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SUBJECT: Comment on draft NRC Bulletin 96-01,suppl 1 re control rod insertion problems.

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AEP:NRC:1249D

Docket Nos.: 50-315
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Chief, Rules Review and
Directives Branch
U. S. Nuclear Regulatory Commission
Mail Stop T-6D-69
Washington, D.C. 20555-0001

Gentlemen:

Donald C. Cook Nuclear Plant Units 1 and 2
LICENSE NOS. DPR-58 AND DPR-74
COMMENTS REGARDING PROPOSED NRC BULLETIN 96-01, SUPPLEMENT 1

The purpose of this letter is to provide comments and recommendations regarding draft NRC bulletin 96-01, supplement 1, control rod insertion problems. It is believed conclusive data has been provided NRC by the industry to preclude issuance of a proposed supplement to bulletin 96-01.

SAFETY ASSESSMENT

The major safety concern of incomplete rod insertion (IRI) is the loss of shutdown margin. The draft supplement states that, once assembly burnups in rodded locations exceed "some burnup level", the potential exists for IRI. In the draft supplement, the staff contends the vast experience compiled by the nation's reactors is not sufficient to demonstrate that control rods in high burnup locations "assure an extremely high probability of accomplishing their safety function." We contend, to the contrary, industry experience sufficiently demonstrates that control rods assure an extremely high probability of accomplishing their safety function. In response to bulletin 96-01, data has been provided in letters AEP:NRC:1249, dated April 8, 1996, and AEP:NRC:1249B, dated November 11, 1996, regarding the behavior of the control rods in high burnup locations for units 1 and 2. These data demonstrated that the control rods were capable of performing their safety function.

If the limits proposed in the draft supplement or other limits are imposed, cycle specific calculations will be required to show that control rods in high burnup locations can be assumed to stick at some point low in the core while maintaining sufficient shutdown margin. It is requested the staff include in the supplement a technically defensible method of calculating this shutdown margin (e.g., steps withdrawn, low in the core, at which control rods should be assumed to stick, and also the fraction of high burnup control rods that should be assumed to stick).

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A significant issue neglected in the supplement is the risk associated with placing the plant in a condition that is required to perform the requested rod drop tests. Inherently, a risk is associated with changing plant modes. Had sufficient time been allowed for a response, as requested in letter AEP:NRC:1249C, dated June 10, 1997, a plant specific transition calculation, based on probabilistic risk assessment (PRA), could have been performed to determine a core damage frequency (CDF) associated with this test. According to 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. This results in a risk, measured by CDF, of 4.7×10^{-7} per year per rod drop test.

Although burnup is used as the variable for defining the point at which IRI may occur, fast fluence is the key parameter in understanding irradiation impact on materials, specifically the guide thimble. The exact relationship between fast fluence in the guide thimble and assembly burnup is significantly different for 17x17, 16x16, 15x15, and 14x14 assemblies. It is requested the staff further review the data presented by the industry to determine appropriate burnup limits for 17x17, 16x16, 15x15, and 14x14 assemblies, independently.

It should be noted there is a significant difference in the phenomena that has created IRI in 12' and 14' cores. The root cause for the Wolf Creek (12' core) IRI was increased compressive load caused by greater than expected fuel assembly growth. The root cause for the IRI at South Texas Project (14' core) was excessive fuel assembly guide tube distortion in the dashpot. The reason for this distortion is inadequate resistance to buckling in the fuel assembly under required loads and burnup. This guide tube distortion for 14' cores has been seen at much lower burnups than the point at which increased compressive loads may increase the risk for IRI in 12' cores. As such, the burnup limits should be increased significantly for 12' fuel as compared to 14' fuel.

Testing has shown that most high drag occurs in high-temperature plants (T_{out}>610°F). This should warrant different limits for high- and low-temperature plants. Previous presentations made by the NRC staff indicated that such different limits would be imposed.

CORE DESIGN AND OPERATIONAL IMPACT

The testing burden imposed by the highly conservative burnup limits presented in the draft supplement could be alleviated by designing core loading patterns with lower burnup fuel in rodded locations. However, these core designs would result in high reactivity fuel being constrained to rodded locations. This results in a loss of safety/operational margin for a variety of parameters. Typical parameters affected would include power peaking, rod ejection, vessel fluence, and moderator temperature coefficient. This reduction in margin is inconsistent with recent 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 concerns, such as xenon and boron control. Implications are that NRC wishes plants to avoid such conditions. The near end of cycle shutdowns will take time to de-borate the system and cause unnecessary additional water processing and waste.

ECONOMIC IMPACT

By applying the draft supplement's guidelines, which have been significantly revised from those in previous NRC presentations, it has been determined multiple rod drop tests will be required during unit 2 cycle 11 (one test), unit 2 cycle 12 (three tests), and unit 1 cycle 16 (three tests). These three cycles either currently reside in core, or are in the process of being fabricated. Both the unit 2 cycle 12 and unit 1 cycle 16 core designs were developed to minimize the impact of the draft guidelines as previously presented. Each shutdown described above will require the units to be off-line for approximately two days. The estimated extra cost of replacement power for these seven tests will be $2,800,000.

Should these overly restrictive burnup limits remain in place with the requirement to perform rod drop testing, future core designs may be modified, at a significant cost, to ensure that all assemblies in rodded locations remain below the proposed burnup limit. These unwarranted fuel costs result in no corresponding increase in the level of public safety.

BACKFIT RULE CONSIDERATIONS

By applying the proposed supplement's guidelines, multiple rod drop tests will be required for unit 2 cycle 11, unit 2 cycle 12, and unit 1 cycle 16. As such, this requirement will require a minimum of seven unit shutdowns for units 1 and 2, which have not experienced any incidence of IRI to-date, with no actual increase in public safety.

The draft supplement states that the backfits are justified under the compliance exception of the backfit rule, 10 CFR 50.109(a)(4)(i). This exception may only be invoked "where the Commission or staff, as appropriate, finds and declares, with appropriated [sic] documented evaluation for its finding ... [t]hat a modification is necessary to bring a facility into compliance with a license or the rules or orders of the Commission..."

10 CFR 50, appendix B, section XI, requires that, "a test program shall be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents." Letter AEP:NRC:1249 specifically addresses this issue. Rod drop tests performed at the beginning of unit 2 cycle 10, and tests performed at the end of cycle 10, indicated similar results. Many of these control rods were located in high burnup locations. Based upon these results, and the lack of any IRI at Cook Nuclear Plant, it is our contention the current testing requirements of our technical specifications (T/S) have documented and are sufficient

to demonstrate the continued operability of control rods in high burnup locations. Thus, as applied to Cook Nuclear Plant the proposed testing requirements fall squarely within the definition of a "backfit", as defined in 10 CFR 50.109(a)(1) (backfitting includes the modification of or addition to the procedures to operate a facility, that result from a new or amended provision in the rules or the staff's implementation of the rules that is either new or different from a previously applicable staff position).

The staff states in the proposed supplement that to the extent the backfit rule may apply, the proposed supplement would fall within what is referred to as the compliance exception to the backfit rule. As noted above, the proposed supplement relies upon 10 CFR 50, appendix B, section XI. However, this section does not provide specific control rod testing requirements or burnup limits. Nor do other existing rules or orders of the commission or our past commitments require specific control rod insertion testing based on the burnup limits in the proposed supplement. Thus, to the extent our existing testing has demonstrated satisfactory performance (i.e., we have tested for satisfactory control rod insertion and have had no IRI in high burnup assemblies at Cook Nuclear Plant), there is no regulatory nexus between the new burnup limits in the proposed supplement and compliance with our current licensing and design bases. In short, we do not believe the new burnup limits are necessary to bring the facility in compliance with the existing license or rules or orders of the commission or our past commitments. The lack of a logical nexus between the newly proposed operating and testing requirements and the existing licensing and design bases soundly supports the conclusion that application of the compliance exception is unsupportable as applied to the proposed supplement. Because the exception does not apply, we believe the proposed supplement would impose new testing requirements subject to 10 CFR 50.109, the backfit rule.

The staff has not shown any modification is necessary to bring our facility into compliance with our current licensing bases and as such a systematic and documented analysis pursuant to 10 CFR 50.109(c) is required. In addition, through the testing performed to demonstrate the continued operability of control rods in high burnup locations, we have shown no increase in plant safety is achieved through rod drop testing above the current T/S requirements.

SUMMARY

It is requested the following recommendations be considered.

1) Perform a systematic and documented analysis pursuant to 10 CFR 50.109(c) showing this backfit is appropriate.

2) The office of the general counsel should determine whether the NRC staff has applied 10 CFR 50.109(a)(4)(i) appropriately.

3) Any limits imposed should be based upon fast fluence and operating temperature.

4) The supplement should include a method acceptable to show sufficient shutdown margin exists, such that rod drop testing is not required.

Sincerely,

E. E. Fitzpatrick

E. E. Fitzpatrick
Vice President

vlb

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