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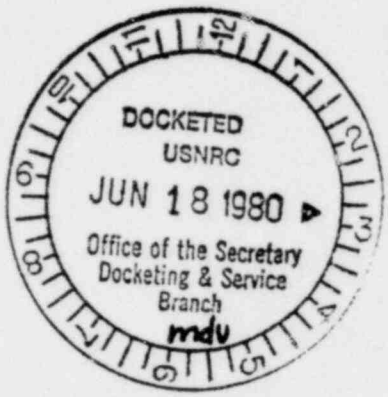
June 13, 1980

WILLIAM O. PARKER, JR.
VICE PRESIDENT
STEAM PRODUCTION

TELEPHONE: AREA 704
373-4083

DOCKET NUMBER
PETITION RULE PRM-51-6 (4)
(45 FR 25557)

Mr. Samuel J. Chilk
Secretary
United States Regulatory Commission
1717 H Street, N.W.
Washington, D. C. 20555




ATTN: Docket and Service Branch

RE: Petition for Rulemaking on Generic Impacts of High Burnup Nuclear Fuel (45 Fed. Reg. 25557, April 15, 1980)

Dear Mr. Chilk:

By the captioned notice the Nuclear Regulatory Commission ("NRC" or "Commission") published for public comment a petition for rulemaking filed by Catherine Quigg requesting that the NRC amend 10 CFR Part 51 to require the preparation of a generic environmental impact statement ("EIS") "for high burnup nuclear fuel as used in commercial nuclear reactors, stored in spent fuel pools or cooling racks, or potentially as processed in reprocessing plants or disposed of in permanent sites". 45 Fed. Reg. at 25557.

On behalf of Duke Power Company we respectfully submit the following comments.

In the wake of President Carter's April 7, 1977 announcement indefinitely deferring all civilian reprocessing of nuclear spent fuel, the United States Department of Energy ("DOE") has instituted limited cost-shared projects testing the feasibility of use of high burnup nuclear fuel in commercial nuclear power plants. 45 Fed. Reg. at 25557. While Petitioner notes that such "experiments...are being conducted without an environmental impact statement". 1/ Petitioner states that her major concern "is the nationwide program of high burnup fuel in nuclear reactors that is sure to follow these fairly limited experiments". 45 Fed. Reg. at 25557. 2/ Petitioner maintains

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1/ It should be noted that for each of these "experiments", and environmental assessment was performed prior to issuance of the necessary amendment to the technical specifications authorizing use of such fuel.

2/ We note that petitioner's assumption of "nationwide" use of high burnup fuel is premature in that results of feasibility tests have not yet been completed.

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that such use of high burnup nuclear fuel may result in increased radioactive releases during normal and potential accident conditions and may increase the potential for accidents due to the increased burnup of the fuel. 45 Fed. Reg. at 25557-8. Thus, Petitioner concludes that the National Environmental Policy Act of 1969 ("NEPA") mandates the preparation of a generic environmental impact statement on the nationwide use of such fuel.

Contrary to Petitioner's implied position, NRC does not currently propose, nor is it anticipated that in the future it will propose, a program for nationwide or even large-scale commercial implementation of use of high burnup nuclear fuel. 3/ Simply stated, there is current testing by DOE regarding use of such fuel, and in the future there may be applications submitted for such use on a commercial basis. In this regard, we maintain that the teachings of Kleppe v. Sierra Club, 427 U.S. 390 (1976) are dispositive. In Kleppe v. Sierra Club, 427 U.S. 390 (1976), several environmental groups sought the preparation of a comprehensive, regional EIS by the Department of Interior (DOI) prior to DOI issuance of individual leases for coal mining operations in that region. (427 U.S. at 395). While the DOI had prepared several studies with respect to the impact of coal mining operations in the region, the Supreme Court ruled that those studies were only efforts to gain background information for subsequent application in the decision-making process and did not constitute federal "contemplation" of a regional development plan or program. (427 U.S. at 403-4). However, the Court stated that even if a regional program was "contemplated" by DOI, there is no support in the language or legislative history of NEPA for requiring a regional EIS until a "proposal" for federal action on a regional scale was before the agency (427 U.S. at 404-5). Further, the Court explained:

> At some points in their brief respondents appear to seek a comprehensive impact statement covering contemplated projects in the region as well as those that already have been proposed. The statute (NEPA), however, speaks solely in terms of proposed actions; it does not require an agency to consider the possible environmental impacts of less imminent actions when preparing the impact statement on proposed actions. Should contemplated actions later reach the stage of actual proposals, impact statements on them will take into account the effect of their approval upon the existing environment; and the condition of that environment presumably will reflect earlier proposed actions and their effects. (emphasis supplied). 427 U.S. at 410 note 20.

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3/ In that the NRC has not made any large scale or irretrievable commitment of resources this situation is clearly distinguished from that in NRDC v. NRC, 539 F.2d 824 (2nd Cir. 1976); and Scientists' Institute for Public Information, Inc. v. AEC, 481 F.2d 1079 (D. C. Cir. 1973).

In sum, Kleppe teaches that there is no NEPA requirement to consider environmental impacts of contemplated actions which are not the subject of a proposed action and which are not so related to the proposed action as to fall within the scope of Section 102(2)(C) of NEPA. 4/ Accord,Trout Unlimited v. Morton, 509 F.2d 1276 (9th Cir. 1974); Sierra Club v. Froehike, 534 F.2d 1289 (8th Cir. 1976); Conservation Society of Southern Vermont v. Secretary of Transportation, 508 F.2d 927 (2nd Cir. 1974); Swain v. Brinegar, 542 F.2d 364 (7th Cir. 1960). Further, the Court stated:

> Nor is it necessary that petitioners always complete a comprehensive impact statement on all proposed actions in an appropriate region before approving any of the projects. As petitioners have emphasized, and respondents have not disputed, approval of one lease or mining plan does not commit the Secretary to approval of any others: Nor, apparently, do single approvals by the other petitioners commit them to subsequent approvals. 427 U.S. at 414, note 26.

Thus, we maintain that NEPA does not require preparation of a generic EIS regarding nationwide use of high burnup nuclear fuel. We, of course, do not mean to imply that NEPA does not require a "hard look" at each application submitted, if any, for use of such fuel. And, in the event that it is determined that such use would have a significant impact on "the quality of the human environment" 5/ we, of course, concur that preparation of an EIS should result. However, we submit that the environmental impact of use of high burnup nuclear fuel, even on a nationwide scale, would not be significant. 6/

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4/ "Section 101(2)(C) states that the statement must be a detailed statement on --

'(i) the environmental impact of the proposed action,

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) alternatives to the proposed action,

(iv) the relationship between local short-term uses of man's environmental and the maintenance and enhancement of long-term productivity, and

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.' (Emphasis added.)

5/ Section 102(2)(C), 42 U.S.C. 4332(2)(C).

6/ A brief assessment of the impact of use of high burnup nuclear fuel is contained as Attachment A to this document.

In any event, if the Commission determines that a generic environmental analysis of commercial use of high burnup fuel is, although not required, appropriate, we maintain that such review clearly should not interrupt experimental testing. See NRDC v. NRC, supra, 539 F.2d at 845. 7/ Further, with regard to interim licensing actions authorizing use of high burnup nuclear fuel in commercial reactors, it is clear that the environmental effects, if any, of exposing fuel to high burnup conditions would not begin until after such fuel has been in a reactor for a period of approximately 3-4 years. Prior to this 3-4 year period, fuel designed to undergo high burnup conditions could simply be removed from the reactor without ever having achieved such high burnup conditions. Thus, we maintain that any generic environmental analysis or report that is prepared must be completed prior to the time when high burnup conditions are achieved and not necessarily before fuel designed for high burnup is initially exposed. Therefore, we submit that completion of any such analysis or report should not delay issuance of licensing amendments regarding high burnup fuel which are conditioned upon subsequent, favorable Commission action prior to the time when such fuel actually undergoes "high burnup" exposure.

We appreciate this opportunity to provide the Commission with our comments on this important area of high burnup nuclear fuel, and will welcome the opportunity to provide detailed comments, if needed, on the environmental impact, if any, of large scale high burnup fuel in commercial reactors.

Very truly yours,

William O. Parker, Jr. By JHB

Attachment

RGS/lk

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7/ This position is not in conflict with Scientists' Institute for Public Information, Inc. v. AEC, supra, 491 F.2d at 1090 in that investments or commitments regarding such research is not so great as to restrict any alternatives.

Attachment A
Environmental Impact Associated with
Increased Nuclear Fuel Burnup

Programs aimed at increasing discharge fuel burnup at commercial nuclear power facilities should be thought of primarily as part of an evolutionary process which has seen pressurized water reactor fuel burnup increase from approximately 18,000 megawatt-days per metic ton uranium (MWD/MTU) in the mid-1960's to design values of approximately 33,000 MWD/MTU today.[1] Historically, commercial fuel development programs have been characterized by careful, stepwise extensions of technology, with demonstration of the acceptability of those extensions on a small scale prior to implementation on a full core basis. In this respect the high burnup fuel programs are no different.

In any event, the environmental impact of high burnup fuel can be demonstrated to be insignificant; indeed, it is our assessment that the overall environmental impact is positive, i.e. beneficial, when compared with lower burnup fuel. The following discussion supports this view through examination of the impact of high burnup on the individual elements of the nuclear fuel cycle.

"Front-End" Fuel Cycle Materials and Services: Without exception, the environmental impact of all elements comprising the "front-end" of the cycle (uranium mining and milling, uranium conversion and enrichment, and fuel fabrication) are reduced with increasing fuel discharge burnup. In particular, requirements for the element of the entire fuel cycle contributing most to radiological impact,[2] uranium mining

and milling, could be reduced by more than 10 percent by adoption of high burnup fuel cycles on an industry-wide basis.[3]

In Reactor: In the case of routine reactor operation, Technical Specifications normally limit coolant activity.[4] These limits apply whatever the burnup of the fuel; therefore, routine releases of radioactivity as a result of reactor operation will not be increased by moves to higher burnup. In any event, one of the primary aims of ongoing demonstration programs is to confirm that fuel may be operated to higher burnups reliably, i. e., without significantly affecting fuel failure rates.

Current limitations on coolant activity also place upper bounds on radioisotopes available for release in transients and accidents whose consequences depend primarily on the coolant inventory.

For other transients and accidents whose consequences are dependent upon the radioisotope inventory in the fuel, i.e., those events which involve possible fuel failure, the effect of higher fuel burnup is minor. This is due to the fact that the dominant, dose-producing radioisotopes are short-lived and thus reach equilibrium conditions early during burnup.[5-6] An increase in fuel failure rates under transient and accident conditions is not expected for high burnup fuel; nevertheless, one element of the demonstration program is evaluation of this area.

It should be noted that for the loss of coolant accident, analytical assessments assume 100 percent fuel failure, pursuant to Nuclear Regulatory Commission guidance.[7] Finally, utility submittals for Nuclear Regulatory Commission review pursuant to 10CFR50.59 must address any unreviewed safety

question for conformance to all applicable criteria.

Spent Fuel Storage and Transportation: The environmental impact of high burnup fuel on these segments of the fuel cycle must be regarded as beneficial. Storage capacity requirements and number of spent fuel shipments are inversely proportional to discharge burnup. For example, fuel cycles with discharge burnups of 30,000 MWD/MTU require one-third more fuel storage locations and transport steps than would fuel cycles employing 40,000 MWD/MTU burnups.

Routine radioactive releases from spent fuel in storage are not expected to be increased in the case of high burnup fuel. It should be remembered that fuel in storage faces an environment far more benign than the in-reactor condition. If, however, for any reason high burnup fuel elements were to experience failure in storage, the rate of such failure would be so extremely slow that ample time would exist for remedial action, such as encapsulation in canisters.

While fuel storage requirements are lower for high burnup fuel, it is true that a given storage facility filled to capacity with high burnup fuel will contain a somewhat higher radioisotope inventory than if it were filled with lower burnup fuel. However, the same argument which applies to the in-reactor case applies here. That is, for hypothetical accident conditions, the inventory of radioisotopes dominating the dose calculation is not significantly higher than for standard burnup fuel. This argument applies to transportation accidents as well.

Fuel Reprocessing and/or Disposal: High burnup fuel will impact these areas of the fuel cycle positively in the respect that the throughput rate will be

lower. In the event reprocessing is allowed, routine release of the radioisotopes dominating population doses will be lower due to lower inventories of these isotopes in the fuel itself, on a per unit of energy generated basis.[6] Standards for radiation protection for this element of the fuel cycle, among others, are set forth in 40CFR190 and do not vary with fuel burnup.

Impact of high burnup on waste disposal, other than the positive impact of lower throughput from a total assembly or total mass standpoint, should be negligible. High burnup fuel does contain additional transuranic inventory, and therefore generates more heat than does lower burnup fuel. This must be allowed for in geologic repository design, but thermal effects are within the control of the designer through the ability to limit canister waste loading and canister spacing.

## References


1. DOE/ER/10020-TI, "Historical Survey of Nuclear Fuel Utilization in U. S. LWR Power Plants," August, 1979.

2. NUREG-0002, "Final Generic Environmental Statement on the Use of Recycle Plutonium in Mixed Oxide Fuel in Light Water Cooled Reactors," August, 1976.

3. DOE/NE-0001/9, "Nuclear Proliferation and Civilian Nuclear Power: Report of the Nonproliferation Alternative Systems Assessment Program," June, 1980.

4. Oconee Nuclear Station Technical Specification 3.2.4.

5. WASH-1400 (NUREG 75/014), "Reactor Safety Study; An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants," October, 1975.

6. DOE/NE-0003/1, Nonproliferation Alternative Systems Assessment Program; "Preliminary Safety and Environmental Information Document," Volume 1, Light Water Reactors, January, 1980.

7. U. S. Atomic Energy Commission Regulatory Guide 1.4, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors," Revision 2, June, 1974.