUSTIFYING CONTINUED OPERATION WITH URANIUM ROD WEIGHT DISCREPANCY

The Design Features section of the Technical Specifications identifies a maximum total weight of uranium in each fuel rod. Due to fuel pellet design improvements such as chamfered pellets with reduced dish and a nominal density increase, the fuel weight has increased slightly. The actual uranium weight has no bearing on the power limits, power operating level or decay heat rate. Although a number of areas involving safety analysis are affected by fuel uranium weight, the areas of safety significance have their own limits which are reflected in the FSAR and Technical Specifications. Technical Specifications on power and power distribution control the fission rate and, hence, the rate of decay heat production. The composition of the fuel is closely monitored to assure acceptable fuel performance for such things as thermal conductivity, swelling, densification, etc. The important fuel parameters have been considered and are addressed in the following evaluation as pertaining to Westinghouse supplied components and services.

Seismic Effects on Fuel/Internals and New and Spent Fuel Storage Racks
The fuel rod uranium weight as stated in the Technical Specifications is not a direct input to the analyses of maximum seismic/LOCA fuel assembly dynamic response, seismic response of reactor vessel and internals, or seismic analyses of new and spent fuel storage racks.

Radiological Source Terms
Fission product generation is not sensitive to the mass of fuel involved but to the power level. As long as the power generated by the core is unaffected, there will be no significant impact on the radiological source terms.

Fuel Handling
Any postulated increase in the amount of uranium in the fuel rods would not have a significant impact on the fuel handling equipment. The spent fuel pit bridge and hoist is designed with a load limit of approximately twice the weight of a nominal fuel assembly. The manipulator crane is provided with two load sensors. One load sensor provides primary protection of the fuel assemblies from structural damage if an assembly were to "hang-up". A second load sensor provides backup protection against high lift force with a setpoint above that of the first load sensor. If the setpoints were unchanged despite a slight overall increase in uranium weight, the impact would be to decrease the potential for fuel damage since reducing the difference between the fuel assembly weight and the lift force limit reduces the amount of stress the fuel assembly structure would be exposed to if the assembly were to "hang-up". The manipulator crane margin to capacity limit far exceeds any potential increase in assembly weight due to increases in the fuel rod uranium weight.

LOCA Safety Analysis
Uranium mass has no impact on ECCS LOCA analyses. LOCA analyses are sensitive to parameters such as pellet diameter, pellet-clad gap, stack height shrinking factor and pellet density as they relate to pellet temperature and volumetric heat generation. Fuel mass is not used in ECCS LOCA analyses.

non-LOCA Safety Analysis
Individual fuel rod uranium weight, as reported in the Technical Specifications, is not explicitly modeled in any non-LOCA event. Total uranium present in the core is input into the transient analyses, but is generated using a methodology independent of the value presented in the Technical Specifications. Thus, any change in the number currently in the Technical Specifications does not impact the non-LOCA transient analyses.

Core Design
The mass of uranium is explicitly accounted for in the standard fuel rod design through appropriate modeling of the fuel pellet geometry and initial fuel density. Variations in uranium mass associated with allowable as-built variations but within the specification limits for the pellet dimensions and initial density are accounted for in the reactor core design analyses. The Technical Specification uranium mass value has no impact on margin to reactor core design criteria.

The conclusion of these evaluations is that there is no unreviewed safety question associated with operation of the unit(s) with a fuel rod weight in excess of that defined in Section 5.3.1 of the Technical Specifications.

ATTACHMENT B

PROPOSED AMENDMENT

PROPOSED AMENDMENT

REASON FOR CHANGE

Design Features Section 5.3.1, Fuel Assemblies, of the Technical Specifications, identifies a maximum total fuel rod weight of 2236 grams of uranium. Recent improvements to the fuel design, (including chamfered pellets with a reduced dish and a nominal density increase), have increased fuel weight slightly. The weight increases have caused the maximum fuel rod weight to exceed the specified maximum value of 2236 gram limit. This change will delete the specified maximum weight limit to allow the current fuel to be in compliance with the D. C. Cook Unit 1 Specifications (see the attached marked-up specification).

SAFETY/ENVIRONMENTAL EVALUATION

Summary of Change

The proposed change to Design Features Section 5.3.1 of the D. C. Cook Unit 1 Technical Specification deletes the maximum fuel rod weight limit of 2236 grams of uranium. The purpose of the change is to permit the use of assemblies with fuel rods over the weight limit and also to reflect the relative insensitivities of this technical specification parameter in the safety analysis. It is judged that this weight difference does not have a significant impact on the safety analyses. Other Technical Specifications cover more important fuel related parameters, therefore,deletion of the Design Features fuel rod weight limit is not significant to the safe operation of the plant.

Evaluation

The proposed change of Technical Specification Design Features Section 5.3.1 is given in Attachment D. This is the only reference to fuel rod uranium weight in the Technical Specifications. In addition, the FSAR identifies a nominal core total weight of UO-2 (in pounds) for the initial (Cycle 1) core.

Although a number of safety analyses are affected indirectly by fuel weight, the analyses are more sensitive to fuel configuration, length, enrichment and physical design which are also specified in the plant Technical Specifications. The Technical Specifications limit power and power distribution, thus controlling the fission rate and the rate of decay heat production. Fuel rod weight does not have any direct bearing on the power limits, power operating level, or decay heat rate. The composition of the fuel is closely monitored to assure acceptable fuel performance. The fuel weight changes that could be made without a Technical Specification limit are not of sufficient magnitude to cause a significant difference in fuel performance as analyzed by Westinghouse. There are no expected observable changes in normal operation due to the noted fuel rod weight changes, and the remaining fuel parameters listed in the Technical Specifications are considered in the Reload Safety Evaluation.

Other Design Basis Events were examined to assess the effects of possible changes in fuel rod weight. Fuel rod weight will only change as a result of a specific change in the physical design, which is addressed in the Reload Safety Evaluation, or within the manufacturing tolerances, in which case the changes in fuel rod weight are relatively insignificant. Changes in nuclear design resulting from fuel rod weight changes are controlled as discussed above. For these changes, the effect on new and spent fuel criticality and fuel handling analyses remain bounded by the existing analyses and Technical Specification Design Feature limits. Fuel-handling equipment and procedures are not affected by these weight changes. Seismic/LOCA analyses contain sufficient conservatism to bound these weight changes. Other accident analyses are not affected by rod weight as a direct parameter, and the existing analyses remain bounding.

Conclusion

In summary, the deletion of the maximum fuel rod weight limit in the Technical Specifications is proposed because the limit is not significant to the safe operation of the plant.

ATTACHMENT C

BASIS FOR NO SIGNIFICANT HAZARDS DETERMINATION

BASIS FOR NO SIGNIFICANT HAZARDS DETERMINATION

The proposed amendment discussed above shall be deemed to involve a significant hazards consideration if there is a positive finding in any of the following areas.

1. Will operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The deletion of the fuel rod uranium weight limit does not significantly increase the probability or consequences of previously evaluated accidents. The variation in fuel rod weight that can occur even without a Technical Specification limit is small based on other fuel design constraints, e.g., rod diameter, gap size, UO-2 density and active fuel length; all of which provide some limit on the variation in rod weight. The current safety analyses are not based directly on fuel rod weight, but rather on design parameters such as power, and fuel dimensions. These parameters are either (1) not affected at all by fuel rod weight, or (2) are only slightly affected. However, a review of design parameters which may be affected indicates that a change In fuel weight does not cause other design parameters to exceed the values assumed in the various safety analyses, or to cause acceptance criteria to be exceeded. The effects are not significant with respect to measured nuclear parameters (power, power distribution, nuclear coefficients), i.e., they remain within their Technical Specification limits. Thus, it is concluded that the Technical Specification modification does not involve a significant increase in the probability or consequences of a previously evaluated accident.

2. Will operation of the facility in accordance with this proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

The creation of a new, different kind of accident from any previously evaluated accident is not considered a possibility. All of the fuel contained in the fuel rod is similar to and designed to function similar to previous fuel. Thus, the existing new and spent fuel storage criticality analyses bound the changes observed. This change is considered as administrative in nature and does not create the possiblity of a new or different kind of accident.

3. Will operation of the facility in accordance with the proposed change involve a reduction in a margin of safety.

Response: No

The margin of safety is maintained by adherence to other fuel related Technical Specification limits and the FSAR design bases. The deletion of fuel rod weight limits in the Technical Specifications Design Features Section 5.3.1 does not directly affect any safety system or the safety limits, thus, not affecting the plant margin to safety.

ATTACHMENT D

MARKED-UP DESIGN FEATURE
FUEL ASSEMBLY SPECIFICATION

DESIGN PRESSURE AND TEMPERATURE

5.2.2 The reactor containment building is designed and shall be maintained in accordance with the original design provisions contained in Section 5.2.2 of the FSAR.

PENETRATIONS

5.2.3 Penetrations through the reactor containment building are designed and shall be maintained in accordance with the original design provisions contained in Section 5.4 of the FSAR with allowance for normal degradation pursuant to the applicable Surveillance Requirements.

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 193 fuel assemblies with each fuel assembly containing 204 fuel rods clad with Zircoloy -4. Each fuel rod shall have a nominal active fuel length of 144 inches. ~~and contain a maximum total weight of 222[illegible] grams uranium~~. The initial core loading shall have a maximum enrichment of 3.35 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment of 3.4 weight percent U-235.

CONTROL ROD ASSEMBLIES

5.3.2 The reactor core shall contain 53 full length and no part length control rod assemblies. The full length control rod assemblies shall contain a nominal 142 inches of absorber material. The nominal values of absorber material shall be 80 percent silver, 15 percent indium and 5 percent cadmium. All control rods shall be clad with stainless steel tubing.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

Attachment 4 to AEP:NRC:1016

Exxon Nuclear Company Letter
Dated October 15, 1986

OCT 2 0 1986

EXXON NUCLEAR COMPANY, INC.

600 108TH AVENUE NE. PO BOX 90777, BELLEVUE, WA 98009-0777
(206) 453-4300

October 15, 1986
ENC-AEP/0529

Indiana & Michigan Electric Company
c/o Richard B. Bennett
Engineer, Nuclear Materials & Fuel Management
American Electric Power Service Corp.
One Riverside Plaza, 20th Floor
Columbus, OH 43215

Dear Rich:

Re: Letter, R.B. Bennett (AEP) to H.G. Shaw (ENC), "Removal of Rod Weight Reference in Technical Specification 5.3.1," dated September 17, 1986 (AEP-ENC/0259)

In response to your request contained in the above reference, the proposed D.C. Cook Unit 2 Technical Specification change has been reviewed. Also reviewed was the documentation attached to the above reference detailing Westinghouse's generic evaluation for this Technical Specification change and its application to D.C. Cook Unit 1.

Exxon Nuclear concurs with the generic Westinghouse evaluation of the proposed removal of the maximum rod weight from Technical Specification 5.3.1. Review of the Exxon Nuclear analyses performed in support of D.C. Cook Unit 2 indicates that this maximum Technical Specification rod weight was not used in any of the calculations. Thus, its removal from the Technical Specification will not affect the results of any of the safety analyses performed by Exxon Nuclear.

If you have any questions regarding the above review, please feel free to contact our Mr. Jerry Holm, telephone 509-375-8142.

Very truly yours,

H. G. Shaw
Contract Administrator

pkc

c: M. P. Alexich
J. M. Cleveland
D. H. Malin
V. VanderBurg
J. S. Holm (ENC)