0509
M. Chatterton
T. Shopaker
W. Burton

Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, Virginia 23060

62 FR 26729
May 20, 1997
(13)

June 18, 1997

VIRGINIA POWER

Chief, Rules Review and Directives Branch
U. S. Nuclear Regulatory Commission
Mail Stop T-6D-69
Washington, D. C. 20555-0001

Serial No. GL97-059

Gentlemen:

COMMENTS ON THE PROPOSED NUCLEAR REGULATORY COMMISSION BULLETIN 96-01 SUPPLEMENT 1; CONTROL ROD INSERTION PROBLEMS

On May 20, 1997, the NRC requested comments on the proposed supplement to Bulletin 96-01 that would request licensees to take action to ensure the continued operability of the control rods.

We have completed the review of the proposed supplement and comments are provided in the attachment. Virginia Power believes that performing control rod testing at 35,000 MWD/MTU with a 2500 MWD/MTU interval is overly restrictive, not technically justified, and will have a significant operational impact. It is our conclusion that performing rod drop time tests during outages of sufficient duration when rodded assembly burnup has exceeded 35,000 MWD/MTU in addition to a technical quantitative analysis for rodded assemblies which exceed 45,000 MWD/MTU is sufficient to demonstrate that the control rods will fully insert and that adequate shutdown margin is maintained.

We appreciate the opportunity to provide comments on the proposed supplement to NRC Bulletin 96-01. Should you have any additional questions, please feel free to contact us.

Sincerely,

M. R. Kansler - Vice President
Nuclear Operations

Attachment

IDSR-11A

250004

I&E

ATTACHMENT

VIRGINIA POWER COMMENTS ON PROPOSED GENERIC COMMUNICATIONS SUPPLEMENT TO BULLETIN 96-01, "CONTROL ROD INSERTION PROBLEMS"

Serial No.: GL97-059

1) Control rod handling problems encountered at North Anna were discussed in the **Description of Circumstances** section. The manner in which this discussion is presented is misleading. The two Vantage 5H fuel assemblies that exhibited problems in the North Anna spent fuel pool had operated with control rods during their last cycle of operation. There were no control rod insertion problems associated with these two affected assemblies during the cycle. Also, during the subsequent refueling outage in September 1994 when the affected assemblies were discharged, the control rods that had resided in them were removed without incident using the control rod handling tool. Prior to the handling difficulty that occurred in February 1996, the affected assemblies resided in the spent fuel pool for approximately 15 months before the new control rods were temporarily inserted in them in December 1995. The new control rods fully inserted. It wasn't until two months afterward in February 1996 that difficulty was experienced in removing the control rods. A Virginia Power evaluation concluded that the drag forces experienced in these two fuel assemblies would not be sufficient to prevent a control rod from fully inserting during reactor operation.

Therefore, Virginia Power requests that either the discussion of these two North Anna fuel assemblies be eliminated from the proposed generic communication or that additional relevant facts regarding these two fuel assemblies be added. Facts to be included are: a) the two fuel assemblies had operated in rodded core locations prior to being discharged, b) there were no incomplete control rod insertion events associated with these two fuel assemblies while they operated in the core, c) there was no difficulty in removing the control rods from these assemblies during the subsequent refueling outage, and d) difficulty in handling control rods in the two affected assemblies did not occur until approximately 17 months after the fuel assemblies were discharged.

2) The control rod test criteria mentioned in the **Discussion** section presumably refers to the use of the Westinghouse F-Specification criteria for control rod drag force in fuel assemblies. It must be recognized that there is no linkage between the F-Specification drag force criteria and the inability for control rods to fully insert. There have been many occurrences where control rods have fully inserted even though the F-Specification criteria has been exceeded. Simply because some fuel assemblies have drag forces which exceed the F-Specification criteria does not mean that there is a problem with insertion. Therefore, using the F-Specification drag force criteria as a "go - no go" test for control rod insertion is not valid.

3) The **Requested Actions** section requests all licensees of Westinghouse and Babcock & Wilcox designed plants to verify the full insertion and rod drop times by testing control rods in fuel assemblies with burnups greater than:
35,000 MWD/MTU for assemblies without IFMs for 12 foot cores,
40,000 MWD/MTU for assemblies with IFMs for 12 foot cores, and
25,000 MWD/MTU for assemblies in 14 foot cores
The tests are requested to be conducted upon first reaching the limit(s) and approximately every 2500 MWD/MTU thereafter until the end of the cycle.

There is no technical basis for the amount of conservatism in the requested testing requirements for 12-foot cores. Data from domestic Westinghouse plants presented to the NRC staff clearly establishes that there has been no incomplete insertion event in 12-foot fuel assemblies having burnups as high as 47,000 MWD/MTU (and greater), with or without IFMs. In fact, the lowest assembly burnup in the Wolf Creek assemblies that experienced incomplete control rod insertion was approximately 49,000 MWD/MTU (this is the approximate actual burnup which has been adjusted from the previously reported estimated minimum

burnup of 47,600 MWD/MTU). Virginia Power plants have never experienced an incomplete insertion event. Although not typical, Virginia Power has operated with rodded assemblies having burnup of approximately 55,000 MWD/MTU (as reported in WCAP-14782) without any insertion problems noted.

It is recognized that there have been several occurrences throughout the industry of higher than normal drag forces measured in some 12-foot fuel assemblies having burnups less than 40,000 MWD/MTU. It is further recognized that excessive drag force could eventually contribute to an incomplete insertion event. However, there is no basis which suggests that higher than normal drag force is a precursor to incomplete insertion. This is evidenced by the fact that there have been no incomplete insertion events associated with assemblies having somewhat higher than normal drag forces at burnups less than 40,000 MWD/MTU. It has been observed in 12-foot cores that both the upper guide tube drag force and the dashpot drag force criteria of the F-Specification must both be exceeded in order for the fuel assembly to be considered susceptible to incomplete insertions. There has been no incomplete insertion event in any 12-foot fuel assembly with slightly higher than normal drag force.

There is no technical basis for repeating the tests every 2500 MWD/MTU. Bulletin 96-01 requested that control rod drop time tests be performed during outages of sufficient duration. During discussions with the NRC staff in 1996, the industry suggested that control rod drop time tests would not need to be repeated during an outage of sufficient duration if 2500 MWD//MTU had not elapsed since the previous control rod drop time tests were performed. The interval was never intended to specify a requirement for forced outages specifically to perform rod drop testing. Therefore, Virginia Power believes that performing control rod tests

in rodded assemblies beginning at 35,000 MWD/MTU with a 2500 MWD/MTU test interval is overly restrictive and has no significant safety benefit.

End-of-cycle control rod drag tests were performed at North Anna Unit 1 in May 1997. All the rodded assemblies from the Cycle 12 core were fabricated with ZIRLO™ guide tubes and cladding. The preliminary test results indicate that all of the ZIRLO™ assemblies had drag forces well within the F-Specification limits with burnups ranging up to 45,000 MWD/MTU [This was the maximum achieved burnup in rodded fuel assemblies in Cycle 12].

Therefore, Virginia Power strongly encourages the NRC eliminate the extreme conservatism for control rod testing for licensees with 12-foot cores as presented in the proposed generic communication and consider modifying the testing requirements to a program similar to the original Bulletin [i.e. testing during outages of sufficient duration]. A program which would continue to verify successful control rod performance, and permit licensees of plants with 12-foot cores to acquire control rod performance data in a more reasonable manner is suggested as follows:

a) Perform rod drop timing tests during an outage of sufficient duration when rodded assembly burnup exceeds 35,000 MWD/MTU or during an outage where anomalous control rod indication position is observed during reactor shutdown, regardless of rodded assembly burnup.

Rationale: *Licensees will obtain control rod performance data during outages when rodded assembly burnup exceeds 35,000 MWD/MTU or whenever anomalous or unusual rod position indication data are*

observed during any reactor shutdown. However, based on the results of item (b) below, the licensee would not be required to have a forced outage specifically for testing control rods.

b) If rodded fuel assembly burnup is expected to exceed 45,000 MWD/MTU, then perform a quantitative engineering analysis to demonstrate that the control rods will not be susceptible to incomplete insertion up to their anticipated cycle burnup. If a quantitative engineering analysis determines that one or more control rods are susceptible to incomplete insertion, then either demonstrate that sufficient shutdown margin is maintained by assuming the affected control rods fail to fully insert **or** demonstrate the continued operability of the control rods by verifying that the control rods fully insert and the control rod drop times are within Technical Specifications limits when the affected fuel assemblies reach the approximate burnup at which susceptibility to incomplete insertion begins. If control rod testing is performed, then determine an appropriate interval for retesting.

Rationale: *Significant testing has been performed in response to Bulletin 96-01, and there have been no incomplete control rod insertion events in domestic 12-foot plants with fuel assembly burnup less than 45,000 MWD/MTU. A quantitative engineering analysis, as opposed to a qualitative discussion of control rod performance data, would be necessary to demonstrate that the control rods will fully insert, and the drop time will be within their prescribed Technical Specifications time limits when rodded fuel assembly burnup exceeds 45,000 MWD/MTU. The proposed generic communication suggests a "rigorous" engineering analysis, but it is not clear what is intended by*

the use of the word "rigorous". Verification of shutdown margin will ensure that sufficient subcritical margin is maintained and prescribed safety limits will be met in the unlikely event of an incomplete insertion.

c) At the end of a cycle, perform control rod drop time tests and conduct control rod drag tests of rodded fuel assemblies.

Rationale: Control rod drop time tests at the end of the cycle will ensure that control rod drop times have been within their prescribed limits throughout the cycle. Drag test data will continue to be collected to support various analytical models and help provide a continued understanding to control rod drop performance.

d) This program would continue through calendar year 1998 and would be subject to continuation if there continues to be concerns regarding excessive drag force or the ability to adequately model a fuel assembly's susceptibility to incomplete insertion.

Rationale: This brings closure to the Bulletin but allows the NRC to continue the program if further evaluation of data and methods is warranted. There is no closure discussed in the draft generic communication.

ATTACHMENT

VIRGINIA POWER COMMENTS ON PROPOSED GENERIC COMMUNICATIONS SUPPLEMENT TO BULLETIN 96-01, "CONTROL ROD INSERTION PROBLEMS"

Serial No.: GL97-059

Conclusion

Virginia Power considers the testing requirements for plants with 12-foot cores as written in the proposed generic communication to be excessively conservative and promotes no significant safety benefit. The cost in bringing a unit to hot shutdown conditions to perform the initial mid-cycle test and repeating the tests at an interval of 2500 MWD/MTU would range from $2 million to $3 million per unit per cycle (in replacement power costs alone) assuming a one day outage per test. This would represent a cost of approximately $5.33 million to $8 million dollars annually to Virginia Power's customers. In addition to this cost, there is potential for additional equipment maintenance as a result of the frequent shutdown/startup cycles.

Virginia power has taken a very proactive position regarding the incomplete control rod insertion issue. Testing was performed at both North Anna and Surry beyond what was committed to in Virginia Power's response to Bulletin 96-01. Virginia Power has continued to perform end-of-cycle control rod performance tests even after the requirements of Bulletin 96-01 have expired and plans for additional in-pool tests later in 1997 at North Anna are currently being arranged with our fuel vendor.

Outlined in this letter is an alternative program which will ensure that control rods fully insert within their prescribed Technical Specifications limits and will further ensure that the required subcritical margin will exist in the unlikely event that a control rod fails to fully insert. Virginia Power urges the NRC to consider the type of program outlined here as the benefits of continued testing and data collection will continue without the severe operational impact imposed by the proposed generic communication.