Westinghouse
Electric Corporation

Energy Systems

Nuclear Services Division

Box 355
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June 18, 1997
CAW-97-1125

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

Attention: Mr. David L. Meyer

Application for Withholding Proprietary
Information from Public Disclosure

SUBJECT: Westinghouse Owners Group Comments on Proposed NRC Bulletin 96-01 Supplement; Control Rod Insertion Problems Notice of Opportunity for Public Comment (62 Fed. Reg. 27629) (Proprietary)

Dear Mr. Meyer:

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-97-1125 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 the Westinghouse Owners Group.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-97-1125, and should be addressed to the undersigned.

Very truly yours,

N J Liparulo

N. J. Liparulo, Manager
Equipment Design and Regulatory Engineering

Enclosures

ttw

cc: Kevin Bohrer/NRC (12H5)

OG-97-061

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared Sadler D. Rupprecht, 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:

Sadler D. Rupprecht, Manager
Systems Analysis Engineering

Sworn to and subscribed
before me this 18th day
of June, 1997

Notary Public

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

(1) I am Manager, Systems Analysis Engineering, in the Nuclear Services 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 that which is appropriately marked in Westinghouse Owners Group Comments on Proposed NRC Bulletin 96-01 Supplement; Control Rod Insertion Problems Notice of Opportunity for Public Comment (62 Fed. Reg. 27629)," (Proprietary), June, 1997 on behalf of the Westinghouse Owners Group by the Westinghouse Electric Corporation, being transmitted by the Westinghouse Owners Group letter and Application for Withholding Proprietary Information from Public Disclosure, Mr. Thomas Green, Chairman, Westinghouse Owners Group to the Document Control Desk, Attention Mr. David L. Meyer. The proprietary information has been requested by the Nuclear Regulatory Commission and is being voluntarily provided by Westinghouse Owners Group for review relative to the incomplete RCCA insertion phenomenon.

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

(a) Provide documentation of the methods for evaluating the implementation of fuel assembly and RCCA tests and inspections.

(b) Establish applicable analytical technologies relative to inspections.

(c) Establish the procedures and guidelines for the examination of fuel assemblies and RCCAs.

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 this information 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 evaluation 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 the procedures, guidelines and analytical methods.

Further the deponent sayeth not.

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).

Westinghouse Owners Group
Comments on Proposed NRC Bulletin 96-01 Supplement
Westinghouse Non-Proprietary Class 3

The purpose of this document is to provide the Westinghouse Owners Group (WOG) comments, exceptions and recommendations regarding the Draft NRC Bulletin 96-01, Supplement 1: Control Rod Insertion Problems.

Executive Summary

Standard shutdown margin analyses bound the kinds of scenarios that could reasonably be postulated to occur based on insertion experiences and plant data. The current safety analysis remains valid and there is negligible safety impact for incomplete insertions that have occurred.

The actions described in the proposed Supplement will cause licensees to incur considerable costs with no commensurate improvement in overall plant safety. In fact, as described herein, the testing outlined in the proposed Supplement will increase risk, as defined by core damage frequency.

The NRC's justification for avoiding the requirements related to implementing backfits, based on the compliance exception to the backfit rule, is inadequate, does not meet regulatory requirements and can not be used to justify the proposed actions.

The actions recommended in the proposed Supplement are not consistent with the safety significance and the large economic impact.

A set of recommendations are made to obtain closure and maintain continued focus on this issue.

The WOG believes there is sufficient data and evaluations available to conclude the issuance of a Supplement to NRC Bulletin 96-01 is not warranted as published.

Introduction

From the issuance of Bulletin 96-01 WOG members and Westinghouse have performed extensive testing and analysis to determine the root cause for incomplete RCCA insertion which occurred in two domestic Westinghouse NSSS plants. As part of the root cause investigation, two skeletons of fuel assemblies that experienced Incomplete RCCA Insertion (IRI) from the Wolf Creek plant were sent to a hot cell and extensive post irradiation examinations performed. A Westinghouse report (WCAP-14782) was issued detailing the results from the various testing and analyses performed to arrive at the root cause. The incomplete rod insertion observed at Wolf Creek was caused by excessive compressive loads on the fuel assembly guide thimble tube. The increased compressive loads were caused by unusual fuel assembly growth due to oxide accumulation and accelerated growth, both of which are a function of local temperature. Westinghouse has responded to numerous NRC questions on the WCAP and at various meetings with the NRC. This information forms the basis for the WOG's position and many of the comments presented below.

Safety Assessment

The major safety concern of an incomplete rod insertion is the loss of shutdown margin. For typical plant operation (base load at nominal conditions with rods nearly fully withdrawn), the standard shutdown margin methodology represents ~1500 pcm conservatism. The explicit number of conservatisms considered are:

1. Single worst stuck rod chosen to minimize N-1 rod worth(worth~500-1000pcm)
2. Calculated rod worth reduced by uncertainty (worth up to 600pcm)
3. Control rods assumed to operate at rod insertion limits(worth ~300-500pcm)
4. Core moderator temperature assumed above nominal (worth ~120 pcm)
5. Burnup shadowing and adverse xenon shapes are generally assumed in calculations of power defects (worth >200pcm)

In addition to these methodology conservatisms, many plants have significant additional excess shutdown margin from extra RCCAs worth that is over and above the minimum needed to satisfy the shutdown margin requirement(SDM). The specific amount of excess SDM depends on the plant's RCCA pattern, the cycle-specific loading pattern, and the burnup point in the cycle.

The amount of uninserted worth involved in postulated trip scenarios is small relative to the design basis assumptions of a worst stuck rod. For example, based on EOC 8 conditions, the actual uninserted worth of the Wolf Creek trip scenario was negligible, less than 1pcm, compared to the design basis worst rod assumption alone of ~800pcm. The conservatisms in the design basis shutdown margin are sufficient to bound the kinds of postulated trip scenarios based on all known incomplete insertion experiences and for scenarios where many more RCCAs stick. For example, for Wolf Creek, if the five RCCAs that stuck were assumed to all stick at the top of the dashpot, the uninserted worth would be ~2pcm which is much less than the design basis methodology worst stuck rod of >800 pcm.

The standard shutdown margin analyses performed for the Reload Safety Evaluation will bound the kinds of scenarios that could reasonably be postulated to occur based on incomplete insertion experiences. Consequently, the current safety analysis remains valid and there is no safety significance for IRIs that have occurred.

Results from Testing and Analysis

As stated above, a significant amount of testing and monitoring has been conducted by WOG member utilities and Westinghouse in response to Bulletin 96-01. Figure 1 provides a summary of recent RCCA rod drop tests in WOG member plants utilizing 12 ft. and 14 ft. fuel with burnups ranging up to 54,900MWD/MTU fuel assembly average. These results are from rod drop tests at 32 different plants having a total of 2766 RCCA insertions. Figure 2a to 2e contain the drag data from 23 different plants for a variety of different fuel designs: 14x14OFA,15x15OFA,17x17XL,17x17IFM, 17x17non-IFM, for a total of 1390 fuel assemblies tested. This huge experience base from hundreds of rodded fuel assemblies demonstrate the validity of the Wolf Creek root cause and the highly unusual nature of this experience.

There are a number of observations to be made from the data obtained and from understanding gained by analysis:

1. Although burnup is used as the variable for defining performance, fast fluence is the key parameter in understanding irradiation impact on materials. For different fuel rod diameter and water lattice, the relationship between burnup and fluence changes. The NRC states ".. incomplete insertion has not occurred below certain burnup levels," which for Wolf Creek was ~49,000MWD/MTU for 17x17 V5H fuel. However, for fuel which has smaller fuel rod diameter (OFA and V5), the same fluence produces an equivalent burnup level which is higher. Therefore the burnup for 17x17 OFA/V5 fuel is~52,000MWD/MTU to give the same fluence as the Wolf Creek fuel assembly burnup of ~49,000MWD/MTU. In establishing burnup limits, the correct burnup limit for the equivalent fluence

should be used otherwise plants with small fuel rods are further penalized without technical justification.

2. The NRC states "IFMs would appear to be stiffer and less susceptible to distortion ... Furthermore, since the mid-span would be strengthened, the top and bottom spans might be the most susceptible portions of the fuel assembly and distortion of the top span could lead to control rods sticking very high in the core." Upper guide thimble tube drag data for fuel assemblies with IFMs is shown in Figure 3 for six different plants with burnups in excess of 50,000MWD/MTU. This drag data does not support the NRC contention that the top spans might be the most susceptible portion of the fuel assembly and thereby lead to control rod sticking very high in the core. Drag data above the dashpot is consistently low and well below any threshold for concern, even for fuel at 50,000MWD/MTU burnup. More details regarding IFM impact on IRI was presented in WCAP-14782, pages 83 and 84, and a separate WOG report was submitted to the NRC on IFMs, NSD-NRC-97-944. Both of these reports clearly justify the ability for IFM fuel design to achieve full insertion at burnups well in excess of the proposed NRC limit and drags in the upper region of the guide thimble are small.

3. On page 7 of the Supplement, the statement is made about the hafnium control rod ... "However, subsequent inspection of hafnium rod did not indicate any adverse dimensional change". This statement is incorrect. The hafnium RCCA R27 from fuel assembly H-16 was inspected and was bulged. Ag-In-Cd RCCAs were also inspected and showed no evidence of tip swelling, bulging or cracking as evidenced in hafnium rods. The root cause for the hafnium rod pausing at 96 steps and sticking at the 90 steps was due to swelling and the reduced temperature of the tests. WOG members with hafnium control rods have been notified by Westinghouse that hafnium control rods should not be used in fuel with high burnup and none are in use or is use contemplated. The fact that the tests were conducted at reduced temperature and included bulged hafnium control rods makes the results not applicable for setting limits.

4. The proposed Supplement states ... "there were other disturbing results. The drag measurements resulted in dashpot drag above the criteria ... " The use of the term "criteria" is believed to be the Westinghouse F-specification. The F-spec intent is to provide guidance to the field personnel to aid in the final installation of the vessel head. The F-spec values were used as a convenient screening tool to separate complete from incomplete insertion indications for 12 ft. fuel. The "criteria" were never intentionally developed as indicators of whether or not full rod insertion could be obtained. The F-spec values are merely values that were being used for another purpose that have coincidentally had some use in screening assemblies for which there is absolutely no concern from those which need closer consideration. Just because there are some assemblies that can't be easily dismissed as "no problem" doesn't mean that there is a problem. In practice, drags have had to exceed the screening values on both sections of the guide tube before full rod insertion may not occur. There are fuel assemblies which exceeded the F-spec and had successful insertion. Applying the F-spec guideline separately and implying that an insertion criteria is not met is an incorrect application of this screening tool.

5. The burnup limits in the proposed Supplement are inappropriately conservative for 12ft fuel for which there are a number of different designs. If the NRC continues the use of burnup limits as opposed to the Predictive Methodology described below, acceptable burnup values can be obtained using measured data and comparing against a susceptibility criteria. A susceptibility criteria has been derived from the measured drag data as a function of position in terms of a parameter called drag work. The drag work integrates the drag at a level with the impact it has on the RCCA rodlets. Therefore drag work accounts not only for the magnitude of drag at a particular location but also the distance over which

that (ng acts on the RCCA rodlet. This criteria was presented at a meeting with the NRC on April 17,1: 7.

Figure 4 shows the measured drag work for 12ft fuel for 19 different plants with a susceptibility criteria of [ ]$^{a-c}$ which bounds with margin the Wolf Creek fuel assemblies that did not completely insert. The criteria can also be employed for different fuel designs as shown in Figures 5a to 5c. From this measured information the following burnup values are conservative values to be used if the Supplement continues to use burnup limits:

Assembly Design		Burnup Values (MWD/MTU)
14x14	OFA	54,900
15x15	OFA	52,500*
17x17	IFM	58,000**
17x17	non-IFM	43,300

* Bounds 15x15 IFM fuel.
** 95/95 value greater than 58,000 which is consistent with licensed lead rod burnup.

These burnup values were generated from the data in Figure 5 using a 95/95 methodology where the fluence intersects the susceptibility criteria. There are three sources of conservatism in these burnup values: the lower bound susceptibility value was used, all data for a particular design was included which therefore incorporates the maximum drags for a given design and use of the 95/95 methodology on the drag work data.

Predictive Methodology

A significant effort in 1996 and 1997 has been on going by Westinghouse to develop a mechanical model to better understand the first order parameters which influence incomplete rod insertion. The large amount of data accumulated from different plants on many different fuel designs and the information learned from the hot cell work provided ample insight for the model development. With a fundamental understanding of the key parameters and the field data, a mechanical model has been developed which assesses the potential for incomplete rod insertion on a global basis as a function of operating and fuel design parameters, such as, power history, core temperature, specific fuel features, cycle length, etc.

The mechanical model has been described to the NRC at a number of meetings. Various sensitivity studies and responses to specific questions have been provided to the NRC to clarify the impact of different parameters such as operating temperature, holddown spring force, etc.

It is the application of this model, along with a susceptibility criteria derived from measured drag data from many plants, which will be used in a predictive methodology as one input to determine the acceptability of currently operating fuel. The following process is proposed as a means to manage the operating fuel:

- For burnup less than proposed NRC guideline - no action required, no testing required

- For burnup in excess of the proposed NRC guideline - use the Westinghouse model to determine susceptibility limit

- For burnup greater than proposed NRC guideline and less than Westinghouse model susceptibility limit - perform EOC testing

- For burnup greater than both guidelines - perform safety evaluation and testing, as appropriate.

This predictive methodology can be supplemented by the use of actual measured data (drag and rod drop times) as a function of burnup for different classes of fuel assemblies to further determine acceptability of currently operating fuel without additional testing. However, WOG members are willing to collect additional high burnup data to provide more information for model extension.

This process does not set arbitrary burnup limits as recommended in the Supplement but instead makes use of drag data from hundreds of tests accumulated for different fuel to arrive at a physical basis to determine acceptable insertion behavior. By this means different fuel features can be represented instead of a broad brush approach which gives no credit for either fuel aspects that mitigate incomplete insertion or operational aspects. This process also is not solely dependent on prior performance to predict future performance but rather addresses potentially significant differences in fuel design and/or other factors such as cycle length and fuel management through application of a mechanical model where all factors influencing fuel assembly distortion are interactively combined.

Risk Assessment

A significant issue neglected by the Supplement in its draft form is the risk associated with bringing the plant to the required operating state to perform the test. Since the test will be performed at hot zero power, the operators will need to reduce power and transfer the feedwater flow from the main feedwater system to the emergency or auxiliary feedwater system. Following the test, the operators will need to increase power and switch feedwater flow back to the main system. These operations increase the probability of causing a reactor trip, which increases the plant risk. Per the information presented in WCAP-14333-P, the probability of a reactor trip during a controlled plant shutdown and plant startup are 0.068 and 0.088 for a typical plant based on a PSA model. This results in a risk, measured by core damage frequency (CDF), of 4.7x10-07 per rod drop test. This represents an increase to CDF of approximately 1% for each rod drop test. Some plants may have to perform from 3 to 9 rod drop tests per cycle per the NRC guidelines, thereby increasing risk (CDF) by 3 to 9%. This increase in risk does not justify the proposed frequent rod drop testing.

Core Design and Operational Impact

The testing burden imposed by the conservative burnup limits proposed in the Supplement could be alleviated by designing core loading patterns with lower burnup fuel under control rods. However, these core designs would result in high reactivity fuel being constrained to control rod locations. This results in a loss of safety/operational margin for a variety of parameters depending on plant specific situations. Typical parameters affected would be power peaking, rod ejection, vessel fluence and moderator temperature coefficient. This reduction in margin is inconsistent with the recent INPO and NRC concerns on erosion of operating margin.

There are also operational impacts for performing rod drop tests near end of cycle which are reflected in reactivity management control challenges, such as xenon and boron control. The industry is being told by NRC and INPO to avoid such conditions and the proposed Supplement is doing the opposite.

In addition, the near EOC shutdowns will take time to dilute the system and cause unnecessary water processing, waste processing, and radiation exposure.

Economic Impact

By applying the Supplement's burnup guidelines, there will be between 62 to 68 rod drop tests performed in the remainder of 1997 for plants with Westinghouse fuel. From current experience, it will take between one and a half to two and a half days to perform each rod drop test. Using a range of cost for replacement power from $450,000 to $1,500,000 per rod drop test gives a total cost of $27,900,000 to $101,000,000 for the remainder of 1997. For 1998, the annual cost will range from $23,400,000 to $78,000,000. Not included in these costs are cost associated with site activities such as water reprocessing along with added radiation exposure for some plants.

The major driving force for the significant cost is the requirement for testing every 2500MWD/MTU after exceeding the NRC burnup limits. A key question is, what is the basis for the 2500MWD/MTU window? It appears the NRC believes the 2500MWD/MTU was the recommendation from the Westinghouse Owners Group (WOG). This is not the case.

During the discussions with the WOG in 1996, the NRC required rod drop testing be performed during all outages of "sufficient duration." The WOG proposed that if two outages of "sufficient duration" were less than 2500MWD/MTU apart and if rod drop testing had been performed during the first outage, then a second test would not be required. The NRC agreed with this position. The intent was never to force outages specifically for rod drop testing at intervals of 2500MWD/MTU.

As stated previously, the mechanical model can be used to establish burnup values below which no testing is required during the cycle. This model can also be used to determine the burnup interval, based on approaching the susceptibility criteria, if testing is required.

Backfit Rule Considerations

In as much as the facts surrounding the incidence of incomplete rod insertion events support the premise that this situation represents a negligible safety impact for operating plants, the requirements being proposed constitute a backfit and the backfit rule of 10CFR50.109 is applicable. However, the justification set forth by the NRC in the Supplement for avoiding the requirements related to implementing backfits based on the compliance exception to the backfit rule is inadequate, not in accord with NRC regulations and can not be used to justify the NRC's proposed actions.

The contention by the NRC that the "backfits" described in the proposed Supplement are justified under the compliance exception of the backfit rule under 10 CFR 109 is invalid. Information provided to the NRC during numerous meetings held on the subject of incomplete rod insertion demonstrate that both rod drop times, as required by plant Technical Specifications, and shutdown margins, have been maintained. In addition, the extensive testing and analysis performed by WOG members and Westinghouse has shown that no plant has violated existing shutdown margins required by current licensing basis. As such, operating plants continue to function within their licensing bases. Therefore the NRC has failed to show any non-compliance to justify avoidance of the backfit rule based on compliance exception.

There is also no justification to support a conclusion that the proposed requirements are necessary to ensure adequate protection to the health and safety of the public. The NRC claims that the actions proposed in the

Supplement are required to "ensure continued operability of the control rods" and "ensure that adequate shutdown margin is maintained and that control rods will satisfactorily perform their intended function of effectively terminating the fission process during operating conditions in accordance with the current licensing basis for each facility". However, no facility's licensing basis, either Technical Specification or shutdown margin, has been violated. Moreover, the regulatory guidance for control rods in General Design Criteria 26,10CFR Part 50, Appendix A, specifically contemplates "appropriate margin for malfunctions such as stuck rods" when it requires that licensees show that their reactivity control system using rods is capable of performing its intended function. Given compliance to licensing basis requirements as currently imposed by the NRC and the fact that the NRC's own regulatory guidance already requires that licensees consider malfunction such as stuck rods to satisfy the requirements of GDC 26, there is no need for the additional proposed requirements to ensure the adequate protection to the public health and safety. The proposed Supplement therefore also is not called for under this exception to the backfit rule.

The actions described in the proposed Supplement will cause licensees to incur considerable costs with no commensurate improvement in overall plant safety. In fact, as described herein, the testing outlined in the proposed Supplement will increase risk, as defined by core damage frequency. In light of these clear costs and safety impacts and the fact that backfit exceptions are not applicable, the NRC can not ignore its backfit rule requirements and issue the Supplement.

Summary

In conclusion , the WOG provides the following summary:

1. Standard shutdown margin analyses bound the kinds of scenarios that could reasonably be postulated to occur based on insertion experiences. The current safety analysis remains valid and there is negligible safety impact for incomplete insertions that have occurred.

2. There is no event at operating conditions where the rods have stuck high in the core.

3. There is an increase in risk, defined in terms of core damage frequency, for the large number of rod drop tests proposed in the Supplement.

4. There is a significant economic impact on utilities to perform rod drop testing.

5. The Backfit Rule applies because of the negligible safety significance.

6. A predictive methodology based on measured data can be used as a tool to assess susceptibility to incomplete rod insertion.

Recommendations

1. The proposed Supplement is recommended to have a time frame of no more than 1year during which time testing would be continued at EOC to obtain additional high burnup data.

2. The WOG would provide a report to the NRC documenting the assessment of the additional data and further assessment by the mechanical model.

3. The NRC must perform a detailed cost/safety benefit analysis before requesting the testing described in the proposed Supplement.

4. There are a number of statements in the proposed Supplement which should be deleted or modified as identified in items 2, 3, and 4 of section Results from Testing and Analysis.

5. If the Supplement is issued, then the WOG recommends the following threshold values for burnup be adopted:

Assembly Design		Burnup Values (MWD/MTU)
14x14	OFA	54,900
15x15	OFA	52,500
15x15	IFM	52,500
17x17	IFM	58,000
17x17	non-IFM	43,300
17x17	XL-Std	30,000
	-V5H	25,000

6. If the Supplement is issued, then the WOG recommends that the utilities have at least 90 days to provide the results of any tests required by the Supplement.

Figure 1: RCCA Rod Drop Tests

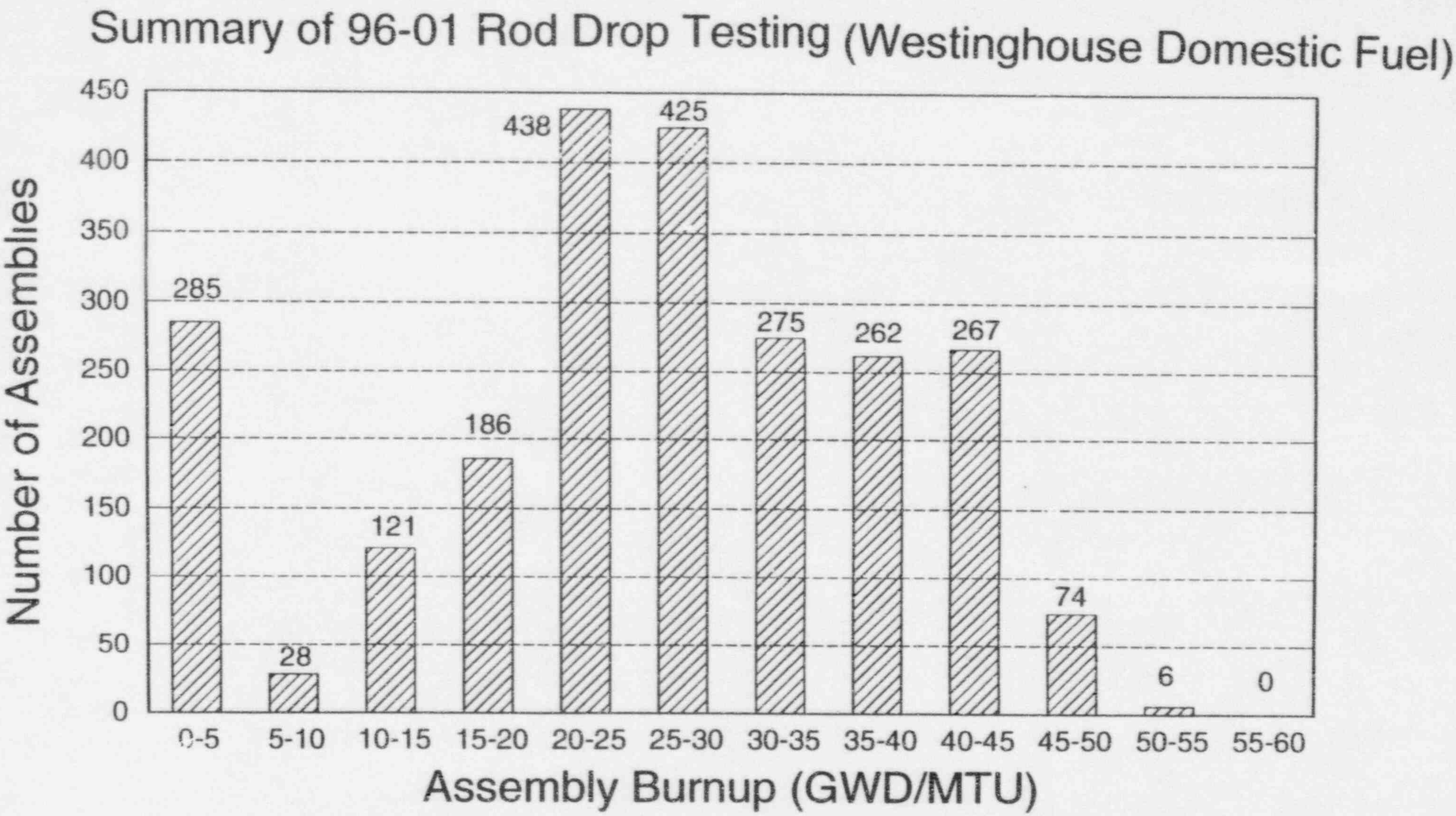

Fig. 2a - Combined Drag vs. Burnup For 14x14 OFA Fuel

a,b,c

Drag (lbs.)

Burnup (MWD/MTU)

Fig. 2b - Combined Drag vs. Burnup For 15x15 OFA Fuel

a,b,c

Drag (lbs.)

Burnup (MWD/MTU)

Fig. 2c - Combined Drag vs. Burnup For 17XL Fuel

a,b,c

Drag (lbs.)

Burnup (MWD/MTU)

Fig. 2d - Combined Drag vs. Burnup For 17x17 IFM Fuel

a,b,c

Drag (lbs.)

Burnup (MWD/MTU)

Fig. 2e - Combined Drag vs. Burnup For 17x17 Non-IFM Fuel

a,b,c

Drag (lbs.)

Burnup (MWD/MTU)

Figure 3: Upper Thimble Drag vs Burnup for IFM Fuel

a,b,c

Drag (lbs.)

Burnup (MWD/MTU)

Figure 4: **Measured Drag Work for RCCAs**

a,b,c

Measured Work (Inch-Pounds)

Plant

Figure 5a

IRI Fuel Category Study - 14 OFA

a,b,c

Drag-Work (inch-pounds)

Fast Fluence (1E21 nvt)

Figure 5b

IRI Fuel Category Study - 15OFA

a,b,c

Drag-Work (inch-pounds)

Fast Fluence (1E21 nvt)

Figure 5c

IRI Fuel Category Study - 17 w IFMs

a,b,c

Drag-Work (inch-pounds)

Fast Fluence (1E21 nvt)