final

NUREG-0575, Vol. 3
Comments on
Draft Statement
Staff Responses

generic environmental impact statement

on

HANDLING AND STORAGE OF SPENT LIGHT WATER POWER REACTOR FUEL

AUGUST 1979

Project No. M-4

U. S. Nuclear Regulatory Commission • Office of Nuclear Material Safety and Safeguards

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NUREG-0575, Vol. 3

FINAL GENERIC ENVIRONMENTAL IMPACT STATEMENT

ON

HANDLING AND STORAGE OF SPENT LIGHT WATER POWER REACTOR FUEL

COMMENTS ON THE DRAFT STATEMENT AND STAFF RESPONSE

August 1979

Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission

FOREWORD

Pursuant to 10 CFR Part 51, the "Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel" was transmitted, with a request for comments, to:

Advisory Council on Historic Preservation
Arms Control and Disarmament Agency
Department of Agriculture
Department of the Army, Corps of Engineers
Department of Commerce
Department of Health, Education and Welfare
Department of Housing and Urban Development
Department of the Interior
Department of State
Department of Transportation
Department of Energy
Environmental Protection Agency

In addition, the NRC requested comments on the draft environmental statement from interested persons by a notice published in the FEDERAL REGISTER on March 24, 1978 (43 FR 12402). In response to the requests referred to above, comments were received from the following (letters in parentheses are codes keyed to comments and responses):*

State of Indiana, State Board of Health
Eugene N. Cramer (A)
State of New Jersey, Department of Community Affairs
Texas Energy Advisory Council (B)
Mississippi State Clearinghouse for Federal Programs
Lt. Col. Emil G. Garrett (RET) (C)
State of Utah, State Planning Coordinator
State of Louisiana, Department of Urban and Community Affairs
State of Iowa, Office for Planning and Programming
State of North Carolina, Utilities Commission (D)
State of West Virginia, office of Economic and Community Development (E)
North Dakota State Planning Division
South Dakota State Planning Bureau (Commissioner)
South Dakota State Planning Bureau (Executive Director)
South Dakota Fourth Planning and Development District (G)
State of Kansas, Department of Administration (F)
U.S. Department of Commerce (H)
U.S. Department of the Interior (I)
Wisconsin Electric Power Company (K)
State of North Carolina, Department of Administration
State of Texas, Budget and Planning Office (N)
Portland General Electric Company (L)
Detroit Edison (J)
General Electric Company (M)
State of Colorado, Department of Local Affairs
Gulf States Utilities Company (O)
State of New Mexico, Department of Finance and Administration (P)
Babcock & Wilcox (Q)
GPU Service Corporation (R)
State of Oregon, Intergovernmental Relations Division (S)
State of Ohio, Environmental Protection Agency (T)
U.S. Department of Health, Education and Welfare (U)
Commonwealth of Virginia, Council on Environment (V)

*In some cases where no specific responses to a letter of comment were deemed necessary by the staff, no code letter has been assigned.

963235

Environmental Coalition on Nuclear Power (Y)
State of Nevada, Office of Planning Coordination (W)
State of California, The Resources Agency of California (X)
State of Illinois, Bureau of the Budget (Z)
State of Missouri, Office of Administration
State of Texas, Budget and Planning Office [Railroad Commission comments] (AA)
Environmental Coalition on Nuclear Power [additional comments] (Y)
State of Alaska, State Clearinghouse
Southwest Research and Information Center (AB)
Virginia Electric & Power Company (AC)
University of Kentucky (AV)
Commonwealth of Puerto Rico, Department of Natural Resources
Arizona State Clearinghouse (AD)
Commonwealth of Massachusetts, Energy Facilities Siting Council (AE)
Allied-General Nuclear Services (AG)
Tennessee Valley Authority (AF)
Kaman Sciences Corporation (AH)
Atomic Industrial Forum, Inc. (AI)
Georgia Power (AJ)
Natural Resources Defense Council, Inc. (AK)
Yankee Atomic Electric Company [UWMG] (AL)
U.S. Department of Energy (AM)
Power Authority of the State of New York (AN)
Yankee Atomic Electric Company (AO)
Commonwealth Edison (AP)
State of Illinois, Attorney General (AQ)
State of Wyoming (AW)
State of New York, Department of Environmental Conservation (AR)
State of Oregon, Department of Energy and Energy Facility Siting Council (AZ)
State of California, The Resources Agency of California (AT)
State of California, Office of Planning and Research (AS)
W. Bonmia (AX)
State of Illinois, Attorney General [corrected comments] (AQ)
U.S. Environmental Protection Agency (AU)
Duke Power Company (AY)
State of Alabama, Alabama Development Office
Boston Edison Company (AAA)
Institut für Metallurgie (AAB)
State of Pennsylvania, Pennsylvania State Clearinghouse
Natural Resources Defense Council, Inc. (supplements to comments)

The letters of comment are reproduced in their entirety in Chapter 1 of this volume. The staff's consideration of the comments received and its disposition of the issues involved are reflected in part by revised text in the pertinent sections of this final environmental statement and in part by the responses presented in Chapter 2 of this volume. In the left-hand margins of the letters of comment (Ch. 1), the staff has marked and coded specific comments. Those comments are presented individually in Chapter 2 and are followed by the staff's response. The coding of comments and responses in Chapter 2 corresponds to the codes marked on the letters in Chapter 1.

CHAPTER 1. LETTERS OF COMMENT RECEIVED ON THE "DRAFT GENERIC ENVIRONMENTAL IMPACT STATEMENT ON HANDLING AND STORAGE OF SPENT LIGHT WATER POWER REACTOR FUEL."

STATE of INDIANA

STATE BOARD OF HEALTH

AN EQUAL OPPORTUNITY EMPLOYER

INDIANAPOLIS

Address Reply to:
Indiana State Board of Health
1330 West Michigan Street
Indianapolis, IN 46206

March 29, 1978

Mr. Richard W. Starostecki, Chief
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and
Material Safety
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Starostecki:

We have reviewed NUREG-0404, the "Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel." We find it to be comprehensive and informative and have no suggested changes.

We appreciate being asked to comment on this material of major public impact.

Sincerely,

Ralph C. Pickard
Assistant Commissioner
for Environmental Health

A-1

Eugene N. Cramer
17146 Ridgepark
Hacienda Heights, CA 91745
(213) 572-2784 Office
(213) 964-1474 Residence
California Registered Professional Engineer

April 5, 1978

Director, Division of Fuel Cycle
and Material Safety
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Director:

These comments apply to NUREG 0404 draft "GEIS on Handling and Storage of LWR Fuel," and are intended for your consideration as advertised in the Federal Register.

1. THE HAZARD OF ACCUMULATING SPENT FUEL ASSEMBLIES IS NOT ADDRESSED. 1-2

Chapter 4.2 considers "Health Impacts" in a broad and uneven fashion--giving in some detail the results of transportation accidents (and of missile accidents) with no consideration of the effects of accumulation of fuel. Appendix G repeats a variety of facts of fuel assemblies and includes an ORIGEN printout of fission product curies and grams, and a graph of heat generation vs time.

On Page 4-9, the unsupported statement is made "...The radiological impacts of this older fuel (is) factors of ten lower than that of the less cooled fuel and results in a small incremental impact to health and safety." This is unduly optimistic unless restricted to the noble-gas fission products, although quite true for the bulk of fission products if allowance is made for the extremely unlikely possibility of fuel element melting upon a total loss of water in the pool more than three months after reactor shutdown.

The enclosed "Relative Spent Fuel Pool Hazard" directly probes the technical safety problem that would be created by requiring a full-sized PWR to store its lifetime spent fuel supply at-the-reactor (AR). The Ingestion Toxicity Index (ITI) option of ORIGEN was used to sum the hazard of all 921 isotopes; computing the volume of water necessary to dilute the isotopes at all times to drinking water tolerance.

The resultant Figure 1 is worthy of inclusion with the miscellaneous data in Chapter 4 and Appendix G because of the startling perspective given:

i) Only after 25 years of 1/3-core discharge would the ITI of the accumulation equal the ITI of a full-core discharge after 1 year operation--both evaluated 10 days after shutdown (Fig. 1).

ii) If the unit were operated 36 years and the full core discharged, the resulting ITI would only be about 85% larger than the ITI of a full core discharged after 1 year operation (Fig. 1).

A-1

iii) Figure 3 shows that the more mobile gaseous radioactivity is approximately two factors-of-ten less than the total radioactivity in a fuel element more than 100 days after shutdown.

iv) Figure 4 shows that the gaseous radioactivity (the controlling hazard) is present for only a few days after reactor shutdown--alone justifying the GEIS conclusion.

This analysis lends great credibility to the statements in the GEIS--Figure 1 would go a long way to supporting the GEIS somewhat generalized discussions.

2. EXCESSIVE RESTRICTION OF REFERENCES TO LICENSING CORRESPONDENCE UNFAIRLY PORTRAYS INDUSTRY CAPABILITIES.

Selecting a model licensing case is excellent for giving guidance on what is (or was) considered important in licensing. Appendix D is well written for overall comprehension, and serves this limited purpose well.

A-2

However, the whole point of U.S. Reactor Licensing is to approve/disapprove someone else's designs on safety-only grounds, so that Licensing cannot be the totality of the effort. Thus it is disappointing that no industry experience is recognized or referenced in Appendix D, and Chapter 3.

Attached to this critique is a set of papers presented to the American Nuclear Society June 1977 which are quite pertinent--and should be referenced.

3. THE VALUE OF UNRECOVERED FUEL IS NOT LISTED.

A-3

Chapter 1.1 (Pg. 1-2) references GESMO for cost-benefits of recovering uranium and plutonium, thus avoiding the awkward political question of discarding some $300 [illegible] worth of energy from spent fuel discharged before the year 2000.

A-3

However, this avoidance should be faced so long as this section unfairly leaves an uneducated reader wondering why industry was so stupid to attempt reprocessing in the first place. Nor should any quantification of reprocessing bene[illegible] stop with statements that "reprocessing could reduce electricity costs by some 1%"--the full truth should be told that "U.S. Reprocessing has been indefinitely banned by Presidential Policy as a means of international politics in stopping breeder reactor development."

I hope you will make these changes.

Very truly yours,

Eugene U. Cramer

Enclosures: 1. ANS Paper, "Hazards...."
2. ANS Paper, "Storage...."

State of New Jersey
DEPARTMENT OF COMMUNITY AFFAIRS

PATRICIA Q. SHEEHAN
COMMISSIONER

363 WEST STATE STREET
POST OFFICE BOX 2768
TRENTON, N.J. 08625

April 5, 1978

Mr. Richard W. Starostecki, Chief
Fuel Reprocessing and Recycling Branch
Division of Fuel Cycle and Material Safety
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

RE: OSRC-FY-78-871

Dear Mr. Starostecki:

In accordance with the U.S. Office of Management and Budget Circular A-95 Revised, your Draft Environmental Impact Statement for Handling and Storage of Spent Light Water Power Reactor Fuel (Vol. 1 & 2) designated application OSRC-FY-78-871, has met the State of New Jersey's Clearinghouse requirements.

We have circulated this Project Notification to the appropriate State agencies, none of which have voiced any obj ctions.

Very truly yours,

Richard A. Ginman
State Review Coordinator

RAG:br

TEXAS ENERGY ADVISORY COUNCIL

7703 North Lamar   Austin, Texas 78752   (512) 475-5588

April 7, 1978

RECEIVED
APR 13 1978

U. S. Nuclear Regulatory Commission
Washington, D.C. 20555
Attn: Director
Division of Fuel Cycle and Material Safety

Subj: Comments on the Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel

Dear Sir:

Utilities operating in the State of Texas will be operating several nuclear facilities by the end of the 1980s. The continued economical operation of those nuclear plants will be in the best interest of consumers and industry in our State. Therefore, the disposition of spent nuclear fuel and its effect on the nuclear plant electric production is of great interest to the State of Texas. 1-4

The intent of your draft appears to be to evaluate the consequences of storage of spent fuel on an indefinite basis versus the consequences of not resolving the storage problem, resulting in the eventual shut down of existing nuclear plants. If the benefits of indefinite storage outweigh the problems and alternatives, then you would propose to accept indefinite storage of spent fuel (possibly in pools) as the procedure for the operation of nuclear plants and storage of commercial nuclear waste.

CREDITABLE ALTERNATIVE

B-1 In evaluating your draft, we agree that shutting down the operating nuclear plants is unacceptable. However, your suggesting that the replacement alternative (if nuclear plants were shut down) would be coal plants overlooks several important constraints on the actions of electric utility management. An impending shutdown of nuclear plants may not be recognized until the last moment as far as a utility planning effort is concerned. Short lead times of less than five years would necessitate the use of oil fired gas turbines or combined cycle plants. Further utility management would be faced with the dilemma of whether the nuclear shutdown would be permanent in which case capital intensive coal plants should be built or whether the shutdown is a short term problem (less than five years), in which case cheap oil plants should be built. Specific regions have experienced difficulties even utilizing coal plants as part of their generation mix. The Kaiparowits and Intermountain projects are examples of failures to develop coal plants. Strict air pollution standards in the Midwest and Northeast might preclude additional coal units from being built.

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If we are correct in our suggestions that the substitute fuel source in
B-1 the absence of storage is oil rather than coal, then the tradeoffs of importance are between waste storage and imported crude oil and its inherent problems.

AWAY-FROM-REACTOR POOL STORAGE

We also agree with your assessment that private industry does not at this time have away-from-reactor pool storage excess capacity. Further private industry would probably not be involved in the issue of spent fuel storage at away-from-reactor pools unless government writes legislation accepting final responsibility for the spent fuel and guaranteeing profits. The only entity which might provide away-from-reactor pool storage will probably be the federal government. Your draft fails to analyze the probability that the government would develop away-from-reactor pool storage in a timely manner. With the amount of spent fuel rapidly increasing and with the long periods of time required for regulatory review and facility development, adequate storage may not be developed on a timely basis; thus, some operating nuclear plants may be forced to shut down by as early
B-2 as 1985. Further, there is no indication of whether domestic utilities will have preference for spent fuel storage or foreign utilities complying with U.S. policy of buying back spent fuel. The NRC's acceptance of a policy of indefinite storage will in fact lead to some problems in the supply of electricity.

For the base case in your analysis of indefinite storage of spent fuel, the following options should be considered as possible:

a) The federal government fails to provide adequate legislation to encourage private industry to build away-from-reactor spent fuel storage.

b) The federal government fails to authorize funding for away-from-reactor spent fuel storage on a timely basis.

OTHER ALTERNATIVES

We think you have ignored the most logical alternative to spent storage. The best alternative is reprocessing. Regardless of whether you feel the President or Congress will or will not support reprocessing, it is an alternative which must be considered as viable as shutting down nuclear plants and replacing their output with that from additional coal or oil plants. In comparing indefinite spent fuel storage with reprocessing, close attention should be paid to the following points:

B-3

a) Long term effect on the price of uranium supplied to utilities with and without the recovery of uranium and plutonium from spent fuel.

b) Economic effects of avoiding reactor shutdown by reprocessing since shutdown is probable under the indefinite spent fuel storage case.

c) Economic effects of removing a stumbling block which has impeded nuclear development by allowing reprocessing. Indefinite spent fuel storage would continue to impede nuclear development.

It appears to us that the NRC was negligent in performing its duties by terminating the GESMO hearing without coming to a conclusion. Had GESMO been completed, a reasonable assessment of the need for reprocessing versus the advisability of indefinite storage of spent fuel versus shutting down nuclear plants would already be available.

B-3

One is forced to question the logic of the NRC's actions. Had the President said he desired reprocessing, the NRC would still have continued its independent analysis of reprocessing and alternatives. The President did say that he wanted to defer reprocessing. Does that mean that the NRC should immediately stop its independent review of reprocessing versus other alternatives?

We look forward to your reply to these three points.

Sincerely,

John B. Gordon

John B. Gordon
Coordinator - Conservation
and Electric Power

JBG:gi

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APR 21 1978
U. S. Nuclear Regulatory Commission
NMSS
Mail Section

OFFICE OF THE GOVERNOR
Planning & Coordination
1503 Walter Sillers Building
JACKSON, MISSISSIPPI 39201
354-7018

CLIFF FINCH
GOVERNOR

JAMES A FLEMING
DIRECTOR

STATE CLEARINGHOUSE FOR FEDERAL PROGRAMS

TO: United States Nuclear Regulatory Commission Washington, D.C 30555	State Clearinghouse Number 78032709
Attn: Richard W. Starostecki	Date: April 14, 1978

PROJECT DESCRIPTION: NATIONWIDE

Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel. Comments should be sent to U.S. Nuclear Regulatory Commission, Washington, D.C., 20555. Attn: Director, Division of Fuel Cycle and Material Safety.

The State Clearinghouse, in cooperation with the state agencies interested or possibly affected, has completed the A-95 review of the project described above.

None of the state agencies involved in the review had comments or recommendations to offer at this time. This concludes the State Clearinghouse review, and we encourage appropriate action as soon as possible.

A copy of this letter is to be attached to the application as evidence of compliance with the A-95 requirements.

Lester R. Howell

Lester Howell, Coordinator
Clearinghouse for Federal Programs

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Box 91
Stockton Springs, Maine 04981
14 April 1978

To: U.S. Nuclear Regulatory Commission
Director, Division of Fuel Cycle and Material Safety
Office of Nuclear Material Safety and Safeguards
Washington, D.C. 20555

Gentleman:

The following comments are presented in regards to the Draft of NUREG-0404:

C-1

1. The draft statement in considering the option of termination of nuclear power and conversion to coal fired power generation implies that the construction of coal fired plants would not be economically feasible in the Northeast. This view is in sharp conflict with reality. In June 1977, Central Maine Power applied to the Maine Public Utility Commission for the construction of a 600 MWE coal fired plant on Sears Island. Further, stockholders and consumers have been notified of the intent to construct the plant. (See enclosed press report). Maine is the most remote of the Northeast states and it would be logical to assume that if coal fired power is feasible in Maine - it must be feasible in other Northeast states. The only other assumption that could be made is that Central Maine Power is going to build a plant that is not economically feasible.

C-2

2. Again, in considering the termination option the draft statement presents the impact of coal fired power in a deceptive manner. The report discusses the release of radioactive substances released in the stack gases of coal fired plants but does not provide a detailed quantitative and qualitative comparison of releases from nuclear plants. Reference to the three published reports, (one of which deals with a hypothetical plant) cannot be regarded as an adequate justification for the views presented by the draft statement.

C-3

3. The potential for the release of radioactive materials from spent fuel pools is not given adequate consideration. The draft statement does not reflect the fact that it is common knowledge that a scenario for black mail and sabotage exists immediately after reactor core re-fueling. Destruction of off-site power lines, sabotage of emergency power sources, and breaching the reactor pool with shaped charges would not present logistic problems of large magnitude.

Please place me on the mailing list for a copy of the final statement.

Yours truly,
Emil S. Garrett
Emil S. Garrett
Lt. Col. USAR RET
CORPS OF ENGR.

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9032##

POOR ORIGINAL

B.D.N
13 April 7[illegible]

Coal plant waits for PUC action

By John Makarowski
NEWS Correspondent

SEARSPORT — The coal-fired power station Central Maine Power Co. wants to build on Sears Island here will not be producing electricity as soon as expected, company vice president John Randazza said this week.

Randazza, at an informational meeting at CMP's environmental studies building in Searsport, told town businessmen and officials that as yet the Maine Public Utilities Commission has taken no action on CMP's application for a certificate of convenience and necessity. The application that was filed last June.

Randazza explained that this certificate is the first permit of approximately 50 that must be approved by various state and federal departments, and that no additional work can begin until the certificate application is approved.

Randazza said the MPUC seems almost incapable of acting quickly.

CMP has studied the project extensively and has submitted to the PUC complete data on the project, Randazza said. He felt that with the data compiled, matters would be expedited. But just the opposite has occurred — the PUC says it can't handle the volumes of data submitted and that a consultant will have to be hired to help with the work, Randazza said. But the only problem with a consultant, Randazza said, is that the PUC has no funds available to hire one.

Area businessmen were told by Randazza that the PUC said it would bring the appropriation up before the legislature during the final meeting, but Randazza said that no such effort was made and therefore no funds were appropriated for the project during the last legislative session and that CMP may have to wait until next year's legislature until money becomes available for PUC action.

What the PUC must decide before it can grant the certificate is whether there is a need for more power, and whether this is the best way to supply it, Randazza said. He went on to say that the PUC has never needed a consultant before, relying in the past on the Office of Energy Resources to analyze proposals.

"A burgeoning bureaucracy" is what Randazza said causes extensive delays in construction of energy plants, noting that it takes from nine to 10 years to complete a coal-fired structure and about 12 years to gain approval and construct a nuclear plant here in the United States.

Randazza claimed that the time required in Canada and Europe is only about six years.

Randazza say's, refering to the PUC, that "people who fail to act today may cause the problems of the future and not even be around to pay the piper." Randazza feels that "CMP will be the one criticized in the future because we weren't able to do things today."

According to Randazza, CMP's schedule called for the certificate application to be filed in June, with the hearing set for last fall, and receipt of the certificate by February, but after 10 months at the PUC, no date has been set for the hearing.

"We had hoped to begin construction in late 1980 or early 1981 on the 600 megawatt unit but with the delay caused by the PUC we can't see beginning construction until late 1981 or later," Randazza said.

The next major permits required must come from the State Department of Environmental Protection, and the Federal Environmental Protection Agency.

"We are moving ahead cautiously," Randazza said, but "we need approval from the PUC before we can release any engineering funds. The cost of the studies required for the two environmental agencies will be one to two million dollars, with a time span of between 30 months to three years between the PUC approval and the environmental agencies' approvals."

Joseph LeBlanc, project manager for CMP, said that Sear's Island is a good site to construct the unit because of the "flexibility we would have in getting coal."

Coal could be shipped by rail or by sea, and such a location would lend itself well to having coal shipped from other countries in the event of shortages or strikes in the U.S., LeBlanc said.

When asked by town manager Peter Garland if CMP would cooperate with other industries on the island, such as the proposed container port, in regards to causeway use and water supply, Randazza said that CMP would be willing to share on a cost basis, the use of rights of way and water, and that CMP sees the need for construction of sewage treatment facilities on the island which would be shared.

CMP also plans to bring power out to the island separate from that needed for the operation of the plant. The power would support any industrial development. CMP is working with the Maine Dept. of Transportation regarding joint use of the island with the proposed container port.

LeBlanc, explaining the operating sequences of the unit, said that coal plants built now are considerably safer and cleaner than those of years ago, and that with 25 to 30 per cent of the budget earmarked for pollution control systems, it will be an extremely clean operating unit.

Pollution control will consist of an electrostatic precipitator which contains electrically charged rods that attract ash and dust before they can be expelled through the smoke stack.

Scott M. Matheson
Governor

James Edwin Kee
State Planning Coordinator

Joseph L. Platt
Deputy, State Planning Coordinator

STATE OF UTAH
Office of the
STATE PLANNING COORDINATOR
118 State Capitol
Salt Lake City, Utah 84114
(801) 533-5246

April 18, 1978

RECEIVED
APR 26 1978
U.S. Nuclear Regulatory Commission

U.S. Nuclear Regulatory Commission
ATT: Director, Division of Fuel
Cycle and Material Safety
Washington, D.C. 20555

Dear Sir:

The Utah State Environmental Coordinating Committee has reviewed the Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel. The Committee offers no comment.

Thank you for the opportunity to comment.

Sincerely,

Joseph L. Platt
Deputy, State Planning Coordinator

JLP/jl

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State of Louisiana
Department of Urban and Community Affairs
Office of Planning and Technical Assistance

April 18, 1978

EDWIN EDWARDS
GOVERNOR

LEON R. TARVER, JR.
SECRETARY

CARL WILKINS
ASSISTANT SECRETARY

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APR 25 1978
U.S. Nuclear Regulatory Commission
Mail Section

Mr. Richard W. Starostecki, Chief
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material
Safety
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Re: The Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel

Dear Mr. Starostecki:

We are in receipt of the above referenced document. The document has been reviewed by our office with respect to the effects of the project on Louisiana's resources.

We do not feel the project will have an effect on Louisiana's natural, economic, or social resources. However, if a storage sight for nuclear fuel is chosen in Louisiana we want to be informed immediately.

We appreciate the opportunity to review the document.

Sincerely,

George P. Gullett
George P. Gullett
Environmental Coordinator

GPG:se

DOCKETED
USNRC
APR 25 1978
NMSS

P. O. BOX 44455—BATON ROUGE, LOUISIANA 70804—389-5664

STATE OF IOWA
Office for Planning and Programming

523 East 12th Street, Des Moines, Iowa 50319 Telephone 515/281-3711

ROBERT D. RAY
Governor

ROBERT F. TYSON
Director

STATE CLEARINGHOUSE

PROJECT NOTIFICATION AND REVIEW SIGNOFF

Date Received: March 23, 1978 State Application Identifier: 781434

Review Completed: April 18, 1978

APPLICANT PROJECT TITLE:
Draft Generic Environmental Impact Statement, Handling and Storage of Spent Light Power Reactor Fuel
APPLICANT AGENCY: U.S. Nuclear Regulatory Commission
Address Washington, D. C. 20555

FEDERAL PROGRAM TITLE, AGENCY U.S. Nuclear Regulatory Commission
AND CATALOG NUMBER:

AMOUNT OF FUNDS REQUESTED:
NA

PROJECT DESCRIPTION:
Draft Generic Environmental Impact Statement on handling and storage of spent light water power reactor fuel. Project No. M-4. NUREG-0404

The State Clearinghouse makes the following disposition concerning this application:

[X] No Comment Necessary. The application must be submitted as received by the Clearinghouse with this form attached as evidence that the required review has been performed.

[ ] Comments are Attached. The application must be submitted with this form plus the attached comments as evidence that the required review has been performed.

STATE CLEARINGHOUSE COMMENTS:

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U.S. Nuclear Regulatory Commission
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CH-14 Rev. 9-75

Federal Funds Coordinator

I-8

7804280122

State of North Carolina
Utilities Commission
Raleigh 27602

OFFICE OF EXECUTIVE DIRECTOR

April 18, 1978

PUBLIC STAFF

Director
Division of Technical Information and Document Control
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Sir:

The Public Staff of the North Carolina Utilities Commission hereby submits its comments on NRC's Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0404) released March 1978.

This report was quite informative and comprehensive. However, there are several areas where the validity or accuracy of the data utilized in some analyses are questionable and tend to project impending peril. Below are the major areas in which the Public Staff feels (1) some clarification is required and (2) the report was in error, misleading or confusing.

D-1 A) In estimating the need for future storage capacity it was assumed that 414 GWE of nuclear capacity would be installed by the year 2000. This estimate is about 10% greater than a 1977 ERDA estimate of 380 GWE by 2000. The NRC's estimate seems even larger in conjunction with recent postponements and cancellations of future nuclear facilities. It appears that this report is overstating the near term requirements of storage capacity of spent light water power reactor fuel.

D-2 B) In the transshipment of spent fuel assemblies there is no mention of who (private concerns or Federal agency) will perform this operation.

D-3 C) In reference to the transshipment scenario, the conclusion reached indicates that such an approach has little value since the net of full storage facilities remains relatively constant with the reference case. However, it was not emphasized that such an approach would keep older nuclear plants operating several more years as compared to the termination scenario. Hopefully, this time extension would al'ow for the completion of a permanent storage facility or construction of independent temporary storage facilities.

D-4 D) We strongly disagree with the assumption that conservation programs will have little impact on projected need for electricity in the future, especially when the study period extends to the year 2000.

D-5 E) When replacing terminated nuclear facilities with coal, NRC's analysis gave coal units a much higher capacity factor, whereas, the studies in our possession indicate that capacity factors of base load coal and nuclear units are within a few percentage points of each other. As further justification for replacing nuclear units with less coal units (not a one for one exchange), it was stated that the fossil units operate closer to nameplate ratings than nuclear units. In the electric utility industry the important rating for judging unit performance is more likely to be its (maximum) dependable capacity, not nameplate capacity.

On behalf of the Public Staff - North Carolina Utilities Commission, we thank the NRC for the opportunity to provide input to such an important issue as storage of spent reactor fuel.

Yours very truly,

Hugh A. Wells
Executive Director

HAW:jpm

DOCKETED USNRC MAY 0 ? 1978 NMSS MAIL SECTION DOCKET CLERK

STATE OF WEST VIRGINIA
GOVERNOR'S OFFICE
OF
ECONOMIC AND COMMUNITY DEVELOPMENT
CHARLESTON 25305

JOHN D. ROCKEFELLER IV
GOVERNOR

DONALD D. MOYER
DIRECTOR

April 23, 1978

RECEIVED MAY 05 1978 U.S. Nuclear Regulatory Commission NMSS Mail Section

Mr. Richard W. Starostecki, Chief
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material Safety
United States Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Starostecki,

We have examined with interest the draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0404). It certainly seems, from the findings of the study, that the expansion of at-reactor storage pools will help to alleviate the storage shortage problem through more compact storage methods without adversely impacting the environment or the health and safety of the populace. It is likewise indicated that the establishment of away-from-reactor storage pools, even with the requisite transportation and handling responsibilities, will have no negative effect on the environment or the health and safety of persons near the storage site or transportation route.

The viewpoint presented in this study appears to be less than objective because of the unquestioning acceptance of the safety and lack of risk involved with storage and transportation of nuclear wastes.

E-1 This position seems especially noteworthy when one considers the general preconception of the inherent risks associated with nuclear waste materials. This dichotomy in the estimates of risk involved with transportation and storage of nuclear wastes should be closely investigated. If this basic conclusion of the study is not substantiated, there are serious questions concerning the other conclusions. The low risk factor that is claimed is actually the premise on which is based the finding that coal powered generation is a less-than-optimal alternative. This, of course, is an issue of critical importance to West Virginia.
E-2 The Administration's impetus for coal-powered electrical generation over the next few decades must also be considered in light of the study's findings. I believe coal-powered generation is a more viable alternative than is indicated by the findings of this Impact Statement.

963246

STATE OF WEST VIRGINIA
GOVERNOR'S OFFICE
OF
ECONOMIC AND COMMUNITY DEVELOPMENT

April 23, 1978
Two

This analysis seems to gloss over certain rather significant questions. If all technological problems with waste storage and transportation have been solved, why have nuclear facilities and plants in Illinois, Kentucky, and West Valley, New York ceased operations? Why have some states outlawed the transportation of nuclear wastes in those states? The generally held view that there remain substantial risks in nuclear waste storage and transportation immediately comes to mind. It also is noteworthy that although nuclear plants have been operating for decades in the U.S., the problem of wastes has yet to be adequately addressed. To continue the practice of worrying about waste storage after the wastes are created will undoubtedly result in increasingly serious difficulties. Even the storage facilities referenced in this impact statement are planned
E-1 for interim storage only until 1985 when permanent storage is to be available. The latest findings show, however, that permanent storage facilities will not be developed by this target date. Is it not questionable to continue development of nuclear energy without having solved the inherent waste management problems of the industry?

At the very least, it would seem that transportation of wastes should be minimized. If it is true that technology has been perfected to allow the safe transport of nuclear wastes to away-from-reactor sites, there must at least be more stringent regulation of such transportation with very strict enforcement of these regulations. First, however, it must be demonstrated that such technology has been developed.

A further difficulty with away-from-reactor sites is the issue of ownership of such sites and assumption of risk. It would seem that the responsibility for such installations should be borne by those who benefit from the electrical production. The power companies involved should absorb all the costs associated with nuclear electric generation, including waste disposal costs. The federal government should not assume such risks and costs when the benefits accrue to only that portion of the populace serviced by the nuclear plant.

E-3

It might well be that there is a fourth alternative to the problem of waste storage. The limitation of further expansion of nuclear power until technology does, in fact, reach an acceptable level of safety would provide another approach. When all storage costs are considered with other associated costs of production, the economics of nuclear power production may be questionable. If wastes have to be retrieved and stored elsewhere in the future additional costs would be nearly impossible to fully assess. It would appear that in view of such facts, the development of coal-

STATE OF WEST VIRGINIA
GOVERNOR'S OFFICE
OF
ECONOMIC AND COMMUNITY DEVELOPMENT

April 23, 1978

Three

powered generating plants would be more feasible and certainly more aligned with the Administration's policy of greater dependence on coal to resolve our short-run energy problems.

E-3

We appreciate the opportunity to comment on the draft Impact Statement and will await further studies which will hopefully explain the discrepancies in the report's views of nuclear fuel storage.

Sincerely,

John D. Anderson

John D. Anderson, Director
Fuel and Energy Office

JDA/CWF/rac

NORTH DAKOTA STATE PLANNING DIVISION

STATE CAPITOL · NINTH FLOOR · BISMARCK, NORTH DAKOTA 58505
701-224-2818

April 24, 1978

STATE INTERGOVERNMENTAL CLEARINGHOUSE "LETTER OF CLEARANCE"
ON PROJECT REVIEW IN CONFORMANCE WITH OMB CIRCULAR NO. A-95

To: U. S. Nuclear Regulatory Commission

STATE APPLICATION IDENTIFIER: 7803239273

U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Director, Division of Fuel Cycle
and Material Safety

Dear Sir:

Subject: Draft Generic EIS on Handling & Storage of Spent Light Water Power Reactor Fuel.

This Draft EIS was received in our office March 23, 1978.

In compliance with OMB Circular No. A-95, our office has reviewed this Draft EIS and hereby gives clearance to it without comment. The ND State Intergovernmental Clearinghouse requests the opportunity for complete review of applications for renewal or continuation grants or applications not submitted to or acted on by the funding agency within one year after the date of this letter.

Sincerely yours,

Bonnie A. Banks

Mrs. Leonard E. Banks
Associate Planner

LEB/mm

DOCKETED
USNRC
MAY 0 4 1978
NMSS
MAIL SECTION

STATE PLANNING BUREAU
State Capitol
Pierre, South Dakota 57501
605/224-3661

SOUTH DAKOTA Office of Executive Management

April 24, 1978

RECEIVED
MAY 1 0 1978
U.S. Nuclear Regulatory Commission
NMSS
Mail Section

Richard Starostecki, Chief
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material
Safety
Nuclear Regulatory Commission
Washington, DC 20555

RE: EIS 090878 Review and comment on the Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel

Dear Sirs:

The State Clearinghouse has distributed for review the above stated draft environmental impact statement. No comments were received. Thank you for the opportunity to review and comment.

Sincerely,

Steve Merrick
Steve Merrick
Commissioner
State Planning Bureau

SM/afw

DOCKETED
USNRC
MAY 3 1978
NMSS
MAIL SECTION

963248

STATE PLANNING BUREAU
State Capitol
Pierre, South Dakota 57501
605/224-3661

SOUTH DAKOTA Office of Executive Management

DOCKETED
USNRC
MAY 0 2 1978
NMSS
MAIL SECTION
DOCKET CLERK

MAR 3 1 1978

DATE:	STATE APPLICATION IDENTIFIER: 090878
TO: DG	PLEASE RESPOND BY: 4-12

PLEASE REVIEW THE ATTACHED NOTICE OF INTENT AND INDICATE YOUR RESPONSE BELOW. NOTE REVIEW DIRECTIONS ON BACK. IF YOU HAVE ANY QUESTIONS CONTACT THE A-95 SECTION, STATE PLANNING BUREAU, 224-3661.

RESPONSE:

XXXXXX 1. This agency does not have any adverse comments on the project.

______ 2. We want more information on the project although no conflict is indicated (specify what information is desired below).

______ 3. We want more information on the project as a conflict is indicated (specify what information is desired below).

______ 4. Other

RECEIVED
MAY 0 2 1978
U.S. Nuclear Regulatory Commission
NMSS
Mail Section

REVIEWED BY: Van A. Lindquist — Van A. Lindquist, Executive Director — April 25, 1978
NAME/TITLE — DATE

STATE OF KANSAS

Department of Administration

DIVISION OF PLANNING AND RESEARCH
Topeka, Kansas 66612

RECEIVED
MAY 02 1978
U.S. Nuclear Regulatory Commission

April 26, 1978

Mr. Richard W. Starostecki, Cheif
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material Study
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

RE: U.S. Nuclear Reglatory Commission
Generic EIS on handling & Storage of
Spent Light Water Power Reactor Fuel.
5474 - EIS

Dear Mr. Starostecki:

The referenced project has been processed by the Division of State Planning and Research under its clearinghouse responsibilities described in Circular A-95.

After review by interested state agencies, it has been found that the proposed project does not adversely affect state plans. Enclosed are comments concerning this project for your information and referral.

Sincerely,

Maggie Vargas

Maggie Vargas
A-95 Coordinator

MV:jc

NOTE: All future requests for A-95 review must be accompanied by seven copies of the basic application.

DOCKETED
USNRC
MAY 02 1978
NMSS
MAIL SECTION
DOCKET CLERK

POOR ORIGINAL

7905249

STATE AGENCY A-95 TRANSMITTAL FORM

Return to:
Division of State Planning & Research, Department of Administration, Suite 501
Mills Building, Topeka, Kansas 66612

PROJECT TITLE: U. S. Nuclear Regulatory Commission - Generic EIS On Handling & Storage of Spent Light Water Power Reactor Fuel.

☐ Notification of Intent
☐ Final Application

DATE REVIEW PROCESS STARTED	DATE REVIEW PROCESS ENDED	SAI NUMBER
3-30-78	4-18-78	5474 - EIS

PART I Initial Project Notification Review (To be completed by Clearinghouse):

The attached project has been submitted to the State Clearinghouse under the provisions of the Federal OMB Circular A-95 revised. This form provides notification and opportunity for review of this project to the agencies checked below. Please fill in Part II and Part III below and return to the State Clearinghouse.

☒ Return by 4/18/78
☐ Expedite
☒ Add. Info. Avail.

REVIEW AGENCIES

☒ Agriculture
☐ Budget Division
☐ Civil Rights Commission
☐ Criminal Administration
☒ Economic Development
☐ Education
☒ Health and Environment
☒ Historical Society
☒ Kansas Corporation Commission
☐ Human Resources
☒ Park and Resources Authority
☐ Social and Rehabilitation Services
☐ Transportation
☐ Water Resources Board
☐ Regional Clearinghouse
APR 4 Recd ☒ Forestry, Fish & Game Commission
☒ State Conservation Commission

PART II Nature of Agency review comments (To be completed by review agency and returned to C

Check one or more appropriate boxes. Indicate comments below. Attach additional sheet if necessary or use reverse side.

☐ Request clarification or additional info. ☐ Suggestions for improving project propos

COMMENTS:

This proposal should have no significant impact on wildlife resources of Kansas. Programs and activities of the Fish & Game Commission will not be involved.

PART III Recommended State Clearinghouse Action (To be completed by review agency and returned to Clearinghouse):

Check one box only:

☒ Clearance of the project should be granted

☐ Clearance of the project should be delayed until the issues or questions have been clarified by the Applicant

☐ Clearance of the project should not be delayed but the Applicant should (in the final application) address or clarif the questions or concerns indicated abov

☐ Request the opportunity to review the final application prior to submission to the federal funding agency

Reviewer's Name	Div./Agency	Date
[signature]	Kans. Fish & Game Comm.	4-4-78

1-13

POOR ORIGINAL

STATE AGENCY A-95 TRANSMITTAL FORM

Return to:
Division of State Planning & Research, Department of Administration, Suite 501
Mills Building, Topeka, Kansas 66612

PROJECT TITLE: U. S. Nuclear Regulatory Commission - Generic EIS On Handling & Storage of Spent Light Water Power Reactor Fuel.

☐ Notification of Intent
☐ Final Application

DATE REVIEW PROCESS STARTED	DATE REVIEW PROCESS ENDED	SAI NUMBER
3-30-78	4-18-78	5474 - EIS

PART I Initial Project Notification Review (To be completed by Clearinghouse):

The attached project has been submitted to the State Clearinghouse under the provisions of the Federal OMB Circular A-95 revised. This form provides notification and opportunity for review of this project to the agencies checked below. Please fill in Part II and Part III below and return to the State Clearinghouse.

☒ Return by 4/18/78
☐ Expedite
☒ Add. Info. Avail.

REVIEW AGENCIES

☒ Agriculture
☐ Budget Division
☐ Civil Rights Commission
☐ Criminal Administration
☒ Economic Development
☐ Education
☒ Health and Environment
☒ Historical Society
☒ Kansas Corporation Commission
☒ Human Resources
☒ Park and Resources Authority
☐ Social and Rehabilitation Services
☐ Transportation
☐ Water Resources Board
☐ Regional Clearinghouse
☒ Forestry, Fish & Game Commission
☒ State Conservation Commission

PART II Nature of Agency review comments (To be completed by review agency and returned to C

Check one or more appropriate boxes. Indicate comments below. Attach additional sheet if necessary or use reverse side.

☐ Request clarification or additional info.
☐ Suggestions for improving project propo

COMMENTS:

We suggest that the comment from the Health and Environment dept be considered as our comment.

PART III Recommended State Clearinghouse Action (To be completed by review agency and returned to Clearinghouse):

Check one box only:

☐ Clearance of the project should be granted
☐ Clearance of the project should be delayed until the issues or questions have been clarified by the Applicant
☐ Clearance of the project should not be delayed but the Applicant should (in the final application) address or clari the questions or concerns indicated abo
☐ Request the opportunity to review the final application prior to submission t the federal funding agency

Reviewer's Name	Div./Agency	Date

STATE AGENCY A-95 TRANSMITTAL FORM

Return to:
Division of State Planning & Research, Department of Administration, Suite 501
Mills Building, Topeka, Kansas 66612

PROJECT TITLE: U. S. Nuclear Regulatory Commission - Generic EIS On Handling & Storage of Spent Light Water Power Reactor Fuel.

☐ Notification of Intent
☐ Final Application

DATE REVIEW PROCESS STARTED	DATE REVIEW PROCESS ENDED	SAI NUMBER
3-30-78	4-16-78	5474 - EIS

PART I Initial Project Notification Review (To be completed by Clearinghouse):

The attached project has been submitted to the State Clearinghouse under the provisions of the Federal OMB Circular A-95 revised. This form provides notification and opportunity for review of this project to the agencies checked below. Please fill in Part II and Part III below and return to the State Clearinghouse.

☒ Return by 4/16/7
☐ Expedite
☒ Add. Info. Avail.

REVIEW AGENCIES

☒ Agriculture
☐ Budget Division
☐ Civil Rights Commission
☐ Criminal Administration
☒ Economic Development
☐ Education
☒ Health and Environment
☒ Historical Society
☒ Kansas Corporation Commission
☐ Human Resources
☒ Park and Resources Authority
☐ Social and Rehabilitation Services
☐ Transportation
☐ Water Resources Board
☐ Regional Clearinghouse
☒ Forestry, Fish & Game Commission
☒ State Conservation Commission

PART II Nature of Agency review comments (To be completed by review agency and returned to

Check one or more appropriate boxes. Indicate comments below. Attach additional sheet if necessary or use reverse side.

☐ Request clarification or additional info.
☐ Suggestions for improving project propo

COMMENTS:

No money involved. Review is to fill some federal requirement.

PART III Recommended State Clearinghouse Action (To be completed by review agency and returned to Clearinghouse):

Check one box only:

☐ Clearance of the project should be granted
☐ Clearance of the project should be delayed until the issues or questions have been clarified by the Applicant
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☐ Request the opportunity to review the final application prior to submission the federal funding agency

Reviewer's Name	Div./Agency	Date
[signature]		

I-14

7903250

STATE AGENCY A-95 TRANSMITTAL FORM

Return to:
Division of State Planning & Research, Department of Administration, Suite 501
Hills Building, Topeka, Kansas 66612

PROJECT TITLE: U. S. Nuclear Regulatory Commission - Generic EIS On Handling & Storage of Spent Light Water Power Reactor Fuel.

☐ Notification of Intent
☐ Final Application

DATE REVIEW PROCESS STARTED	DATE REVIEW PROCESS ENDED	SAI NUMBER
3-10-78	4-18-78	5474 - EIS

PART I Initial Project Notification Review (To be completed by Clearinghouse):

The attached project has been submitted to the State Clearinghouse under the provisions of the Federal OMB Circular A-95 revised. This form provides notification and opportunity for review of this project to the agencies checked below. Please fill in Part II and Part III below and return to the State Clearinghouse.

☒ Return by 4/18/78
☐ Expedite
☒ Add. Info. Avail.

REVIEW AGENCIES

☒ Agriculture
☐ Budget Division
☐ Civil Rights Commission
☐ Criminal Administration
☒ Economic Development
☐ Education
☒ Health and Environment
☒ Historical Society
☒ Kansas Corporation Commission
☐ Human Resources
☒ Park and Resources Authority
☐ Social and Rehabilitation Services
☐ Transportation
☐ Water Resources Board
☐ Regional Clearinghouse
☒ Forestry, Fish & Game Commission
☒ State Conservation Commission

PART II Nature of Agency review comments (To be completed by review agency and returned to C

Check one or more appropriate boxes. Indicate comments below. Attach additional sheet if necessary or use reverse side.

☐ Request clarification or additional info.
☐ Suggestions for improving project propos

COMMENTS:

See Comment attached

PART III Recommended State Clearinghouse Action (To be completed by review agency and returned to Clearinghouse):

Check one box only:

☐ Clearance of the project should be granted

☐ Clearance of the project should be delayed until the issues or questions have been clarified by the Applicant

☒ Clearance of the project should not be delayed but the Applicant should (in the final application) address or clari the questions or concerns indicated abo

☐ Request the opportunity to review the final application prior to submission t the federal funding agency

Reviewer's Name	Div./Agency	Date

SAI: 5474 EIS

Title: U.S. Nuclear Regulatory Commission Generic EIS on Handling & Storage of Spent Light Water Power Reactor Fuel.

Comment:

F-1 Table ES-" Executive Summary requires a bit more descriptive unit than "excess mortality". Is the unit deaths per year or for the period to year 2000.

F-2 Pages 4-14 paragraph 4.2.2.1 First paragraph following Day Event list describes remaining byproduct materials inventory in percent. The use of percent is not particularly helpful in view of the fact that for many the removal of 90+ percent of anything seems to imply that none remains. This type of nonsense is no more acceptable than the nuclear opponent who describes the occurance of 2 cases of leukemia in a population where one is expected as a 1000% increase. In both cases the numbers are being used editorially not to mathematically describe a system. Such use of the editorial number is not helpful in impact statements.

POOR ORIGINAL

1-15

8603251

FOURTH PLANNING
& DEVELOPMENT
DISTRICT (605) 229-4740

615
s. main
aberdeen, s.d. 57401

RECEIVED
MAY 1 0 1978
U.S. Nuclear Regulatory Commission
NMSS
Mail Section

RESOLUTION

WHEREAS, the Fourth Planning and Development District Commission has been designated as the Areawide Planning Organization to perform and carry out comprehensive planning for District IV, and

WHEREAS, the Office of Management and Budget Circular No. A-95 (revised) requires that certain federal programs and projects shall be submitted to the designated Areawide Planning Organization for its review and comments, the basis of which is provided under Section 401 (a) of the Intergovernmental Cooperation Act of 1968 and Section 204 (c) of the Demonstration Cities and Metropolitan Development Act of 1966, and

WHEREAS, the Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel is located within the jurisdiction of the Fourth Planning and Development District Commission.

NOW, THEREFORE, BE IT HEREBY RESOLVED that the Fourth Planning and Development District Commission has reviewed the above program and found it to be consistent with the areawide goals and objectives.

Adopted this 26th day of April, 1978, by vote of the Commission.

DOCKETED
USNRC
MAY 1978
NMSS
MAIL SECTION
DOCKET CLERK

Lyle Richter, Chairman

ATTEST:

Chester Sellevold, Vice-Chairman

S.A.I. Number EIS090878

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230
(202) 377-4335

RECEIVED
MAY 0 8 1978
U.S. Nuclear Regulatory Commission

May 2, 1978

Mr. Richard W. Starostecki
Chief, Fuel Reprocessing and
Recycle Branch
Division of Fuel Cycle and
Material Safety
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Starostecki:

This is in reference to your draft environmental impact statement entitled, "Handling and Storage of Spent Light Water Power Reactor Fuel." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving ten copies of the final statement.

Sincerely,

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosures--Memos from:
1. William H. Stevenson, Regional Director, National Marine Fisheries Service
2. Douglas M. Le Comte, Special Projects, Environmental Data Service

DOCKETED
USNRC
MAY 0 8 1978
NMSS

POOR ORIGINAL

9603252

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL DATA SERVICE
Washington, D.C. 20235

APR 4 1978

April 3, 1978

TO: William Aron, Director
Office of Ecology and Environmental Conservation

FROM: Douglas M. Le Comte
Special Projects

SUBJECT: EDS Review of DEIS 7803.26 - Project No. M-4, Handling and Storage of Spent Light Water Power Reactor Fuel

1-1 When considering the alternative of terminating nuclear power plant construction, the additional release of CO_2 into the atmosphere which would result from increased fossil fuel burning should be considered. Climatologists suspect that increased CO_2 could significantly increase global temperatures in the next century, leading to the melting of Arctic ice and alteration of the climate. Any change in weather and climate could have adverse impacts on agriculture and other activities. The National Academy of Sciences report, "Energy and Climate," (1977) states that the "climatic effects of carbon dioxide release may be the primary limiting factor on energy production from fossil fuels over the next few centuries."

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Duval Building
9450 Koger Boulevard
St. Petersburg, FL 33702

APR 2 , 1978

April 12, 1978 FSE61/RPC

TO: Director, Ofc of Ecology & Conservation, EC

APR 21 1978

THRU: Assistant Director for Scientific & Technical Svcs, F5

FROM: William H. Stevenson
Regional Director

SUBJECT: Comments on Draft Environmental Impact Statement - Project No. M-4, Handling & Storage of Spent Light Water Power Reactor Fuel (NRC) (DEIS #7803.26)

The draft environmental impact statement for Project No. M-4, Handling and Storage of Spent Light Water Power Reactor Fuel that accompanied your memorandum of March 20, 1978, has been received by the National Marine Fisheries Service for review and comment.

The statement has been reviewed and the following comments are offered for your consideration.

General Comments:

1-2 We believe that all of the generic options discussed for handling and storage of spent light water power reactor fuel could be exercised without adversely impacting fishery resources provided that proper consideration is given to facility siting, design, and operation from the inception of the project. At the time a specific facility and location are proposed, the NMFS would be critically interested in reviewing the proposal for environmental compatibility with fisheries.

It is requested that one copy of the Final EIS be sent our Area Supervisor, Environmental Assessment Branch, P.O. Box 570, Beaufort, NC 28516.

cc:
F53 (3)
FSE611

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

ER 78/236

MAY 3 1978

Mr. Richard W. Starostecki, Chief
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle & Material Safety
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Starostecki:

Thank you for your letter of March 17, 1978, transmitting copies of the Nuclear Regulatory Commission's draft generic environmental impact statement on handling and storage of spent light water power reactor fuel [NUREG-0404].

Our comments are presented according to the format of the statement or by subject.

Outdoor Recreation

We find that the spent fuel policy as proposed within existing boundaries of licensed nuclear plants appears to have little or no effect on recreation resources in proximity to nuclear power plants. Substantive comments with regard to recreation concerns will be made on a case-by-case basis at the time of licensing application.

Groundwater

I-1 The analysis of replacement with coal-fired facilities does not indicate comparison of potential groundwater impact. We suggest that the inclusion in the final statement of at least a brief analysis of potential groundwater impacts from the use of coal-fired facilities would be appropriate.

Pool Storage

I-2 It is not clear what the effects of a total loss of water for moderation in pool storage may be -- other than perhaps the unshielded radiation hazard. This should be addressed in the final statement in terms of both effects and probability of occurrence.

Site Requirements

I-3 We suggest that the final statement provide a discussion of site requirements for spent-fuel storage facilities. Although site evaluations will be done on a case-by-case basis, we also believe it would be desirable in the final statement to establish some generic criteria, such as avoidance of flood plains.

We hope these comments will be helpful to you in the preparation of a final statement.

Sincerely,

Larry E. Meierotto
Deputy Assistant SECRETARY

Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

May 5, 1978

U. S. Nuclear Regulatory Commission
Washington, D. 20555

Attention: Director, Division of Fuel Cycle and
Material Safety

Gentlemen:

Attached is a brief note entitled "Detroit Edison Comments on Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel." The most important comment is that we concur with the findings. NUREG-0404 should be of significant help to industry and to DOE in proceeding with providing for the interim storage needs of the nuclear power industry while further work continues on ultimate waste disposal. Work on both interim storage of spent fuel and ultimate waste disposal should clearly be expedited, including licensing evaluations by NRC.

Sincerely,

Wayne H. Jens
Wayne H. Jens
Assistant Vice President
Engineering and Construction

/br

attachment

HEC78-75

<u>Detroit Edison Comments on</u>
<u>Generic Environmental Impact Statement on</u>
<u>Handling and Storage of Spent Light Water Power Reactor Fuel</u>

Edison has made a cursory examination of the subject document and judges that it represents an adequate assessment of the spent fuel problem. Moreover, we concur with the FINDINGS. A few specific comments are given below:

J-1
- Unfortunately, it now appears that the 1985 target date for an operational geologic repository for high-level nuclear waste has slipped to the early 1990's. While we see no drastic impact from this slippage on the findings in NUREG-0404, the report should be appropriately updated so as not to detract from its credibility.

J-2
- The 1985 away from reactor (AFR) storage requirements as given in Table 1.1 are a little higher than would be estimated from utility data gathered by EEI. Our estimate is 1300-1500 MT storage requirements with full core removal capability and compact on-site storage compared with 1900 MT given in Table 1.1. However, this difference has only a small impact on the need for AFR storage capability.

J-3
- The analysis of shipping cask requirements does not take into account the possibility of shipping more assemblies per cask than now licensed. Five year cooled fuel should have different shielding and cooling requirements than 120 day cooled fuel.

J-4
It may be prudent to begin design and licensing of such casks now as a step toward solving shipping problems and helping to reduce the cost. However,

J-4 before industry can be expected to take such a step, it will be necessary for the government to commit to a definite plan for AFR storage.

The possibilities of dry storage facilities appear particularly promising if indeed extended interim storage is expected. We are pleased that 10 CFR Part 72 will cover that option.

Earl H. Page
5/5/78

Wisconsin Electric POWER COMPANY
231 WEST MICHIGAN, MILWAUKEE, WISCONSIN 53201

May 4, 1978

U. S. NUCLEAR REGULATORY COMMISSION
Washington, D. C. 20555

Attention: Director, Division of Fuel Cycle and Material Safety

Gentlemen:

DRAFT ENVIRONMENTAL IMPACT STATEMENT
SPENT FUEL STORAGE

This is to acknowledge with thanks Mr. Starostecki's letter to us of March 17, 1978 transmitting for our review and comment the Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel, identified as NUREG-0404. We have reviewed this document, and appreciate the completeness of this report prepared by the Commission's Office of Nuclear Material Safety and Safeguards.

K-1 Any report of this nature which includes data in respect to the operations of existing nuclear facilities and the projected operations of plants currently under construction is, of course, subject to operating changes and may, therefore, reflect the situation only as of some date prior to publication. Examination of the Appendix tables indicates several areas where, we believe, information is already out of date. It may be appropriate for the NRC staff to consider making the final EIS more current by utilizing the spent fuel storage data recently submitted to, and summarized by, the Department of Energy. To assist you in updating the Appendix data for Point Beach Nuclear Plant, we have attached copies of our responses to the spent fuel storage questionnaires of both DOE and the House of Representatives Subcommittee on Oversight and Investigation of the Committee on Interstate and Foreign Commerce.

Obviously, changes in the projected discharges of spent fuel will result in changes in available storage space for each year and changes in the specific dates by which reactors would need to cease operation.

U. S. Nuclear Regulatory Commission -2- May 4, 1978

K-2.1 The economic analysis appearing on Page 6-9 concerning the cost increase if 1000 MW of nuclear capacity were forced to shut down is entirely unrealistic. We have calculated, for example, that the replacement power for our Point Beach Nuclear Plant, which is of approximately 1000 MW capacity, would require an additional expenditure of $206 million for fuel alone, or about 20 times the value appearing in the Draft EIS.

It is extremely unlikely that sufficient coal-fired generation exists to replace present nuclear capacity that might be forced to shut down because of lack of spent fuel storage capability. The usual and expected result of nuclear plant shut-down would be replacement of this capacity with older, inefficient generation or with peaking capability, almost all of which would be oil-fired.

K-3 No mention is made of demand changes that would be required for such replacement capability. It is virtually certain that few, if any, utility systems would have sufficient spare or reserve capacity to allow replacement of their nuclear generation without having to purchase such capability from sources outside their system to the extent it is available. No mention is made of the consequences of not being able to replace nuclear capacity by alternative generation sources.

K-2.2 Further in respect to these costs of nuclear plant shut-down because of lack of spent fuel storage capability, we suggest that these economics be calculated for the time at which they are expected to occur, namely in the early 1980's, with comparative cost and price data applicable to the period of time rather than to historic costs of times past in which substitute generation was not required.

Very truly yours,

Executive Vice President

Sol Burstein

Attachments

Copy to Mr. R. W. Starostecki, NRC

Wisconsin Electric POWER COMPANY
231 WEST MICHIGAN, MILWAUKEE, WISCONSIN 53201

January 18, 1978

Mr. Eric S. Beckjord, Acting Director
Division of Nuclear Power Development
U. S. DEPARTMENT OF ENERGY
Mail Stop F-305
Washington, D. C. 20545

Dear Mr. Beckjord:

DEPARTMENT OF ENERGY PROGRAM
FOR RETRIEVABLE SPENT FUEL STORAGE

In accordance with Mr. G. W. Cunningham's December 20, 1977, request for information pertaining to the proposed Department of Energy program for retrievable storage of spent fuel, Wisconsin Electric Power Company offers the following response:

1. Wisconsin Electric's estimate of spent fuel discharges from the Point Beach Nuclear Plant, Units 1 and 2, is as follows:

SPENT FUEL DISCHARGES FROM POINT BEACH
NUCLEAR PLANT BY CALENDAR YEAR, 1972 THROUGH 1990

NOTE: All Fuel Is Pressurized Water Reactor Type

YEAR	METRIC TONS OF HEAVY METAL AT DISCHARGE Total (MT)	NUMBER OF FUEL ASSEMBLIES Total
1972	17.1	44
1973	-	-
1974	43.0	113
1975	6.2	16
1976	25.4	66
1977	32.2	85
1978	32.9	85
1979	27.9	72
1980	27.9	72
1981	27.9	72
1982	27.9	72
1983	27.9	72

YEAR	METRIC TONS OF HEAVY METAL AT DISCHARGE Total (MT)	NUMBER OF FUEL ASSEMBLIES Total
1984	27.9	72
1985	27.9	72
1986	27.9	72
1987	27.9	72
1988	27.9	72
1989	27.9	72
1990	27.9	72

(All data based on final discharge date and isotopic data as of that date.)

Discharges of spent fuel from the planned Haven Nuclear Plant, Unit 1 will total 54 assemblies (25 MTHM) in each of the years 1989 and 1990.

2. Wisconsin Electric's estimate of calendar year cumulative totals of spent fuel on hand which has been cooled for at least five years is as follows:

POINT BEACH NUCLEAR PLANT SPENT FUEL
WHICH HAS BEEN COOLED AT LEAST FIVE YEARS

NOTE: All Fuel Is Pressurized Water Type

YEAR	METRIC TONS OF HEAVY METAL AT DISCHARGE (Cumulative)	NUMBER OF FUEL ASSEMBLIES (Cumulative)
1977	17.1	44
1978	17.1	44
1979	60.1	157
1980	66.3	173
1981	91.7	239
1982	123.9	324
1983	156.8	409
1984	184.7	481
1985	212.6	553
1986	240.6	625
1987	268.5	697
1988	296.4	769
1989	324.4	841
1990	352.3	913

As noted in item 3 below, not all fuel is currently at the Point Beach Nuclear Plant.

3. ESTIMATED TRANSFERS OF POINT BEACH NUCLEAR PLANT SPENT FUEL TO THE GOVERNMENT(1)

NOTE: All Fuel Is Pressurized Water Reactor Type

YEAR	METRIC TONS OF HEAVY METAL AT DISCHARGE (Cumulative)	NUMBER OF FUEL ASSEMBLIES (Cumulative)
1978	41.8	109(2)
1979	41.8	109
1980	87.4	229(3)
1981	87.4	229
1982	87.4	229
1983	87.4	229
1984	87.4	229
1985	87.4	229
1986	87.4	229
1987	87.4	229
1988	87.4	229
1989	87.4	229
1990	87.4	229

(1) Estimated transfers are based on successful completion of a spent fuel pool rerack program at Point Beach Nuclear Plant. The planned program will result in an additional 1200 long-term storage positions in the existing storage pool. Also, please refer to item 4C below.

(2) 109 spent fuel assemblies (41.8 MTHM) currently in storage at the General Electric Company facility near Morris, Illinois would be transferred to the Government. Transfer of this fuel as early as possible is based on the assumption that the government will assess the same one-time storage fee for all spent fuel transferred, regardless of the type of storage facility (interim or permanent) to which delivery is made.

(3) 120 spent fuel assemblies (45.7 MTHM) currently in storage at the Nuclear Fuel Services, Inc. facility near West Valley, New York would be transferred to the Government. Also, please see item 4(a) below.

4. Statement Of The Need For Fuel Transfers Prior To Five Years Notice and Cooling

(a) Wisconsin Electric Power Company anticipates that it will wish to transfer 45.7 metric tons of heavy metal (estimated at discharge) contained in 120 PWR fuel assemblies to the Government during the year 1980.

Although the five-year notice requirement will not have been satisfied by 1980, all of the fuel to be transferred will have cooled for at least five years.

The subject 120 fuel assemblies are now stored at the Nuclear Fuel Services facility near West Valley, New York. Wisconsin Electric's need to transfer such fuel to the Government in 1980 arises from the presently projected expiration of NFS's lease at the end of 1980 and the present inability to determine whether continued storage at this site will be available to Wisconsin Electric in 1981 and beyond.

(b) Wisconsin Electric desires to transfer 109 spent fuel assemblies (41.8 MTHM) from the General Electric Company facility near Morris, Illinois to the Government at the earliest possible date. All transfers would necessarily violate the basic requirement for five years notice and, depending on the actual year of transfer, some of the spent fuel assemblies delivered may have less than five years of cooling after discharge from the reactor.

(c) If Wisconsin Electric is unsuccessful in its efforts to modify Point Beach spent fuel storage racks to provide increased capacity for on-site water pool storage, it will be necessary to substantially revise the schedule of transfers to the government. Based on current capacity of the Point Beach Nuclear Plant spent fuel storage pool, it would be necessary to transfer 22 fuel assemblies (8.5 MTHM) in 1979 and 72 fuel assemblies (27.8 MTHM) in each year thereafter until such time as a rerack program is complete or some other fuel disposal opportunity is available in order to maintain full core discharge capability. Of these additional fuel assemblies to be shipped from Point Beach to the Government, the following would not meet proposed notice and/or cooling criteria:

YEAR OF TRANSFER	METRIC TONS OF HEAVY METAL AT DISCHARGE	NUMBER OF PWR FUEL ASSEMBLIES	WOULD NOT MEET CRITERIA FOR: NOTICE	COOLING
1979	8.5	22	X	X
1980	27.8	72	X	X
1981	27.8	72	X	X
1982	27.8	72	X	X
1983	27.8	72		X
1984	27.8	72		X
1985	27.8	72		X
1986	27.8	72		X
1987	27.8	72		X
1988	27.8	72		X
1989	27.8	72		X
1990	27.8	72		X

Please note that the above quantities are 1) not cumulative and 2) not included in the preceding estimate of transfers (cumulative) to the government.

5. Comments On The Acceptance Guidelines And Criteria Provided For Consideration

(a) Although the five-year notice requirement appears to be reasonable as a general rule where such notice is required to determine new pool construction it should be waived, if at all possible, for those operating reactors which are unable to accommodate an additional five years of spent fuel discharges or where such notice is not required for pool operation.

(b) It is not clear from the indicated guidelines and criteria whether or not contracting would be on a "take-or-pay" basis; a more flexible arrangement would be preferred since reactor schedule disruptions could affect required storage amounts.

(c) Technical justification for the requirement for five years cooling prior to transfer for interim storage should be provided. Since the age of spent fuel affects only the interim storage cooling system, which comprises a small increment of interim storage facility cost, the five year cooling period requirement appears to be an unjustifiable restriction.

(d) Although receipt of fuel in owner-provided casks might complicate receiving activities at the government facility due to the wide variety of casks which could be utilized, it is recommended that the receiving facility be designed to make efficient use of all currently-licensed spent fuel shipping casks. This will be necessary to accommodate the anticipated demand for shipping services and to serve those reactors which are restricted to certain types of casks.

6. Comments On Time And Form Of Proposed Fee Payment

(a) Storage fee arrangements should be cost-based and should provide no more than full cost recovery to the Government. All customers should be charged the same fee for storage without regard to actual facility utilization (interim or permanent) or year of spent fuel transfer, except as to actual or estimated changes in operating costs with time.

(b) Payment of a one-time storage fee at the time of delivery to the government facility is acceptable; the fee should be based on anticipated costs at the time of delivery for storage and should not be subject to retroactive adjustment.

(c) The mechanism under which retrieval of spent fuel would be offerred to storage customers seems to be overly restrictive. There does not appear to be a compelling argument for forcing customers into a one-time-only decision to take back their spent fuel, particularly when the Government's offer to return the spent fuel may not be timely or appropriate with respect to the availability of reprocessing or other forms of disposition.

7. Other Comments

(a) The Government should be prepared to administer both receiving and storage schedules in an effort to maximize facility utilization and accommodate customers' requirements. It will be necessary to trade deliveries or assign storage positions among customers upon relatively short notice (substantially less than five years) in order to effectively deal with the customers' contingencies or operating perturbations. Such schedule administration can be done more effectively by the operator of the facility than by any other entity.

(b) Wisconsin Electric supports the Government's efforts in providing a viable solution for the disposition of spent fuel particularly to the extent that such action will effectively answer current public expressions of concern about nuclear waste management. It should be emphasized, however, that Wisconsin Electric continues to believe in the need for, and desirability of, uranium and plutonium reprocessing and recycle to assure the continued availability and efficient utilization of a valuable energy resource.

Very truly yours,

Sol Burstein
Executive Vice President

POOR ORIGINAL

9603260

Wisconsin Electric POWER COMPANY
231 WEST MICHIGAN, MILWAUKEE, WISCONSIN 53201

November 28, 1977

Mr. John E. Moss, Chairman
Subcommittee on Oversight and
Investigations
CONGRESS OF THE UNITED STATES
House of Representatives
Washington, D. C. 20515

Dear Representative Moss:

NUCLEAR SPENT FUEL QUESTIONNAIRE

Attached are responses to your request of November 4, 1977 regarding the spent fuel storage situation of Wisconsin Electric Power Company.

Point Beach Nuclear Plant, Units 1 and 2, have a common spent fuel storage pool. We have, therefore, completed Sections II, III, IV, and V accordingly. Section I is answered for each reactor.

Very truly yours,

Executive Vice President

Sol Burstein

Attachment

11/28/77

NUCLEAR SPENT FUEL QUESTIONNAIRE

I. Reactor Information

A. Complete name of unit: Point Beach Nuclear Plant, Unit 1

B. Owner(s): Wisconsin Electric Power Company
Wisconsin Michigan Power Company

C. Licensed operator (utility): Wisconsin Michigan Power Company

D. Maximum dependable capacity (gross MWe): 524

E. Type of reactor (e.g. PWR, BWR): PWR

F. Date of first commercial operation: December 21, 1970

G. Core size (number of assemblies): 121

H. Average yearly fuel discharge (number of assemblies): 36

I. Date of first refueling: September 30, 1972

J. Date of next scheduled refueling and discharge: Sept. 29, 197

K. Total number of spent fuel assemblies discharged to date: 217

L. Number of spent fuel assemblies in storage at reactor: 87

M. Please explain difference between the number given in response to "L" and that provided in response to "M" above.

Spent fuel shipments have been made to:

Nuclear Fuel Services, West Valley, New York	120
General Electric, Morris, Illinois	9
Battelle Memorial Institute, Columbus, Ohio	1

A. Complete name of unit: Point Beach Nuclear Plant, Unit 2

B. Owner(s): Wisconsin Electric Power Company
Wisconsin Michigan Power Company

C. Licensed operator (utility): Wisconsin Michigan Power Compan

D. Maximum dependable capacity (gross MWe): 524

E. Type of reactor (e.g. PWR, BWR): PWR

F. Date of first commercial operation: October 1, 1972

G. Core size (number of assemblies): 121

H. Average yearly fuel discharge (number of assemblies): 36

I. (continued)

I. Date of first refueling: October 16, 1974

J. Date of next scheduled refueling and discharge: March 10, 197

K. Total number of spent fuel assemblies discharged to date: 120

L. Number of spent fuel assemblies in storage at reactor: 21

M. Please explain difference between the number given in response to "L" and that provided in response to "M" above.

Spent fuel shipments have been made to:

General Electric, Morris, Illinois

II. Spent Fuel Storage Program

A. Pool Statistics

(1) Physical size of pool (depth, length, and width):

Point Beach Units 1 and 2 share a common spent fuel storage facility. It is composed of a North and a South pool. Each is 41'4" deep, 34' long, and 18'4" wide.

(2) Original capacity of pool (number of assemblies):

The North pool has a cask setdown area and, as such, has fewer storage spaces available. The initial capacity of the facility was:

North pool	64 assemblies
South pool	144 assemblies
	208 assemblies

(3) Present capacity of pool (number of assemblies):

North pool	63 assemblies
South pool	288 assemblies
	351 assemblies

(4) Maximum future capacity of pool:

Wisconsin Electric is contemplating the expansion of total capacity up to potential maximum of 1,488 assemblies. This would be accomplished by using high-density storage racks containing poison material.

1-25

POOR ORIGINAL

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II. (continued)

A. (continued)

(5) Estimated annual operating and maintenance cost of spent fuel storage program:

The annual operating and maintenance cost of our spent fuel storage facility is not segregated from other plant operating and maintenance costs.

(6) Date of loss of storage capacity sufficient for discharging a full core:

(a) Present pool: October 1979

(b) Pool with maximum expansion: March 1995

(7) Date of loss of storage capacity for a normal refueling discharge:

(a) Present pool: March 1980

(b) Pool with maximum expansion: September 1996

(8) Number of assemblies currently in storage considered to be "leakers" or otherwise defective:

Two assemblies presently in storage at Point Beach are considered to be "leakers". One is the result of baffle-jetting induced vibration; the other, of unknown cause.

B. Past Pool Capacity Expansion

(1) Number of times pool capacity has been expanded:

The pool capacity was expanded in 1975 from 208 to 352 assemblies.

(2) Date that the application for an amendment to the operating license was filed with the Nuclear Regulatory Commission for each expansion: March 28, 1975

(3) Date each expansion was completed: October 1975

(4) Type of expansion:

The expansion was the replacement of old racks with racks of closer spacing.

963262

II. (continued)

B. (continued)

(5) Number of additional assembly spaces created by each expansion: 144

(6) Total pool capacity after each expansion (number of assemblies):

The total capacity is now 351 assemblies. One space was designated to provide room for visual inspection of fuel assemblies.

(7) Cost of each expansion:

Approximate cost of the expansion was:

Storage rack modification	$ 800,000
Cooling system modification	1,200,000
	$2,000,000

(8) Extent of intervenor participation, if any, in each expansion proceeding: None

C. Current Pool Capacity Expansion

Not applicable

D. Planned Pool Capacity Expansion

(1) Estimated date for filing an application for an amendment to the operating license with the Nuclear Regulatory Commission: March 1978

(2) Scheduled date of completion:

Estimated completion dates are October 1979 for the North pool, and October 1980 for the South pool.

(3) Type of expansion:

The new racks will be high-density storage racks utilizing boron poison material.

(4) Number of additional assembly spaces to be created:

A maximum of 1,137 additional spaces will be created.

II. (continued)

D. (continued)

(5) Total pool capacity after expansion (number of assemblies):

The maximum total pool capacity would be 1,488 upon completion.

(6) Estimated cost of expansion:

The estimated cost of the expansion is $3,800,000.

(7) Extent of expected intervenor participation, if any, in expansion proceeding: Unknown

(8) Type(s) of expansion, if any, which is (are) not being considered; and, for each, the reason why it is not being considered:

a. Additional off-site storage facility is being considered, but economics, timing, expected life, and uncertain governmental actions remain as concerns.

b. Reracking with non-poison material - Not economically justified for limited capacity obtained.

III. Spent Fuel Shipping Program

A. Number and present location(s) of spent fuel assemblies shipped away from reactor pool, if any:

General Electric, Morris, Illinois	108
Nuclear Fuel Services, Inc., West Valley, New York	120
Battelle Memorial Institute, Columbus, Ohio	1

B. Mode(s) of transportation used (truck, rail, barge):

All were shipped by truck.

C. Mode(s) of transportation capable of being used (truck, rail, barge):

The only mode available is truck.

D. Preferred mode of transportation (truck, rail, barge):

Truck is the preferred mode.

III. (continued)

E. Owner(s) of shipping casks used:

Nuclear Fuel Services, Inc.
Nuclear Assurance Corporation

F. Plans for future shipment of spent fuel including

(1) Estimated shipment date(s): Unknown

(2) Number of assemblies: Unknown

(3) Destination: Unknown

(4) Mode of transportation: Unknown

IV. Spent Fuel Storage Problems

A. Have any fuel rods ruptured, exploded, or otherwise leaked radiation while in storage? If yes, please explain.

No fuel rods have ruptured or "exploded" while in storage at Point Beach. As noted in II(A)(8), some leakers have been found; however, no assemblies were found to begin leaking while in storage.

B. Have you experienced problems with warped or damaged fuel assemblies in storage? If yes, please explain.

No problems with warped or damaged fuel assemblies have been encountered in plant operation.

C. Have you experienced problems with damaged racks? No

D. Has the liner of the spent fuel pool ever leaked? No

E. Has the pool radioactive waste system ever failed? No

F. Has the pool coolant circulation system ever failed? If yes, please explain.

Yes. In March 1977 a mechanical seal on the cooling pump failed. Four to six hours were required for repair.

G. Have you had problems with "crud" build-up on the assemblies in the pool? No

H. Has the spent fuel pool ever been drained? No

IV. (continued)

I. Has the radiation level of the spent fuel pool ever exceeded allowable limits? No

J. Have fuel assemblies ever been dropped during handling?

No fuel assemblies have been dropped during handling at Point Beach Nuclear Plant.

K. Please describe any problems encountered in storing spent fuel not described in response to the above questions.

Wisconsin Electric has not encountered any problem which is not previously answered in this questionnaire.

V. Alternative Storage Plans

Please list and explain any spent fuel storage alternatives in addition to increasing at reactor pool storage that you have considered. Please include, if appropriate, discussion of possible shipments to independent storage facilities that you operate, independent storage facilities not operated by you, other reactors, or other utilities. To what extent have any of these options been considered and implemented?

The operators of the Point Beach Nuclear Plant have been discussing the possibility of expansion of the Morris facility in possible joint venture with General Electric and some of its other former reprocessing customers. Although these discussions have been taking place for almost a year, no conclusion has been reached.

We have been informed by Nuclear Fuel Services that they are not in a position to receive any more spent fuel for storage at their West Valley, New York facility. We have also been informed by Allied-General Nuclear Services that they are not able to make spent fuel storage available to us.

We are aware of studies of "independent" spent fuel storage facilities that have been made, but none has progressed sufficiently to allow serious consideration of such a facility at this time.

Questionnaire completed by Sol Burstein, Executive Vice President
Wisconsin Electric Power Company
231 West Michigan Street
Milwaukee, Wisconsin 53201
(414) 277-2121

Date completed: November 28, 1977

3603264

POOR ORIGINAL

North Carolina
Department of Administration
116 West Jones Street Raleigh 27603

James B. Hunt, Jr., Governor
Joseph W. Grimsley, Secretary

May 4, 1978

RECEIVED
MAY 1 0 1978
U.S. Nuclear Regulatory Commission

Mr. Richard W. Starostecki
Fuel Reprocession & Recycle Branch
Div. of Fuel Cycle & Material Safety
US Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Starostecki

RE: SCH File # 045-78; Draft EIS on Generic, Handling & Storage of Spent Light Water Power Reactor Fuel

The State Clearinghouse has received and reviewed the above referenced project. As a result of this review, the State Clearinghouse finds that no comment is necessary on this project at this time.

Sincerely,

Denny M. Guire

Denny Mc Guire (Ms.)
Clearinghouse Supervisor

DOCKETED
USNRC
MAY 1 0 1978
NMSS
MAIL SECTION
DOCKET CLERK

PGE Portland General Electric Company

John E. Grund Assistant Vice President

May 5, 1978
ESD-0251-78L
ENV 6

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Director, Division of Fuel Cycle and Material Safety

Gentlemen:

Attached for your consideration are comments offered by Portland General Electric Company personnel regarding the Draft Generic Impact Statement (Nureg-0404).

We appreciate the offer to comment on this document.

Sincerely,

John E. Grund

John E. Grund
Assistant Vice President
Environmental & Analytical Services Dept.

JEG/SCK:kaw

Attch.

INTER-OFFICE COMMUNICATION
PORTLAND GENERAL ELECTRIC COMPANY

Date April 27, 1978

JLF-259-78M

To J. E. Grund

From J. L. Frewing

Subject <u>NRC GEIS on Spent Fuel Storage, Comments on</u>

L-1 We offer for your use the following comments on NUREG-0404, the NRC generic environmental impact statement on spent fuel storage. Our comments are somewhat limited because of the relatively short time for review. If the NRC extends the comment period, additional comments might be warranted.

A. Page 3-9, Table 3.4: The correct pool storage capacity for Trojan is 280 assemblies rather than the 256 shown. The correct planned increase in capacity for Trojan is 371 assemblies rather than the 395 shown.

L-2 B. Section 7.0: The section states that conservation alone cannot compensate for the loss of electrical generating capacity from reactor shutdowns caused by the lack of spent fuel storage and that coal will be the primary replacement energy source. This hypothesis is used in the impact statement to evaluate the consequences of reactor shutdown. While we do not disagree with this conclusion, we recommend that additional justification be provided in this regard to avoid later controversy on this subject.

L-3 C. Page B-4, Section 1.2 and Appendix D: These sections discuss design codes and regulatory requirements applicable to spent fuel storage facilities. These sections should reflect that these codes and regulatory requirements have evolved with time and, as such, the particular design features in individual plants may differ somewhat depending when the plants were designed and licensed.

D. Page E-8, Table E.1: The storage capacity for Trojan should be revised from 340 to 280 assemblies to reflect the actual storage capacity.

E. Table E-14, Table E.2: It is our understanding from Fuel Supply (J. T. Owens) that PGE anticipates discharging approximately 60 assemblies per year to the Spent Fuel Pool rather than the 42 assemblies shown.

F. Page E-20, Table E.3; Page E-25, Table E.4 and Page E-31, Table E.5: These Tables should be revised to reflect the actual Trojan storage capacity and expected spent fuel discharge rate discussed in D. and E. above.

JLF-259-78M
J. E. Grund
April 27, 1978
Page two

G. Page F-12, Table F.1 and Page F-16, Table F.2: These tables should be revised to reflect the actual storage capacity. This revision will change the years in the tables when full core reserve is lost and when the Spent Fuel Pool is filled.

H. Page F-20, Table F.3: This table should be revised to reflect that the proposed expanded storage capacity is 651 assemblies per year, or using the assumed generic expansion factor of 2.5, the capacity should be 280 x 2.5 = 700.

I. Page F-24, Table F.4: This table should be revised to reflect the correct capacity discussed in H. above. This correction will change the date listed in the table when Trojan will loose full core reserve.

J. Page F-31, Table F.10; Page F-34, Table F.11; Page F-37, Table F.12; Page F-41, Table F.13 and Page F-42 and Table F.13: These tables should be revised to reflect the corrections discussed in G., H., and I. above.

L-4 H. Page H-22, Section 3.1.3: We recommend that the discussion of spent fuel storage experience include the work of Dr. A. B. Johnson which is described in Document BNWL-2256, Behavior of Spent Nuclear Fuel in Water Pool Storage.

If you have questions on these comments, please contact T. D. Walt.

JLF/TDW/jdh/4.1A4

c: W. J. Lindblad
D. J. Broehl
S. Katkansky
R. L. Sullivan
J. W. Lentsch
G. A. Zimmerman
J. T. Owens
File: Federal Spent Fuel Storage Programs

POOR ORIGINAL

963266

March 30, 1978

RECEIVED
[illegible] 1978
R. B. SNYDER

MEMORANDUM

TO: Bruce Snyder

FROM: J. T. Owens JTO

SUBJECT: Comments on Draft EIS on Spent Fuel

The data used in the analysis of spent fuel storage need is not correct for Trojan. Correct data using the EIS assumptions is provided in the attached memo from Mark Litterman.

L-1 The fuel usage assumptions for Trojan are also in error. The maximum fuel usage is really the normal usage for the plant. The minimum usage assumes a 42 bundle reload. Under current specifications and limitations, the minimum reload appears to be 48 bundles.

L-5 The assumption on rack modification for Trojan was 2.5 times existing space. This is not correct for Trojan.

The sweeping assumptions of minimum usage and rack expansion were incorrect for Trojan and are questionable on a generic basis.

JTO/lm

896

March 24, 1978

MENORANDUM

TO: J. T. Owens

FROM: Mark Litterman ML

SUBJECT: Corrections to Appendices E&F of "Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel."*

L-1 The Draft report erroneously assumes Trojan has 340 spent fuel assembly locations in its spent fuel racks. In actuality Trojan has only 280 spent fuel locations in its spent fuel racks. The following corrections should be included in the final report.

1) Table E-1, page E-8: 280 replaces 340

2) Table E-2, page E-14: The report defines both minimum and maximum fuel usage. Table E-2 lists minimum fuel usage values for all reactors Trojan's estimated spent fuel discharge data is 64 assemblies in 1978 and 60 assemblies thereafter.

3) Table E-3, page E-20: The fuel pool date of 1985 for Trojan again assumes minimum fuel usage. The expected fuel pool date assuming no installation of additional racks is 1982.

4) Table E-4, page E-25: Same as 3 above.

5) Table E-5, page E-31: Same as 3 above.

6) Table F-1, page F-12: Correct to

	78	79	80	81	82	83	84	85	86	Year Out	Storage Capacity
Trojan	216	152	88	24	-40	-104	-168	-232	-296	1982	280
	238	196	154	112	60	8	-44	-96	-148	1984	

7) Table F-2, page F-16: Correct to

	78	79	80	81	82	83	84	85	86	Year Out	Storage Capacity
Trojan	23	-41	-105	-169	-233	-297	-361	-425	-489	1979	87
	45	3	-39	-81	-133	-185	-237	-289	-341	1980	

* NUREG-0404, Vol. 2. Appendices

8) Table F-3, page F-30:

	78	79	80	81	82	83	84	85	86	Year Out	Storage Capacity
Trojan	587	523	459	395	331	267	203	139	75		651
	609	567	525	483	431	379	327	275	223		

9) Table F-4, page F-24:

78	79	80	81	82	83	84	85	86	Year Out	Storage Capacity
394	330	266	202	138	74	10	-54	-118	1985	458
416	374	332	290	238	186	134	82	30		

10) Table F-10, page F-31: Minimum fuel usage Move Trojan from 1985 to 1984
Maximum fuel usage Move Trojan from 1983 to 1982

11) Table F-11, page F-33 - F-34:
Minimum fuel usage Move Trojan from 1981 to 1980
Maximum fuel usage Move Trojan from 1980 to 1979

12) Table F-12, page F-37: Minimum fuel usage Place Trojan in 1991
Maximum fuel usage Move Trojan from 1992 to 1988

13) Table F-13, page F-40: Minimum fuel usage Move Trojan from 1992 to 1987
Maximum fuel usage Move Trojan from 1988 to 1985

* Tables F-3, F-4, F-12 and F-13 assume expanded storage of 651 spent fuel assembly locations.

INTER-OFFICE COMMUNICATION
PORTLAND GENERAL ELECTRIC COMPANY

Date April 17, 1978

RECEIVED
APR 17 1978
D. J. BROEHL
Asst. Vice President

To D. J. Broehl

From L. J. Booth

Subject Generic Environmental Impact Statement
NRC Project M-4, March 1978 - Appendix C

We have reviewed the coal fired plant termination case impacts of Appendix C of the Generic EIS for handling of spent fuel from light water power reactors.

The model plant description covers both pulverized coal fired and cyclone furnace fired units, which are called "current technology". We feel that cyclone fired units should no longer be considered "current practice".

L-6

The cyclone furnace inherently produces higher levels of oxides of nitrogen (NO_x) and hence it is unlikely that future coal fired units would use cyclone furnaces. Even before the present NO_x limitations went into effect, its use had declined. ~~American Electric Power,~~ The largest ~~single~~ users of cyclone units in the 50's and 60's, has decided not to buy additional cyclone units, largely because the cyclone type furnace limited their coal procurement choices to those coals which had ash characteristics suitable for cyclone firing. A change to pulverized coal firing gave them a much broader choice of coal supplies. In the last few years, only two cyclone fired units have been sold to utilities, one of approximately 125 megawatts in 1974 and one of approximately 450 megawatts in 1975.

The description of the model plant mentions a steam pressure of 3500 psig. We feel that the current trend is for units with nominal steam pressure of 2400 psig, rather than the nominal 3500 psig supercritical pressure cycle.

Many other items are somewhat out of date. For example, it is assumed that no scrubber system would be required if low sulfur coal is used, and it is assumed that Intermittent Control Systems would provide a cost effective emission control. It is currently unlikely that scrubbers could be omitted or that an intermittent control system would be an acceptable emission control method. In the listing of scrubber types, the venturi and the moving bed are listed as most widely used. Currently, the trend is toward the use of the spray chamber type of scrubbers.

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L-6

The Section 5.1.1 on electrostatic precipitators and Table C.4 on emissions contain various inconsistencies. Section 5.1.1 shows fly ash residuals from 0.4 - 1% leaving the precipitator. Table C, on the contrary, shows emissions as low as 0.13% of the total ash in the fuel. The statement in Section 5.1.1 with respect to reduced collection efficiency of cold precipitators is misleading, since either a cold or a hot precipitator would be designed to meet the required emission limits. The assumption of precipitator efficiency on cyclone fired units equal to precipitator efficiency on pulverized coal fired units is totally unrealistic. Hence all of the data on particulate matter from the cyclone fired units are incorrect.

GENERAL ELECTRIC

NUCLEAR ENERGY BUSINESS GROUP

GENERAL ELECTRIC COMPANY, 175 CURTNER AVE., SAN JOSE, CALIFORNIA 95125

1978 MAY 11 AM 10 23

NUCLEAR ENERGY PROGRAMS DIVISION

DMD-175

May 5, 1978

DOCKETED USNRC MAY 12 1978 NMSS MAIL SECTION DOCKET CLERK

U.S. Nuclear Regulatory Commission
Washington, D.C.
Attention: Director, Division of Fuel Cycle and Material Safety

SUBJECT: DRAFT GENERIC ENVIRONMENTAL IMPACT STATEMENT ON HANDLING AND STORAGE OF SPENT LIGHT WATER POWER REACTOR FUEL

Gentlemen:

This letter is in response to the request for comments on the subject Draft Environmental Impact Statement (GEIS). We have reviewed the GEIS and find that it is a comprehensive report which covers all important aspects of spent fuel storage and handling in an adequate manner.

We concur with the conclusion that storage and handling of spent fuel is a well established technology and represents a low environmental impact and low potential risk to the health and safety of the public.

It is appropriate that these findings be published at this time to refute the claims of opponents to nuclear power that spent fuel storage is an unresolved problem with grave potential risk.

We trust that the completion and issuance of the GEIS will be beneficial to future licensing/actions for away from reactor spent fuel storage facilities.

Respectfully submitted,

GENERAL ELECTRIC COMPANY

Don Dawson

D.M. Dawson, Manager
Licensing & Transportation
408*925-6330 MC 861

DMD:RKS:bn

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POOR ORIGINAL

DOLPH BRISCOE
GOVERNOR

OFFICE OF THE GOVERNOR

May 5, 1978

RECEIVED MAY 17 1978

Mr. Richard W. Starostecki, Chief
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material Study
United States Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Starostecki:

The Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel has been r[illegible] by the Budget and Planning Office and interested State agencie .

The comments of the reviewing agencies are enclosed for your use in the preparation of the final environmental impact statement. If this Office can be of further assistance, please contact us.

Sincerely,

Roy Hogan

Roy Hogan, Assistant Director
Budget and Planning Office

Enclosures

DOCKETED USNRC MAY 17 1978 NMSS MAIL SECTION DOCKET CLERK

EXECUTIVE OFFICE BUILDING • 411 WEST 13TH STREET • AUSTIN, TEXAS 78701

April 26, 1978

Mr. Charles D. Travis, Director
Governor's Budget & Planning Office
700 Executive Office Building
Austin, Texas 78701

SUBJECT: U.S. Nuclear Regulatory Commission -- Draft Generic Environmental Impact Statement -- Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0404, Vols. 1 and 2), March 1978.

Dear Mr. Travis:

In response to your memorandum of March 27th, the Texas Department of Water Resources (TDWR) has reviewed the subject Draft Generic Environmental Impact Statement (DGEIS) prepared by the U.S. Nuclear Regulatory Commission (NRC) pursuant to NRC's regulations, 10 CFR Part 51, relative to the implementation of the National Environmental Policy Act of 1969.

The scope of the subject DGEIS is limited essentially to an evaluation of two alternative interim solutions to the federal government's nation-wide problem of insufficient spent nuclear fuel storage capacity through the year 2000, pending the development of a U.S. public consensus and the formulation of a U.S. governmental policy on the permanent disposition or storage of the spent fuel by reprocessing or waste management. The two alternative solutions considered in the DGEIS (see page 7 7, Vol. 1) are:

1. Curtailment in the further growth of spent nuclear fuel by the shut-down of existing nuclear plants when capacities of their present unmodified fuel storage pools are exhausted and the plants are replaced with coal-fired units.

2. Increase of at-reactor (AR) storage capacity by providing compact storage in the fuel pool to provide immediate relief of the capacity problem. This alternative entails later shipment of spent fuel to away-from-reactor (AFR) facilities for perpetual storage, after the present AR storage capacity is exhausted. (See pages ES-3, and 8-1, Vol. 1: The projected cumulative quantity of spent fuel generated by the year 2000 is 95,000 metric tons of heavy metal (MTHM); and the quantity to place in AFR storage is 41,000 MTHM.)

TDWR offers the following review comments:

1. Page ES-8, section 4.1.4; page ES-11, second paragraph; page 8-1, paragraph 3: Attention is invited to the predictions made on page ES-11 that "...action will be taken on policy issues pertaining to the ultimate disposition of spent fuel by mid-1980's," and that "...the situation is manageable for some time beyond then, provided that the planning for AFR storage is initiated in a timely fashion."

5-1 In elaboration of the foregoing, an important assumption and further prediction is made on pages 8-1 and -2, that if "...the national objective of an operational geologic repository for high-level nuclear wastes and possible disposal of spent fuel by 1985 is attained, the amount of spent fuel requiring away-from-reactor storage is not great. Only if there is a serious slippage in the startup date for such a facility will a large amount of spent fuel require away-from-reactor storage in the last decade of this century. Even under these circumstances, only 6 storage pools of...(7,000 MT) would be required by the year 2000."

Finally, attention is invited to the statement made on page ES-8 that "...extended spent fuel storage, per se, does not foreclose any options on the future storage and possible ultimate disposal of spent fuel as nuclear waste materials. Rather, storage of spent fuels for a period of time could be beneficial as it would provide time for the decay of short-lived radionuclides; subsequent storage and disposal need then only provide for the long-lived radionuclides."

Mr. Charles D. Travis
Page Three
April 26, 1978

In the light of the foregoing statements from the DGEIS, the TDWR suggests that an explanation be given of the ultimate disposal of spent nuclear fuel if nuclear fuel reprocessing facilities cannot be licensed, and if a national policy on the ultimate disposal of spent nuclear waste is not attained by the mid-1980's -- as anticipated in the DGEIS. Is it implied in the said statements quoted from the DGEIS that full reserve capacities of the spent nuclear fuel can be stored <u>indefinitely</u> at the existing AR and AFR storage pools? Also, is to be assumed from the quoted statements that spent fuels and radioactive wastes stored indefinitely on an "interim" basis using water pool storage technology, will be "<u>retrievable</u>" <u>indefinitely</u>?

N-1

2. <u>Page 4-3, section 4.1.2 (Termination Case); page 7-1, section 7.1.1.2 (Water):</u> TDWR believes that the discussion on water use impacts associated with nuclear and coal-burning power stations should mention the necessity for future, more detailed coverage on a "project-specific" basis. Detailed analysis appears to be especially vital in the case of "storage-only" facilities (i.e., Independent Spent Fuel Storage Installations -- ISFSI) for the reasons mentioned in Section 6 (The Need for More Definitive Standards and Criteria to Govern the Licensing of One or More of the Alternatives Considered), page ES-9; Section 6, page ES-13; and Section 6, page S-3.

N-2

Therefore, a firm proviso should be introduced in the DGEIS to require future, detailed, project-specific analyses of water systems management requirements to ensure that uninterrupted adequate cooling and shielding is provided for the growing inventory of spent fuel to be stored at AR and AFR storage sites. The complex water need and use requirements associated with nuclear plant operational systems which are discussed briefly in Section 1.2 (Spent Fuel Pool) and Section 1.3 (Heat Dissipation), pages H-2 through H-6 of Appendix H in Volume 2 should be reflected in Section 8.0 (Findings), pages 8-1 through 8-3 of Volume 1, and in Section 8.2 (Findings), pages ES-11 through ES-13 of the Executive Summary.

In general, TDWR believes that the publication and development of the subject generic impact statement should not be regarded as precluding any requirements of a site-specific impact statement for spent fuel storage. The impacts noted in the generic statement are too general to allow an adequate analysis of specific impacts at a given site.

Mr. Charles D. Travis
Page Four
April 26, 1978

3. <u>Page ES-10, third paragraph; and page B-32, third paragraph:</u> It is believed that further consideration should be given to the impacts of the statutory in-transit exemption of spent nuclear fuel from physical protection, incident to shipments to away-from-reactor storage sites. The reasoning given on page ES-10, third paragraph, for the exemption assumes that the hypothetical removal and dispersal of spent fuel material would be lethal to "those who might try to remove the contents by disassembly of the cask end covers." However, no time period is established between such initial exposure and ensuing incapacitation and death. Hence, it is not certain to what degree a spent fuel could be dispersed in the enviroment by a subversive act.

N-3

In view of the foregoing, it appears that further special consideration should be given to the technical criteria for exemption of spent fuel from security requirements for protection under 10 CFR Part 73 because it is regarded as "a special nuclear material (SNM) that is not readily separable from other radioactive material and that has a dose rate greater than 100 rem per hour at a distance of three feet when there is no intervening shielding." (See page B-32, third paragraph.)

We appreciated the opportunity to review the subject document. Please advise if we can be of further assistance.

Sincerely,

Charles E. Nemir

for Harvey Davis
Executive Director

POOR ORIGINAL

9003274

General Land Office
AUSTIN, TEXAS 78701
BOB ARMSTRONG, COMMISSIONER

PLANNING PROGRAM
1700 North Congress Ave.
Austin, Texas 78701

(512) 475-1539

RECEIVED
APR 27 1978
Budget/Planning

Mr. Terry Leifeste
Budget and Planning Office
Office of the Governor
411 West 13th Street
Austin, Texas 78711

RE: Draft Generic Environmental Impact Statement for Handling and Storage of Spent Light Water Power and Reactor Fuel (EIS-8-0 3-018)

Dear Mr. Leifeste:

The General Land Office staff has reviewed the report on "Handling and Storage of Spent Light Water Power and Reactor Fuel". We have no comments at the present time.

Cordially

A. J. Bishop

A.J. Bishop,
Coordinator

AJB:mr

TEXAS AIR CONTROL BOARD

8520 SHOAL CREEK BOULEVARD
AUSTIN, TEXAS 78758
512/451-5711

April 27, 1978

Mr. Ward C. Goessling, Jr.
Natural Resources Section
Budget and Planning Office
Office of the Governor
411 West 13th Street
Austin, Texas 78701

Subject: Draft Generic Environmental Statement for Handling and Storage of Spent Light Water Power and Reactor Fuel
EIS-8-003-018

Dear Mr. Goessling:

We have reviewed the above cited documents and are of the opinion that because of Section 3.11(b) of the Texas Clean Air Act none of the matters involved fall within our jurisdiction. Therefore, it would be inappropriate for us to comment on the adequacy of this E.I.S.

Thank you for the opportunity to review this document. If we can be of further assistance, please contact me.

Sincerely,

Roger Wallis

Roger R. Wallis, Deputy Director
Standards & Regulations Program

7803272

STATE DEPARTMENT OF HIGHWAYS
AND PUBLIC TRANSPORTATION
AUSTIN, TEXAS 78701

COMMISSION
REAGAN HOUSTON, CHAIRMAN
DEWITT C. GREER
CHARLES E. SIMONS

ENGINEER-DIRECTOR
B. L. DeBERRY

April 13, 1978

IN REPLY REFER TO
FILE NO.

D8-E 454

RECEIVED
APR 14 1978
Budget/Planning

Draft Generic Environmental Statement
Handling and Storage of Spent Fuel
U.S. Nuclear Regulatory Commission

Mr. Ward C. Goessling, Jr., Coordinator
Natural Resources Section
Governor's Budget and Planning Office
411 West 13th Street
Austin, Texas 78701

Dear Sir:

Reference is made to your memorandum dated March 27, 1978 transmitting the above captioned draft generic environmental statement for review and comments.

The Department has no comment regarding the handling and storage of spent light water power reactor fuel.

Sincerely yours,

B. L. DeBerry
Engineer-Director

By:
R. L. Lewis, Chief Engineer
of Highway Design

TEXAS
PARKS AND WILDLIFE DEPARTMENT

COMMISSIONERS
PEARCE JOHNSON
Chairman, Austin
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Beaumont

HENRY B. BURKETT
EXECUTIVE DIRECTOR

4200 Smith School Road
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APR 6 1978
Budget/Planning

April 5, 1978

Mr. Ward C. Goessling, Jr., Coordinator
Natural Resources Section
Governor's Budget and Planning Office
Executive Office Building
411 West 13th Street
Austin, Texas 78701

Re: Draft Generic Environmental Statement for Handling and Storage of Spent Light Water Power and Reactor Fuel (EIS-8-003-018)

Dear Mr. Goessling:

This agency has reviewed the referenced document and offers no comments.

Sincerely,

HENRY B. BURKETT
Executive Director

HBB:KH:lmw

Department of Local Affairs
Colorado Division of Planning
Philip H. Schmuck, Director

STATE OF COLORADO 1876
Richard D. Lamm, Governor

May 8, 1978

RECEIVED
JUN 16 1978
U.S. Nuclear Regulatory Commission
NMSS
Mail Section

Director,
Division of Fuel Cycle and Material Safety
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: Handling and Storage of Spent Light Water Power Reactor Fuel

Gentlemen:

The Colorado Clearinghouse has received and distributed the above-referenced project for review by state agencies. Enclosed please find comments received.

Thank you for the opportunity to review this plan.

Very truly yours,

S O Ellis
Stephen O. Ellis
Prinicpal Planner

SE/NN/je
Enclosure
cc: Office of the Governor
Colorado Department of Health

DOCKETED
USNRC
JUN 26 1978
NMSS
MAIL SECTION
DOCKET CLERK

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520 State Centennial Building, 1313 Sherman Street, Denver, Colorado 80203 (303) 892-2351

COLORADO DEPARTMENT OF HEALTH

4210 E. 11TH AVENUE DENVER 80220 PHONE 388-6111 EXT. 329

ANTHONY ROBBINS, M.D., M.P.A. EXECUTIVE DIRECTOR

APR 26 1978
DIV. OF PLANNING

DATE: April 25, 1978

SUBJECT: NON-STATE ASSISTANCE

REVIEW AND COMMENTS

TO: Mr. Philip H. Schmuck
Director, Colorado Clearinghouse
Division of Planning

PROJECT TITLE: Handling and Storage of Spent Light Water Power Reactor Fuel
U.S. Nuclear Regulatory Commission

STATE IDENTIFIER: NA

COMMENTS DUE BY: May 8, 1978

Yes [X] No [ ] Is this project consistent with the goals and objectives of this agency?

Yes [ ] No [X] Is there evidence of overlapping of duplication with other agencies?

Yes [ ] No [X] Is meeting desired with applicant?

Yes [ ] No [X] A 15-day extension is requested.

Comments:

Ron Simsick
Name, Title & Phone
Ron Simsick, Program Administrator

SOC-3, Feb 77

ATTACHMENT B

GULF STATES UTILITIES COMPANY
POST OFFICE BOX 2951 BEAUMONT, TEXAS 77704 PHONE: 713-838-6631

JAMES H. DERR, JR.
Vice President - Power Plant
Engineering and Design

May 8, 1978

DOCKETED
USNRC
MAY 12 1978
NMSS
MAIL SECTION
DOCKET CLERK

Director
Division of Fuel Cycle and
Material Safety
Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Below are our comments on NUREG-0404 "Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel":

General

0-1.1 Omission of commercial reprocessing of spent fuel as an alternative to storage is unacceptable. Since other countries are reprocessing commercial spent fuel and since the probability of the U.S. doing so in the near future must be seriously considered, this alternative must be treated.

Executive Summary

3.0 Methods for Dealing with the Problem of Extended Spent Fuel Storage (p.ES-5)

0-2 The "life expectancy" of LWR spent fuel in water pool storage is not explicitly treated. It should be evaluated in this document to determine the effects of protracted storage versus reprocessing. During the Fifties, government officials assured Congress that defense production liquid waste tanks would last 500 years; this, of course, was incorrect. Analogously, it is very important that an explicit statement on a verifiable minimum "lifetime" of spent fuel in water storage be made.

3.2 Permitting the Expansion of Spent Fuel Storage Capacity at Reprocessing Plants (p.ES-5)

0-1.2 The statement that "there are no reprocessing plants in operation at the present time" needs qualification as it applies to U.S. commercial nuclear power. Foreign commercial, research and defense reprocessing is

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0-1.2 going on as is U.S. government activities. The remaining portion of this paragraph is deceptive. It does not deal honestly with the alternative of using existing commercial reprocessing sites for fuel storage. Government caretaking (even ownership) of such reprocessing and spent fuel storage facilities needs more thorough evaluation.

3.5 Ordering the Generation of Spent Fuel to be Stopped or Restricted (Termination of Nuclear Power Production) (p.ES-9)

0-3 The statement that "the replacement of nuclear power generating capacity by coal fired plants because of filled reactor plant storage pools is technically feasible" is highly questionable.

In light of the extreme difficulties encountered by both coal and nuclear generation in coming on-line, it strains credibility to imagine the possibility of the above statement. The statement implies a certain ease in bringing about 50,000 MWe of extra coal generation on-line in a relatively short time to replace nuclear plants forced out of service (it is more believable that the slack would be taken up by expensive oil-fired generation where possible). Some quantification to justify the "technical feasibility", or magnitude of this task is called for. The implication that continued nuclear generation is merely a matter of choice rather than national necessity needs correction.

4.0 Cost-Benefit Analysis of Alternative (p.ES-7)

0-1.3 General - The analyses of alternatives are incomplete in that reprocessing is not explicitly treated.

Main Report

4.0 Environmental Impacts (p.4-1)

0-4 General - The impact of nuclear power restriction on our human national environment has been inadequately treated (i.e., NEPA was passed to improve our citizens' human condition, not to attempt to hold static naturally changing environmental conditions). The environmental impact due to nuclear power restriction and resultant increased needs for greater oil and natural gas imports needs to be addressed. To the extent that nuclear power cannot be replaced expeditiously, the economic, social and health effects of power shortages should be treated.

4.1.2.2 Replacement with Coal-Fired Facilities (p.4-3)

After stating in the Executive Summary that though "technically
0-3 feasible" coal replacement of nuclear would entail severe economic,
social and environmental costs, NRC states in this section that the only
"economically feasible replacement" is coal. This contradiction should
be resolved and made perspective to what is actually possible.

4.1.2.2.2 Operational Impacts (p.4-5)

"Questions of global thermal balance including the effect of
additional production of CO_2 from replacement coal plants are beyond
the scope of this document." This foregoing statement appears unaccept-
able since the NRC sees fit to treat the global effects of Kr-85
emissions in Section 4.2.1.1 (p.4-11). Obviously the same basis for
comparison of nuclear and coal should be used. Both in this section
0-5 and in its supporting Appendix C, CO_2 effects should be evaluated
globally or drop such evaluation of nuclear power plant emissions.

Though NRC does note that radioactive emissions from coal plants occur, it implies they are directly due to thorium and uranium and neglects to mention radium which appears to be the worst actor on a specific and perhaps gross basis. Coal's radiological effects should be more closely examined in this section and in Appendix C with reference to regional supplies (e.g., Appalachian coal versus Western coal).

6.2 Termination Alternative (p.6-9)

The replacement of nuclear by coal generation as treated herein
seems to imply that sufficient excess existing coal-fired capacity would
be available. As noted previously, this is not a plausible assumption.
0-3 The case for such replacement should recognize that older, presently
less used oil-fired generation would be called on since totally new coal
units could not appear virtually overnight. The most believable
replacement for shutdown nuclear plants would be oil-fired generation.
This should be acknowledged and evaluated along with the resulting oil
importation problem and any resulting power shortages.

7.4.1.2 Courses of Action (p.7-7)

0-6 In the discussion of electrical energy consumption growth scenarios
it is unclear to what extent consequential effects of "reasonable"

(punitive?) Federal actions to induce conservation would be counter-
productive. For example, in the State of Georgia severely inverted
residential electric rates are currently spurring a consumer shift over
to natural gas service. However, in Texas consumers are shifting over
0-6 to use of more versatile fuel-source electricity to cut down on the use
of the natural gas this state produces. Now visualize the national
effect of Federally initiated, highly inverted electrical rates while
natural gas continues to be Federally controlled below value at a
price which discourages greater production.

Yours very truly,

J. H. Derr, Jr.

State of New Mexico
DEPARTMENT OF FINANCE AND ADMINISTRATION

State Planning Division
505 Don Gaspar Avenue

Coordination Bureau (505) 827-2073
Planning Bureau (505) 827-5191

Santa Fe, New Mexico 87503

May 8, 1978

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MAY 24 1978
U.S. Nuclear Regulatory Commission
Mail Section

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Director, Division of Fuel Cycle
and Material Safety
Office of Nuclear Material Safety
and Safeguards
U. S. Nuclear Regulatory Commission
Washington, DC 20555

RE: Comments on Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Reactor Fuel - SAI 8 04 11 023

Dear Sir:

The following are our comments on the various sections of the subject document:

EXECUTIVE SUMMARY

2.1 Generation of Spent Fuel

P-1 This section should identify the percentage of total electrical generating capacity that the projection is supposed to represent. Current estimates of nuclear power generation contribution to the total electrical output vary from 5 percent to 9 percent. Does this projected growth rate anticipate a larger, smaller, or static percentage of the total? This could easily be accomplished in Section 2.2 of the main text.

4.1 Impacts on Public Health ....

P-2 Table ES-3 should be extended to give a true picture of what it's supposed to represent. What does this actually interpolate to mean in gross numbers of excess mortality from 1975 thru 2000? This could be discussed in Section 4.2 of the main text.

8.2 Findings

P-3 6. If the six storage pools (the size of the Exxon facility) mentioned in subsection 3 are actually licensed and built, will the individual

P-3 states in which they might be located have any recourse if they do not wish to have the facility? The Department of Energy's proposed Waste Isolation Pilot Plant near Carlsbad, New Mexico has encountered widespread opposition and for this reason (among many others) the likelihood of realizing a practical geologic disposal by 1985 is rather dim. This seems to make the Away-from-Reactor sites a virtual certainty. If public opposition were sufficiently strong to preclude a timely addition of AFR sites, how would the gathering wastes be handled?

P-4 7. Naturally the NRC staff would find that cessation of nuclear power plant operation and prohibition of new plant construction to be undesirable and unnecessary. NRC's assumption is that there will be no "catastrophic" releases of radioactive materials to the degree covered in the October 30, 1975 Reactor Safety Study in which the worst accident considered would cause 3,300 "early" deaths, 45,000 early injuries, and $14 billion in property damage. Although these statistics relate to reactor operation and not particularly to the subject of the DGEIS, it does point up the lethal nature of the subject being dealt with. One major transportation accident which released substantial radiation would easily dwarf the 15-120/0.8 GWY(e) excess mortality of coal power generation presented in Table ES-3.

MAIN TEXT

1.3 Scope of This Treatment

P-5 A footnote for this section points out that the DOE's policy is to take title to spent fuel and its final disposition. This will not alter the estimated amounts of spent fuel to be stored until the year 2000; however, it could certainly alter whether the DOE or a private industrial firm would ultimately construct and operate the proposed AFR sites. It should be clearly delineated in the final GEIS whether the federal government will construct and operate such facilities. In addition, DOE's policy regarding acceptance of spent fuel assemblies from foreign countries' reactors should be explored in regard to the impact on transportation and storage requirements. Obviously, such acceptance will alter the risk analyses and total costs estimates.

2.1.3 Design Assumptions of Existing Technology for Storing Spent Fuel Away-from-Reactors

P-6 News media have reported that Nuclear Fuel Services has abandoned the West Valley, New York plant and asked the State of New York to assume

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P-6 responsibility for disposal of radwaste at the site. If so, this could mean the technology of AFR storage is not so far advanced as supposed. Please elucidate on the NFS West Valley situation.

2.2.2 Storage Capacity through 2000

P-7 This section should clearly define the projected number of reactors and their probable size and locations required to compose the aggregate capacity. This would seem necessary in order to estimate train-miles or truck-miles required to transport the spent fuel to arrive at a complete risk analysis during transportation phase.

3.1.5.2 Possibility of New Facilities

P-8 In light of the policy decision cited in Section 1.3 above and assuming that the Federal Government, instead of private industry, will build and/or operate AFR storage facilities, what would be the probable phasing requirements and what are the most logical and appropriate locations?

3.1.6 Transportation Requirements for AFR Storage

This section should provide an estimate of train-miles or truck-miles per year to be expected so that some judgement on the magnitude of the problem is apparent. Obviously, the miles traveled are to be enormous since shipment to AFR storage will require either 499 truck casks or 92 rail casks by 2000.

P-9.1 After computing the miles traveled, the figures should be applied to the Accident Probabilities per Vehicle Mile in Table 4.7 so that a probable frequency for each accident severity can be estimated. This should be relatively simple since all the factors are already "given": a) tonnages to be hauled, b) rate of spent fuel to be shipped from various reactors, and c) probable locations of AFR facilities, transportation routes and mix of carrier mode (Section 4.2.1.3).

4.2.2.9 Dry Waste Materials

P-10 How much of this type of waste would accumulate through the projection period? Where would it be disposed of and how would it be transported? What would be the costs related to transportation and disposal?

4.2.3.7 Lowering of Pool Water Level

P-11 What is the definition of a "skyshine dose"?

4.2.4 Considerations and Assumptions Used for Offsite Transportation Accident Analysis

P-9.2 This section states that "the consequences of a major release of radioactive material from a spent fuel shipping cask could be severe ...." A full revelation of such consequences should (or must) be made no matter how low the probability is assumed to be. The transportation link is the most vulnerable portion of the cycle under consideration, and people living on the potential transport routes or near AFR sites have the right to know what the risks are, in real terms which are not couched in scientific and mathematical jargon (e.g., statements such as "this probability would be about 4×10^{-14}" are largely unintelligible to the general public). Conclusions on the consequences of a severe accident should be clearly delineated in a manner exhibited in Section 6.5 of "Possibility of Release of Cesium" by Marc Ross (Nuclear Fuel Cycle, Union of Concerned Scientists, MIT Press, Cambridge, 1975).

4.3.2.2 Life Style/Quality of Life

P-12 The nuclear fuel cycle will also cause local societal stresses impacts and adjustments. The uranium mining area known as the Grants Uranium Belt is undergoing all the stresses of boom-town economic conditions. Transportation corridors for spent nuclear fuel will surely feel stress as the shipments increase in the late 1980's. In addition, localities will feel stresses and adjustments in an area selected as a location for an Away-from-Reactor storage site, particularly if those sites are expanded or later chosen as nuclear fuel reprocessing sites.

5.4 Spent Fuel in Transient

P-13 "The high radiation level of the contained fuel and the heavy shielded casks required for safe transport are viewed as adequate protection from malevolent acts." And in Section 7.0 of the Executive Summary it states, ".... the localized direct radiation hazard would be lethal to those who might try to remove the contents by disassembly of cask end covers." It seems that such "safeguard" assumptions are inadequate in that a) it presumes that a determined group could not have the expertise and facilities to handle the contents of a truck cask, and

Director, Division of Fuel Cycle
and Material Safety
Page 5
May 8, 1978

P-13 b). although the unknowledgeable or clumsy miscreant would be exterminated by his own recklessness, he could still release substantial radioactivity to a localized area.

6.2 Termination Alternative

It would seem desirable to thoroughly investigate the likelihood of anticipated regional shortfall of electrical energy consumption vs. present excess capacity. A substantial migration to the "sunbelt" states is now under way and expected to intensify by 2000. Conservation is still a viable alternative but will not be achieved by administrative jawboning or feeble public relations attempts.

P-14 The cost comparisons contained in this section do not include the substantial hidden subsidies to the nuclear power industry. Some sources estimate ERDA's enrichment services to be worth at least 1.0 mill/kwh to the nuclear power industry. The Price-Anderson Act could provide as much as 3.8 mills/kwh. Research and development costs provided by government are probably incalculable but were estimated by the Investor Responsibility Research Center in January, 1975 to be about $5 billion. These costs are all spread over the taxpaying public and make it appear that nuclear power is a bargain when it in fact may not be.

One other cost not considered in the rate comparison is decommissioning of nuclear plants. When one considers the additional costs (mothballing at $3 to $5 million plus $60,000 to $100,000/year for surveillance; entombment at $18 to $30 million plus $15,000 to $25,000/year; or dismantling at $36 to $60 million) involved here, the rate comparison might be less attractive for nuclear.

It would certainly be worthwhile for NRC to address these issues that have so long been ignored.

Thank you for the opportunity to comment on this Draft Generic Environmental Impact Statement.

Very truly yours,

Jack M. Mobley
Planner
Resource Planning

JMM:ja

9603259

Babcock & Wilcox

Power Generation Group
P.O. Box 1260, Lynchburg, Va. 24505
Telephone: (804) 384-5111

RECEIVED
MAY 17 1978

May 9, 1978

Mr. S. Meyers, Director
Division of Fuel Cycle & Material Safety
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel, NUREG-0404

Dear Mr. Meyers:

Babcock & Wilcox has reviewed the draft of the subject report and would like to provide the following comments:

(1) We endorse the staff's analysis to investigate a long range policy and alternative methods for the handling and storage of spent light water power reactor fuel. Resolution of this issue will make the nuclear alternative an even more viable energy option.

(2) B&W has investigated two methods of storing spent fuel not mentioned in NUREG-0404. These are:

a. The possibility of disassembling the fuel assembly and close-packing the fuel rods in storage cans.

Q-1 b. It is possible to suppress the neutron interaction between assemblies to a sufficiently low level by placing poison material in the control rod channels.

We believe both of these proposals show good technical promise for high density storage. If the cost per assembly for storage racks continues to increase, or if very high capacities for long term on-site storage are required, these techniques may prove viable. To help ensure completeness of your report, we recommend that both storage methods be mentioned in NUREG-0404 as possible future alternatives.

We would be glad to discuss these comments if you have any questions; you may contact me or Frank Levandoski of my staff (Ext. 2536).

DOCKETED
USNRC
MAY 17 1978
NMSS
MAIL SECTION
DOCKET CLERK

Very truly yours

James H. Taylor
Manager, Licensing

The Babcock & Wilcox Company / Established 1867

Babcock & Wilcox

-2-
Mr. S. Meyers
NUREG-0404

JHT/fw

cc: R. B. Borsum

9632280

GPU Service

GPU Service Corporation
260 Cherry Hill Road
Parsippany New Jersey 07054
201 263-4900

RMP&P/NUC/Spent
Fuel Storage

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MAY 17 1978
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RECEIVED
MAY 17 1978
U. S. Nuclear Regulatory Commission

May 9, 1978
F-5446

Mr. Richard Starosticki
Chief, Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material Safety
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0404)

Dear Mr. Starosticki:

GPU is pleased to comment on the Draft NUREG 0404, dated March 1978. In a general sense, we find the draft to be a well balanced analysis of the alternatives extant for the interim storage of spent nuclear fuel and fully concur with the statement's findings. Since the scope of the statement includes ". . . emphasis on developing long range policy," however, we believe the statement and its findings should be strengthened or broadened in several areas.

R-1 First, the statement develops a storage supply and demand assessment that, when combined with the conclusions that result from the cost/benefit and environmental analyses of the "curtailment of nuclear power" alternative, clearly points to the requirement for aggressive and timely implementation of the DOE Spent Fuel Storage Policy. The statement should therefore explicitly recommend such action, justified by analyses developed in the course of this review.

R-2 Second, the statement indicates that the two current "storage only" facilities were licensed under 10 CFR Part 50 and 10 CFR Part 70, neither of which regulations are directly applicable to away-from-reactor storage facilities. While action is underway to develop 10 CFR Part 72 "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation," the statement should recommend that the

R-2 development and publication of this important regulation be accelerated so as to provide a timely interface with the actions of DOE in implementing its policy.

R-3 Third, the statement should address the requirement for close coordination between the federal agencies involved in the continued or future licensing of rack compaction or away-from-reactor storage plans, whether they be a part of individual utility plans or national policy.

R-4 Fourth, the statement should be revised to reflect more current data as it relates to the DOE Waste Disposal and current industry plans. In the DOE Task Force Report on Waste Disposal, the original 1985 target date for an operational geologic repository was indicated to be unrealistic and has since been supplanted by a 1988 objective. This slippage, and any further delays, will increase the requirement for AFR facilities. Further, while announced plans of GE (in terms of expanding the Morris facility) or Exxon (in terms of a reprocessing plant) might indicate industry capabilities, they cannot be assumed available for planning purposes.

R-5 Fifth, while conservative, the cost benefit analysis for the curtailment of nuclear generation presumes all lost nuclear capacity would be replaced on a one to one basis by coal-fired generation. Given the lead times to new construction, the financial capabilities of most utilities, the uncertainty present in licensing coal units and in setting environmental compliance standards, and the fact that several stations are nearing loss of storage circumstances with shorter lead times than new generating stations, it would be more realistic to assume that a portion of lost generation will be purchased through interchange at significantly higher costs than new coal generation.

R-6 Finally, section 3.1.5.1., entitled "Existing Spent Fuel Storage Facilities," only addresses federal facilities. This section should be expanded to include commercial and possible hybrid (e.g., joint utility and government) facilities and address the possibilities of federal contracting or acquisition of these storage capabilities.

R-7 In summary, then, GPU finds the statement to be an adequate analysis but also believes the statement, in view of its potential use as an instrument of policy, should present clear recommendations.

If any additional information or clarification of the comments is required, however, feel free to contact me.

Very truly yours,

V. P. Zodiaco
Manager of Fuels

VPZ/dcf

Executive Department
INTERGOVERNMENTAL RELATIONS DIVISION
ROOM 306, STATE LIBRARY BLDG., SALEM, OREGON 97310

May 11, 1978

RECEIVED
MAY 24 1978
U.S. Nuclear Regulatory Commission
NMSS
Mail Section

Richard W. Starostecki, Chief
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material Safety
U.S. Nuclear Regulatory Commission
Washington, D.C.

Dear Mr. Starostecki:

RE: Handling & Storage of Spent Light Water Power Reactor Fuel
PNRS 7804 4 280

Thank you for submitting your draft Environmental Impact Statement for State of Oregon review and comment.

Your draft was referred to the appropriate state agencies. The Department of Energy offered the enclosed comments which should be addressed in preparation of your final Environmental Impact Statement.

We will expect to receive copies of the final statements as required by Council of Environmental Quality Guidelines.

Sincerely,

Kay Wilcox
for Martin W. Loring, Manager
Grants Coordination & Management Section

MWL:wb

Attachment

DOCKETED
USNRC
MAY 24 1978
NMSS
MAIL SECTION
DOCKET CLERK

AN EQUAL OPPORTUNITY EMPLOYER

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

Intergovernmental Relations Division
240 Cottage Street S.E., Salem, Oregon 97310
Ph: 378-3732

PNRS STATE REVIEW

Project #: 78 ...   Return Date: ______

ENVIRONMENTAL IMPACT REVIEW PROCEDURES

1. A response is required to all notices requesting environmental review.
2. OMB A-95 (Revised) provides for a 30-day extension of time, if necessary. If you cannot respond by the above return date, please call the State Clearinghouse to arrange for an extension.

ENVIRONMENTAL IMPACT REVIEW
DRAFT STATEMENT

( ) This project does not have significant environmental impact.

( ) The environmental impact is adequately described.

(✓) We suggest that the following points be considered in the preparation of a Final Environmental Impact Statement regarding this project. See comments below.

( ) No comment.

REMARKS

RECEIVED
... 1978
DEPT. OF ENERGY

DOE was given the opportunity to provide input into a prepublication draft of this EIS in the context of the Trojan Spent Fuel hearings.

Pursuant to the Federal Register notice, additional comments from the Department of Energy will be submitted directly to the U.S. Nuclear Regulatory Commission.

Agency ______   By [signature]

1-46

963282

OhioEPA

Re: Draft EIS (Generic) - Handling and Storage of Spent Light Water Power Reactor Fuel - USNRC

1978 MAY 17 AM 11 15

Director, Division of Fuel Cycle and Material Safety
U.S. Nuclear Regulatory Commission
Washington D.C., 20555

May 11, 1978

Dear Sir:

The Ohio Environmental Protection Agency, acting as lead agency and review coordinator on Federal Environmental Impact Statements concerning Ohio, has solicited comments on the adequacy of the above referenced Draft EIS. The attached comments from the Ohio Power Siting Commission were the only ones received within the review period. They are being transmitted to you for your information and response.

Thank you for the opportunity to review the Draft EIS. We look forward to the production of the Final EIS.

Sincerely,

Ned E. Williams, P.E.
Director

NEW/mah
12013.0

Attachment

DOCKETED USNRC MAY 24 1978 NMSS MAIL SECTION DOCKET CLERK

State of Ohio Environmental Protection Agency
Box 1049, 361 E. Broad St., Columbus, Ohio 43216 - (614) 466-8565

James A. Rhodes, Governor
Ned E. Williams, P.E., Director

INTER-OFFICE COMMUNICATION

TO: Carl Wilhelm DATE: April 18, 1978

FROM: Harold W. Kohn

SUBJECT: Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel. NUREG-0404.

I have examined the subject document and would like to submit the following comments.

T-1.1 General: We are still dissatisfied with the lack of progress of the high level waste disposal program. We had indicated some of our problems as early as 1974 in letters addressed to James Liverman, namely that the waste disposal program was proliferating paper rather than projects or results. Four years later, we find the program even more diffuse and still foundering. It is not at all clear from the subject document where responsibility for the decisions lie, how the decisions will be made, or what the criteria of acceptability for any decision will be. Also, it seems evident that some degree of risk will be entailed in fuel element disposal no matter what disposal route is chosen. Again beyond the statutory language "as low as reasonably achievable" there is no indication of what an acceptable risk would entail.

T-2 At the same time that NUREG-0404 was issued, the "Deutsch" Report (Report of Task Force for Review of Nuclear Waste Management DOE/EK-0004/D) was also issued. The conclusions of this task force should also be heeded and will undoubtedly be quoted by many respondents. Although we endorse in general the conclusions of the Deutsch report, we are not in thorough agreement with some of its generalizations. For example, if it is "inappropriate and premature to decide now whether or not WIPP should be used for the permanent disposal of high-level defense wastes," (p.3) it is equally inappropriate and premature to use the facility as a demonstration of spent fuel disposal (next paragraph). The statement that "scrupulous adherence to the NEPA process is an essential part of the waste management program and DOE efforts in this regard must be strengthened.", (p.4) is meaningless unless the weaknesses of the present DOE program are pointed out. Many state environmental agencies, including our own, have commented upon the need for reform of the NEPA process, especially upon the never ending parade of environmental statements about waste disposal projects which are being perpetually postponed. The instant GEIS seems simply another paper tiger in this parade. The next statement that "Substantial additional work on the GEIS is needed" is also meaningless unless exact areas of deficiency are delineated.

The Deutsch report concludes that geologic disposal can be achieved in a safe and environmentally acceptable manner and that discussions with representatives of the USGS found them to be in agreement with this statement. However, a careful perusal of USGS circular 779 "Geologic Disposal of High Level Radioactive Wastes - Earth Science Perspective" shows that although

USGS may agree with the concept of ultimate geologic storage, they have many reservations and pose a number of unanswered questions concerning such storage, especially storage in bedded salt. Before such storage could be implemented to USGS satisfaction many years and many dollars would have to be spent on research and development. Even then, some of the geologic answers could be in error by a factor of ten. With these uncertainties plagueing the program we wonder when, if ever, an ultimate disposal facility will be built.

Two conclusions from the Deutsch report with which we agree wholeheartedly are that "highest priority should be assigned to demonstrating the capability to place existing military wastes and existing spent fuel from light water reactors into ultimate disposal", and that the 1985 date will probably not be met, 1988 is a more realistic target date.

T-2 We would also urge all concerned, DOE and Nuclear Regulatory to describe GEIS efforts which have taken place abroad and to expand cooperative programs with foreigh reactor operators and waste management agencies. It appears that the European countries, especially Sweden, are less enthusiastic about salt disposal than is the U.S., and even the Germans are apparently having misgivings about the disposal of High-Level Wastes at Asse. Based on the information in USGS 779 and ORNL-4555 (Project Salt Vault, a Demonstration of the Disposal of High Activity Solidified Wastes in Underground Salt Mines) there would seem to be sound technical reasons behind this as follows: the containers cannot be expected to retain their integrity over long periods of time. Brine pockets would migrate towards the waste canisters because of the thermal gradient. Ultimately, the radionuclides would be dissolved in concentrated brine. Migration of these radionuclides can, of course, be impeded by adsorption on soil particles (as happened (fortunately) in the case of the Hanford spills. But in bedded salt, the opportunity for adsorption is virtually nil and even in soil, adsorption from concentrated brine solution would be highly unlikely. Hence, other geologic formations should be more actively considered.

In summary, evaluations of the waste management situation even before the GEIS appeared indicate considerable institutional barriers to the management of high level reactor wastes as well as some technical uncertainties. Observing that it took nearly two and one half years to simply prepare the GEIS makes us doubtful that any of the proposed schedule will be met.

T-1.2 Specific comments: p. ES-11. "Although the Staff is confident that action will be taken on policy issues pertaining to the ultimate disposition of spent fuel by the mid 1980's ---". We question the basis of such confidence. Ten years ago the staff was confident that the problem would be solved by now.

T-3.1 p. 4-5 and 4-6. The articles on radioactivity from coal plants grossly exaggerate the extent of these emissions. (The Eisenbud and Petrow article is especially out of date). The most recent article on this subject is by Barber and diGiorgio, and this prompted a reply from our agency which is enclosed with these comments.

T-3.2 p. 4-14. The statement about 129I is a remarkable non sequitur. The very long half life of 129I implies also a very low specific activity, 1.4 dpm/g. According to the TERMOD tables one microcurie of 129I would deliver a dose of 3.961 REM to the thyroid. Simple calculation therefore shows that under TERMOD conditions, which are conservative, to deliver a dose of one millirem to the thyroid from 129I would require a disintegration rate of 560 disintegrations per minute or 400 g. of 129I. Since a thyroid only weighs about 20 g., it is clearly impossible for any appreciable dose to the thyroid to come from 129I. Indeed this is even stated in the paragraph. Therefore, if any dose to the thyroid cannot be obtained from 129I, why should its release to the environment be minimized?

T-4 p. 4-15. Recent applications to the Ohio Power Siting Commission have predicted burnups of 32,000 MWd/MTU. This probably does not change the results of table 4.4 very much. We would like to know if the 25,000 MWd/MTU is a more realistic figure than the 32,000 figure quoted for Erie 1 & 2 and Davis-Besse II and III.

T-5 p. 7-1. First paragraph. "The other, called the reference case, solves the problem by providing for additional spent fuel storage." We wish to emphasize that this does not solve the problem, it merely postpones, and in some ways exacerbates the problem. It is obvious that the failure of the waste management program to provide repositories for high-level waste has now necessitated the construction of additional storage facilities. In no way can this be considered solving the problem. This should be referred to throughout the document as interim storage.

T-1.2 p. 8-1. "Only if there is a serious slippage in the startup date for such a facility will a large amount of spent fuel require away from reactor storage in the last decade of this century." Prudence as well as past performances and the massive institutional barriers noted previously dictate that Nuclear Regulatory would do well to plan on this contingency.

POOR ORIGINAL

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963284

STATE OF OHIO

Power Siting Commission

GOVERNOR JAMES A. RHODES

351 E. BROAD ST. P.O. BOX 1735 COLUMBUS, OHIO 43216 614/466-~~6422~~ 7560

May 31, 1977

J. R. Cameron (608) 262-2170
University of Wisconsin
Dept. of Radiology, 262-2570
University Hospital
1300 University Ave.
Madison, Wisconsin 53706

Letter to the Editor: Health Physics
Comment on the article "Gamma Ray Activity in Bituminous, Subbituminous and Lignite Coals".

Dear Sir:

The article by Barber and Giorgio revives the question about radioactive emissions from fossil-fired plants first raised by Eisenbud and Petrow (Ei, 64). Several years ago, on the basis of this article, the Ohio Power Siting Commission had formulated a rule requiring coal analyses for radioactivity, largely on the basis of that article. During the hearings and litigations, however, another (then) more recent and definitive article (Ma, 71) became available and, based upon the information in this article, the rule was deleted. The Barber and Giorgio article now reopens the question of radiation from coal-fired plants.

The purpose of this letter is to call to your readers attention the already excellent services available from the Bureau of Mines, Department of the Interior. Since we now needed data on Ohio coals to justify our deleting the rule, we called a few key personnel and found out that a series of 150 analyses had been performed by delayed neutron activation analysis on 78 representative samples and that these results were available from the State Geological Survey Office. These analyses were recently done (summer of 1975). Fortunately for us, and for our rulemaking, all Ohio coals are low in thorium and uranium. The highest thorium content reported was 6.8 ppm and the highest uranium con ent was 3.4 ppm. If any state radiation officers are concerned ab[illegible] radioactivity in co[illegible] we would suggest they contact their State Geological Survey or the U.S. Bureau of M[illegible] for the data already existing.

We thank Horace R. Co[illegible]s, Chief, Ohio Geological Survey, George A. Savanick and William Miska of the U[illegible] Bureau of Mines for their excellent cooperation.

Harold W. Kohn

Harold W. Kohn
Staff Scientist
Ohio Power Siting Commission

Bibliography

References

Ba 77 Barber, D.E. and Giorgio, H.R. "Gamma-Ray Activity in Bituminous, Subbituminous and Lignite Coals", Health Physics 32, 83

Ei 64 Eisenbud M., and Petrow H.G. 1964 "Radioactivity in the Atmospheric Effluents of Power Plants That Use Fossil Fuel". Science 144, 288

Ma 71 Martin, J.E., Harward, E.D., Oakley, D.T., Smith, J.M. and Bedrosfan P.H. "Radioactivity From Fossil Fuel and Nuclear Power Plants". Rep. Sm-146/19, Environmental Aspects of Nuclear Power Stations IAEA, Vienna

Re: Health Effects Attributable to Coal and Nuclear Fuel Cycle Alternatives

Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C.

Gentlemen:

The Ohio Environmental Protection Agency, acting as lead agency and review coordinator for Federal Environmental Impact Statements has received a copy of the above referenced document. The Director of OEPA has transmitted the document to me for comments, which follow:

We endorse the draft study and the conclusions drawn, as well as the warnings as to the uncertainty of some of the numbers which appear throughout the text. However, we would like to add to the discussion of the radioactive emissions from coal-fired plants. Actually, we believe that this is a trivial issue, but the bibliography is not complete or accurate nor are the conclusions drawn.

The most recent article on radioactivity in coal is "Gamma Ray Activity in Bituminous, Subbituminous and Lignite Coals" by D.E. Barber and H.R. Giorgio, Health Physics 32, 83-88 (1977). There was one coal (Willeston Basin, Illinois) which had a high, 0.18%, uranium content. Apparently, this was sufficient to inspire an article, "The Coal Uranium Breeder: Uranium from Coal" by Kirk R. Smith of the University of California. Frankly, I find it difficult to believe that this article will be taken seriously by the scientific and engineering community. If, however, you read through all the enclosed material, you will see that the Willeston Basin coal is indeed a unique material and that both the radiation emissions and the recoverable uranium from most coal is truly trivial. I am enclosing copies of the cited articles as well as unpublished correspondence.

I suggest also that you pay special attention to the article "Radioactivity From Fossil Fuel and Nuclear Power Plants" by J.E. Martin, E.D. Harward, D.T. Oakley, J.M. Smith and P.H. Bedrosian. Rep. Sm-146/19, Environmental Aspects of Nuclear Power Stations IAEA Vienna 1971. Unfortunately, I do not have a copy of this article to send you but I do remember that the article showed that emissions from both nuclear and coal-fired plants are indeed trivial. Of course, the big difference, especially as perceived by the public is that the nuclear plants have the potentiality for emitting large amounts of radioactivity and create a hazardous waste, hence, they require more stringent control. But that subject is beyond the scope of these comments.

We thank you for the opportunity to comment on these documents.

Very truly yours,

Harold W. Kohn

Harold W. Kohn, PhD
Staff Scientist, OPSC

HWK/sb

9632 86

Environmental Impact Statement Reform
Council on Environmental Quality
Executive Office of the President
722 Jackson Place, N.W.
Washington, D.C. 20006

Gentlemen:

This letter is in response to your Federal Register Notice Vol. 42 #83 - Friday, April 29, 1977, entitled "Environmental Impact Statement Reform". The Ohio Environmental Protection Agency has been designated by the Governor as lead agency for the examination of and comments upon Environmental Impact Statements. These comments were prepared by staff members who have been dealing with Environmental Impact Statements over the past several years. Needless to say, the views expressed are also consonant with my own.

Generally, we feel that the Environmental Impact Statement procedure has reached a state of near absurdity. It is overly expensive, cumbersome, time consuming, but above all it is ineffective.

The overall effect of most impact statement hearing proceedings has been simply to delay projects and thus, make them more expensive and less timely. This has led to intense feelings of frustration on the part of intervenors, applicants, and regulatory personnel. The intervenors find that "all projects are go" and, with very few exceptions, cannot be cancelled or modified significantly. Hence, the intervenors are reduced to delaying the project or trying to make it so expensive that the applicant himself will cancel the project. The applicants see only a mechanism for delay and expense. The regulatory agencies are caught in the middle.

It appears that much of this problem may be the result of confusion as to the use of the EIS document within what has come to be known as the "NEPA" process. The NEPA process, it should be remembered, is not just the preparation of an EIS after all planning has been completed on a project. The process begins upon determination that a need exists. Given this, then it becomes apparent that the EIS is the end product of a long decision process wherein other materials (in this case the Environmental Assessment Statement) are utilized to make rational, effective decisions. Without this process and the production of the EAS and ancillary materials, the EIS becomes the all-too-familiar "justification document" by which poorly conceived projects are made to look as "environmentally beneficial" as possible. While the justification style of EIS could be expected on projects conceived prior to the passage of NEPA, the continued production of these documents shows that the NEPA process remains, to a great extent, unknown and unused.

We would like to suggest that CEQ might aid in the "maturation" of NEPA by emphasizing this part of the process, the Environmental Assessment Statement, more than has been done in the past. De-emphasizing the "punitive" nature of EIS documents would also aid in this matter. A methodology to be used in doing this would be a campaign to get to the affected applicants and explain clearly the why, where and how of the NEPA process. Too often, the applicants have been creating the problems which they have been complaining about. This occurs mainly because the applicants submit projects to the appropriate Federal agency with insufficient information included in the Environmental Assessment for that agency to make intelligent decisions concerning the environmental impact of the project. When this happens, the Federal agency is left with little choice as to what can be done. Most often an EIS is produced. Sadly, many of these EIS documents then return a verdict of "no significant impact", a verdict which could have been ascertained with sufficient front end information---a properly prepared, comprehensive Environmental Assessment Statement. The EAS would have prevented this from happening since it would have provided the Federal agency with information showing the general nature of the area, the alternatives considered, the environmental impacts of all of the alternatives (not just the proposed action), and the reason that the proposed action had been chosen. Provision of this NEPA required information to the Federal agency would have then allowed the agency to intelligently determine the necessity of an EIS. Without this information, the Federal agency often requires additional data, much of it superfluous as far as the impacts of the project are concerned, because the initial assessment was deficient.

The major point we are making is that applicants' major complaints against NEPA are complaints against themselves---they are complaining that they are not developing an adequate and required Environmental Assessment! The EAS, as you are fully aware, is required during the planning process and therefore poses no significant project planning or development delay. An EIS, if the EAS was deficient, would then be required after the project planning process and has to be developed and used as the "ex post facto" decision-making tool! This is totally contra-NEPA in our estimation; creates "red-tape", exorbitant delays; etc.

Thus, it would appear that emphasis on the applicant prepared EAS, during the planning process, may do more for cutting down on "red-tape", after the fact EIS documents, than anything else CEQ may attempt.

1. Concentrating on real issues instead of paper production. Those concerned with certain aspects of environmental protection often seem more interested in expanding their empires rather than solving problems. It is quite obvious to us that certain environmental problems have been exposed as "straw dogs" and are no longer worthy of serious consideration. Nevertheless we find them addressed again and again in finer and finer detail, bolstered by an ever burgeoning volume of worthless paper. A prime example of this

exists in the Nuclear Regulatory Commissions' treatment of environmental effects of the routine releases of low level radioactivity. Such problems could be treated once in a generic manner and then incorporated by reference. Sometimes these agencies appear more interested in repeating these triumphs of the past than in coping with each project's possible new or unique problems of the present and future.

Concerning real alternatives, we consider it most important to establish the need for the project. If a project of a magnitude to require an environmental impact statement is to proceed then it is obvious that a massive environmental impact will indeed take place. There is indeed no way to avoid this. Hence, a real need, not simply a favorable cost/benefit analysis should be established. Frequently, these cost benefit analyses are self-serving exercises of doubtful value.

2. Streamlining the process. The average impact statement takes entirely too much time, personnel, and money. We have the following suggestions to make:

   a) Early warning. By this, we mean discussion of a project with the State or Federal E.P.A. before the project becomes hardened by a great deal of planning and engineering. An early identification of environmental problems allows the project director to design around them or to move the project to a more suitable site.

   b) Eliminate statements on projects of very limited impact. We find statements dealing with near trivia being reviewed at great length. This can be accomplished by the EAS process detailed above.

   c) Limit statements to those environmental parameters likely to be affected by the construction of the proposed facility. The construction of a facility should not be looked upon as an excuse for an extended study of every conceivable environmental parameter in the vicinity.

   d) Similarly, limit review agency interrogatories to those environmental parameters which are at issue. This means those likely to be affected by construction of the facility, and those which are important.

3. Eliminating conflicts and duplication. Joint hearings e.g. N.R.C. & State of Maryland have been suggested. Sometimes, this is impossible or not practicable. In our view, the State hearings should then take precedence. In situations where both Federal and State permits are required for a single facility, entirely too much pressure devolves upon the state if a Federal permit has already been issued. Yet, state interests and concerns are often quite different from those of the Federal Government.

Letter to Environmental Impact Statement
Reform Council on Environmental Quality
Executive Office of the President
Page Four

4. Other problems. We have seldom seen an environmental impact statement which was prepared "impartially". The nature of the process precludes this being done. The application of these statements to legislative proposals is also an area of great concern to us. Recent proposed environmental legislation leads us to believe that much of it was drafted with very little input from engineers or scientists. Hence, most of it is impractical and some of it is impossible. Environmental problems will not be solved by laws forbidding usage of the environment. The problems will be solved by environmental technologists working with the envi ment, not against it.

We would lik to thank you for the opportunity to comment on this subject. We reiterate that the impact statement procedure has become too lengthy, expensive and ineffective to justify the amount of agency time, money, effort and personnel necessary to deal with it. If impact statements are to serve the function for which they were intended, they must be more pertinent and less repetitious.

Very truly yours,

Ned E. Williams, P.E.

NEW/sb

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
FOOD AND DRUG ADMINISTRATION
ROCKVILLE, MARYLAND 20857

MAY 1 1 1978

Mr. Leland C. Rouse
Chief, Fuel Processing
and Fabrication Branch
Division of Fuel Cycle
and Material Safety
Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Rouse:

The Department of Health, Education, and Welfare has reviewed the health aspects of the Genetic Environment Impact Statement on Handling and Storage of Light Water Reactor Fuel (NUREG-0404) and has the following comments to offer.

U-1 Chapter 4. In this chapter there is a discussion of the incremental health impacts associated with the alternatives of the termination and reference case storage of spent fuel. The radiological impact from spent fuel storage is considered to be primarily from release of ^{85}Kr from leaking fuel elements, transportation of spent fuel, and occupational exposure of plant personnel. The population dose from these operations appear to be minimal based on analysis of the possible release mechanisms. The occupational exposure of workers based on reactor experience is within acceptable limits. However, as the MT of fuel in storage increases the exposures could become unacceptable. Thus, additional control techniques may be needed to decrease the workers exposures based on operational experience.

U-2 Page 4-13. Data from studies on the management of nuclear waste show that that transportation and transportation accidents are likely to be the major source of population exposure. The conclusion in the statement that the overall impacts of spent fuel transportation is essentially insignigicant may not have fully taken into consideration the findings from new studies of high level waste management along with the AEC report, WASH-1238, "Environmental Survey of Transportation of Radioactive Material to and from Nuclear Power Plants."

U-3 On page 4-5, in evaluating the termination case relative to release of radioactive materials from coal fuel plants it should be pointed out that ^{226}Ra is a significant source of environmental contamination that results

Mr. Leland Rouse 2

from burning coal. It is likely that the actual public health hazard from ^{226}Ra in the surface piles of coal ashes is greater than from ^{226}Ra in
U-3 geologically isolated high-level waste from nuclear power. Also, the amount of ^{226}Ra in ashes from coal containing higher than average concentrations of uranium is comparable to the concentrations of ^{226}Ra found in uranium mill tailings.

Page 4-13 to 4-26. Discussion of safety and accident considerations indicate that there is no mechanism available for release of radioactive material in significant quantities from the facility, i.e., atmospheric dispersion. The statement that the inventory of radioactive material in
U-4.1 aged spent fuels may be in the order of a billion curies or more and that very little is available in a dispersable form suggests that there is a potential for environmental contamination and possible population exposure. In the highly unlikely event of an accident at one of these facilities it is believed that a radiation emergency response plan should be developed and tested to assure protection of the public health and safety.

The statement on page 4-18 that a range of potential accidents and natural phenomena events have been analyzed is not considered to be adequate.
U-4.2 In particularly some discussions should be included on the probabilities and consequences from tornadoes and earthquakes.

Based on the information contained in the documents, it appears that the handling and storage of light water reactor fuel can be accomplished without undue impact on the environment from radiation or radioactivity.

Sincerely yours,

Bernard Shleien for

Charles L. Weaver
Consultant
Office of Medical Affairs
Bureau of Radiological Health

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COMMONWEALTH of VIRGINIA

Council on the Environment

SUSAN T. WILBURN
ACTING ADMINISTRATOR

903 NINTH STREET OFFICE BUILDING
RICHMOND 23219
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May 12, 1978

RECEIVED MAY 24 1978 U.S. Nuclear Regulatory Commission NMSS Mail Section

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Mr. Richard E. Cunningham
Acting Director
Division of Fuel Cycle
and Material Safety
U.S. Nuclear Regulatory
Commission
Washington, DC 20555

SUBJECT: Handling and Storage of Spent Light Water Reactor Fuel

Dear Mr. Cunningham:

The Council on the Environment has completed its review on the subject Draft Environmental Impact Statement. The following State agencies participated in that review.

Department of Agriculture
Department of Health
State Air Pollution Control Board
State Corporation Commission
State Water Control Board
Virginia Energy Office

Based on our review and the comments that we have received, we have no objection to the proposed action at this time. We look forward, however, to receiving the Final Environmental Impact Statement.

Thank you for the opportunity to participate in the review of the Draft Environmental Impact Statement. Please do not hesitate to contact me if you have any questions about this letter or if I can be of assistance in any way.

Sincerely,

Susan T. Wilburn

Susan T. Wilburn
Acting Administrator

RFW/mlt

cc: Honorable Maurice B. Rowe, Secretary of Commerce and Resources

STATE OF NEVADA
GOVERNOR'S OFFICE OF PLANNING COORDINATION
CAPITOL COMPLEX
CARSON CITY, NEVADA 89710
(702) 885-4865

May 12, 1978

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U. S. Nuclear Regulatory Commission
NMSS
Mail Section

Mr. Richard W. Starostecki, Chief
Fuel Processing and Recycle Branch
Division of Fuel Cycle and Material Supply
United States Nuclear Regulatory Commission
Washington, D. C. 20555

RE: SAI NV #78800047 - Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel

Dear Mr. Starostecki:

Thank you for the opportunity to review the above-mentioned project.

The State Clearinghouse has processed the proposal and has no comment. Based on the information contained therein and the responses of interested parties, the proposed project is, as of this date, found not to be in conflict with the State's plans, goals or objectives.

Sincerely,

for Wallace W. Decatur
Bruce D. Arkell
State Planning Coordinator

BDA/pf

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State of California

The Resources Agency of California

Memorandum

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DOCKET CLERK

To : Frank Goodson
Project Coordinator
Resources Agency

Richard Starostecki
Nuclear Regulatory Commission
Washington, D.C. 20555

Date : May 12, 1978

RECEIVED
MAY 24 1978
U. S. Nuclear Regulatory Commission
NMSS
Mail Section

From : Energy Resources Conservation and Development Commission
1111 Howe Avenue
Sacramento, 95825

Richard L. Maullin

Subject: DRAFT GENERIC EIS ON HANDLING AND STORAGE OF SPENT LIGHT WATER POWER REACTOR FUEL (NRC-NUREG-0404)

Introduction: The Nuclear Regulatory Commission's Office of Nuclear Material Safety and Safeguards examines in this report the possible shortage of storage space for spent nuclear fuel and alternative solutions to the problem. The three alternatives given were increased storage, transshipment and termination of nuclear generation. These alternative storage scenarios are interim solutions. Also presented is a cost-benefit analysis of the alternative solutions. The analysis essentially discusses three areas of concern: 1) environmental impacts, 2) safeguards, and 3) economics.

After evaluation of the alternative solutions with the cost-benefit analysis, the report makes the following conclusions:

1. The lack of sufficient spent fuel storage capacity at nuclear power plants has been alleviated by ongoing and planned modifications of at-reactor spent fuel storage pools.

2. Licensing reviews of these applications have shown that the modifications are technically and economically feasible and justified.

3. The timing and magnitude of the away from reactor spent fuel storage requirements are as follows:

Frank Goodson
Richard Starostecki
May 12, 1978
Page 2

Year	Metric Tons of Heavy Metal (MTHM)
1980	190
1985	1,900
1990	5,800
1995	17,000
2000	41,000

4. The storage of light water reactor spent fuels in water pools has an insignificant impact on the environment, whether at reactor or away from reactor sites.

5. Although relatively small and manageable, assuming the power reactor industry continues to increase at-reactor spent fuel storage capacity, there is a continuing need for away-from-reactor spent fuel storage through the mid-1980's.

6. There is a recognized need for a more definitive regulatory basis for the licensing of future "storage only" facilities.

7. Curtailment of the generation of spent fuel by ceasing the operation of existing nuclear power plants when their spent fuel pools become filled is found to be undesirable, and the prohibition of construction of new nuclear plants is not necessary.

8. No modification of 10 CFR 51.20(e) (the summary of environmental considerations for the uranium fuel cycle) appears necessary for spent fuel storage considerations.

General Comments

This draft EIS obscures the viable alternative solutions to the spent nuclear fuel problem with poor organization, flaws in methodology and insufficient analysis of key environmental and safety issues. The following comments should be considered and responded to in the final generic EIS.

Frank Go
Richard Starostecki
May 12, 1978
Page 3

A. ALTERNATIVES

X-1

1. Choice of Alternative Scenarios. The scenarios chosen for evaluation do not reflect the range of realistically available options for managing spent fuel. The three alternatives presented are increased storage, transshipment, and termination. The termination alternative is inappropriate for this statement. The transshipment alternative does present a bounding case for spent fuel management methods; but no environmental, health, or safety impact analysis is performed for this case. The increased storage alternative as described obscures the choices that must be made concerning storage technologies: dispersed vs. centralized, wet storage vs. dry, and so on. Thus, the alternatives chosen do not clarify the issues in a useful way. We have commented generally on each of the alternatives, followed by an outline of a more appropriate choice of alternatives to be analyzed.

X-2

2. Comments on Alternatives as Presented.

a. It is clear that the most common choice for utilities in managing spent fuel has been the expansion of storage capacity at the reactor site. Alternative 1 as presented includes this among the options it examines, but no comparative environmental analysis is made of the various storage technologies assumed under this alternative. At-reactor compact storage, away-from-reactor storage pools, current government facilities, and a design-stage SURFF technology are all treated together. Detailed analysis is confined to current reactor site and AFR technologies; 14 pages are devoted to description of pool storage health and safety effects but no space is given to dry storage. Environmental impacts of dry vs. wet storage are dismissed with a one paragraph description of the INEL facility which concludes that "...the facility does not appear to have any ecological impact on the surface or groundwater environment" (p. 4-3).

b. Although transshipment is identified as an alternative for analysis, "environmental impacts and financial factors of this alternative were not examined" (p. 3-34). The "safety analysis" (Section 3.2.1.3) consists of a two-sentence dismissal of any safety problems in spite of the greatly increased transportation and handling requirements associated with this alternative. The reason given is that trans-
X-3.1 shipment is "only a means for postponing the spent fuel storage problem." This is not convincing since all spent fuel storage technologies short of final disposal are interim solutions. Therefore, transshipment should not be ignored. Instead the analysis should focus on two questions: (1) how long will transshipment allow storage expansion to be postponed? (2) what are the relative impacts of transshipment vs. increased on-site storage?

c. The "termination case" is seriously flawed in concept and the purported choice -- coal vs. nuclear -- is not supported. An analysis of the large question of nuclear vs. other electricity-generating technologies appears to be seriously out of place in this impact statement.

Replacement of nuclear plants with coal plants is not a spent fuel management alternative; it is an electricity supply alternative.

The specific choice of coal as the only available alternative is also deficient. Other alternatives do exist -- stringent conservation, oil, replacement of electricity at the point of use, or even new
X-4.1 nuclear plants. The latter option points out the flaw in methodology: if it is assumed that utilities would choose to build all-new generating capacity instead of new pool storage, there is no obvious reason not to build a new nuclear plant with a larger pool. A more credible alternative would be the construction of new storage facilities at the existing reactor, similar to Stone and Webster's design which has been submitted to NRC as a topical report (SWECO-7601).

The EIS should also discuss conservation techniques (such as Building Standards and other viable electric generating technologies that could lessen the storage problem. These conservation techniques could reduce the need for

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X-4.1 additional "new" capacity, as existing nuclear baseload capacity would subsequently not be needed to the degree discussed in the DEIS.

3. Recommended Choice of Alternatives. A more useful selection of scenarios for evaluation would focus on three key questions: dispersed vs. centralized storage; maximum vs. minimum transshipment of spent fuel; choice of technology for storage. The alternatives proposed below would allow comparison of environmental impacts for a broad range of answers to these questions.

Alternative 1 -- Centralized Storage, Minimized On-Site Storage Expansion. This scenario assumes that centralized AFR storage facilities (perhaps government-operated) are made available by a specified target year, e.g. 1985. Pending AFR availability, spent fuel is transshipped between existing pools to the extent necessary to minimize the need for expanded reactor-site storage capacity.

X-2 Alternative 2 -- Centralized Storage, Minimized Transshipment. This alternative is similar to alternative 1 except that reactor-site storage capacity is expanded to the extent necessary to minimize or eliminate the need for shipment of spent fuel between reactors.

Both Alternative 1 and Alternative 2 should include comparative evaluations of different types of AFR storage, specifically of pool storage vs. the various proposed dry-storage techniques.

Alternative 3 -- Dispersed Storage, Minimized Transshipment. This scenario envisions maximum expansion of reactor-site storage pools. Comparative analyses would be made for different methods of on-site expansion: re-racking in existing pools, expansion of existing pools, construction of new pools on-site. Transportation of spent fuel would be limited, and would only be used to maintain full core reserve or reload capability while storage expansion takes place.

Alternative 4 -- Dispersed Storage, Minimized Expansion of Existing On-Site Storage Capacity. This alternative is similar to the trans-

X-2 shipment case presented in the draft statement, though more realistic assumptions should be made for storage capacities at new reactors. Environmental and other impacts of the increase in transportation should be evaluated; loss of full core reserve and reload capability over time should be estimated.

B. SAFEGUARDS CONSIDERATIONS

The "Safeguards Considerations" chapter (Chapter 5.0) fails to provide any analysis of the safeguards threat to on- or off-site s nt fuel storage facilities. All that is presented is a brief summary of certain provisions of 10 CFR Part 73. There is no comparative analysis of the relative vulnerability of at-reactor or AFR storage, no discussion of environmental consequences of sabotage attempts, and no economic analysis of the impact of physical protection measures on storage costs.

X-5

In fact, there is little if any attempt to give any analysis in terms of environmental impact with respect to safeguards considerations. Although many safeguards considerations are in terms of non-quantifiable, i.e., civil liberties and anticipated or perceived threats, addressing these problem areas is still warranted given the potential magnitude of the hazards compared to alternatives such as coal and solar.

The Safeguards Chapter, only three pages long, clearly does not fulfill the role of an environmental impact analysis. It should therefore be expanded to include a discussion of the above issues.

C. ANALYSIS OF ECONOMICS NEEDED

1. Implementation costs of viable conservation techniques sufficient to reduce rate of energy consumption equal to the energy generated by the waste fuel to be stored in facilit s over and above existing capacity should be described.

X-6

2. Estimate what the cost to the utilities would be to store spent fuel under each alternative (per unit of waste or mills/Kwh). This data is essential in determining the impacts on rate payers,

X-6 an area the DEIS failed to analyze.

D. SCOPE AND INTENT OF THE STATEMENT

Section 1 of the summary states that the staff was directed to examine alternatives for spent fuel management "...with particular emphasis on developing long range policy." This purpose appears to have been lost in the draft atement. By casting the issue as "spent fuel management vs. nuclear shutdown," long range policy choices among storage alternatives are obscured.

X-7 The draft statement also appears to be directed at proving that AFR storage will be needed. From the figures presented in Table 3.1 and in the "Transshipment" section, it appears that compact storage at reactors combined with transshipment could reduce or eliminate the need for large storage-only facilities. This is not meant to suggest that such a policy is the preferred one; however, to illustrate accurately the bounding cases for spent fuel management some such alternative should be analyzed. Instead, every scenario chosen requires that large amounts of AFR capacity be made available in the mid-1980's and beyond.

SPECIFIC COMMENTS

Page	Comments
ES-1	Although extension of the time period to 2000 is reasonable, it leads directly to the staff's dismissal of the transshipment option as "...only a means for postponing the spent fuel storage problem..." (p. 3-34). This is not consistent with the recognition of spent fuel storage as "...an interim action, not a final solution."
ES-3	As the projected generation of spent fuel is highly influenced by the assumption that 414 GWE of nuclear power will be

X-3.2

X-8

Page	Comments
	constructed by the year 2000, the EIS should update and justify the estimates in Table ES-1. For example, does the projection take into account the present status of the proposed Sundesert and Stanislaus nuclear plants in California.

X-8

ES-4 The statement that maintenance of a full core reserve is not a safety matter should be supported. Has a detailed analysis been performed to verify this position?

X-9.1

That "many" power plant operators find maintenance of a full core reserve desirable is understating the case. Has any reactor owner indicated that he is willing to forego FCR?

X-9.2

It should be made clear that Table ES-2 assumes no transshipment of fuel.

ES-5 The conclusion that expansion of at-reactor storage capacity "...can be taken without significant effect on health and safety..." appears to prejudge the outcome of the NRC's consideration of pending licensing proceedings on this subject.

X-10.2

Although the Barnwell plant storage capacity is now limited to 360 metric tons (not 400 as stated), recent testimony before Congress by AGNS officials indicated that this could be extended to 2000-3000 metric tons if necessary.

X-11.1

Given the termination of the Exxon licensing proceeding, it is misleading to present the storage pool at the proposed Exxon reprocessing plant as a potential storage facility.

X-11.2

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Page Comments

ES-6 Since the NFS or GE Morris facilities were not designed as independent spent fuel storage installations, they should not be used as examples of the successful operation of ISFSI's. Handling techniques, surrounding structures, personnel training and availability may all be different for facilities designed solely for spent fuel storage.

X-11.3

If AFR storage becomes available in the mid- to late 1980's, as projected by DOE, then the fact that "...transshipment provides some relief for about the first decade" is significant. By rejecting transshipment because it is "only a short-term solution," this summary of the transshipment case conflicts with the original statement that spent fuel storage is an interim solution.

X-3.2

ES-7 Physical security measures are already in place at a reactor site, but a new security system would be needed at an AFR storage facility. Therefore, construction of independent facilities would have a greater impact on the need for guards, equipment, etc., than would on-site expansion.

X-5

Reduction of the comparative analysis of spent fuel management options to a coal vs. nuclear comparison follows only because of the alternatives that have been chosen for analysis in this statement. As pointed out previously, the statement should be rewritten to provide guidance in choosing among the management alternatives.

X-1

ES-8 Table ES-3 is misleading, since the figures given for excess mortality due to nuclear generation are given with more precision than is warranted. A credible range of figures should be presented as is done for coal.

X-10.1

ES-9 The paragraph beginning "A replacement of nuclear generating capacity..." is logically flawed. It is true that coal plants can also generate electricity, but this does not lead to the conclusion that "...the only real option...is to continue generating electricity." Furthermore, this conclusion is beyond the proper scope of this document.

X-1

Page	Comments
X-3.1	The statement that the incremental environmental impact of increased transportation is insignificant is not supported by analysis in the summary or in the text of the report.
ES-10 (X-10.2)	The sentence beginning "Away-from-reactor spent fuel storage..." does not seem to have any point. What distinction could be made between AFR storage facilities and "storage only" type facilities?
X-2	In the introduction to the findings the statement is made that on-site and AFR storage have essentially equal environmental impacts, but that "[t]his conclusion is based on existing water pool storage technology." Dry storage is expected to have equivalent low impact "[b]ecause of the physical characteristics of aged spent fuel...." This qualification is not made clear in the full document, where judgements of dry storage environmental impacts appear to be based on an uncritical acceptance of the designers' goals and not on the age of the spent fuel.
ES-11	The meaning of the statement "the situation is manageable for some time beyond [the mid-1980's]..." is unclear. At what point would the situation become unmanageable? How long is "some time"? When must planning for AFR storage begin in order to be "timely"?
ES-12 (X-12.1)	The finding that "Even under these circumstances, <u>only</u> six storage pools of the size of the projected Exxon facility (7000 MT) would be required by the year 2000" (emphasis added) seems to downplay the significance of such a shortage in storage capacity. In light of the suspension of hearings on the GE Morris expansion, the termination of the Exxon license proceeding, and the uncertainties surrounding the government spent fuel policy, the possible 41,000 MT shortfall by 2000 could become very serious.
X-13	Finding number 4 fails to mention the possible effects of long-term corrosion on zircaloy-clad fuel. A recent study for DOE, "Behavior of Spent Nuclear Fuel in Water Pool Storage" (BNWL-2256) recommended that detailed examinations of fuel bundles

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Page	Comments
X-13	stored for long periods be conducted, especially if storage under water is expected to last longer than 20 years. This report identified several factors needing further study, including: behavior of defective fuel in pool storage, effects of changes in pool temperature and water chemistry on fuel condition, hydriding of zircaloy due to galvanic coupling, fission product attack on the inner wall of the cladding, and the incidence and consequences of corrosion due to residual stress, crud layer build-up, and crevice corrosion.
ES-13 (X-2)	The finding that dry storage techniques will be feasible and environmentally acceptable is not supported by detailed analysis or by demonstration of any of these techniques.
X-11.3	Characterizing GE Morris and the NFS plant as "storage only" facilities is misleading since they were not designed for this purpose. This emphasizes the urgent need for release of 10 CFR 72 and supporting regulatory guides.
X-4.3	Finding number 7, based on the "termination alternative," includes the statement that "...the prohibition of construction of new nuclear plants is not necessary." This does not follow from the termination case analysis, which is based on the replacement of <u>existing</u> plants with coal-fired plants. The phrase should be deleted.
X-14	Finding number 8 should acknowledge that the adequacy of the S-3 table is currently being questioned and that changes in 10 CFR 51 may be required.

Richard Starostecki
May 12, 1978
Page 12

Comments:
NUREG-0404, Chapters 1 and 2

Page	Comments
1-2 to	Because of the brevity of the discussion of spent fuel permanent
X-15 1-3	disposal in GESMO, an analysis of such an option would be useful.
X-9	Has any reactor operator proposed to operate for any length of time without FCR? Is the "no-FCR" case a realistic one?
X-12.2	The figure of 63,000 MTHM AR storage seem incompatible with the projected requirements for 41,000 MT of AFR storage given in Table 1.1. That this is due to lack of transshipment should be stated clearly in the table.
1-3	The alternatives presented do not really address the issues. See
X-1	general comments on choice of alternatives.
X-12.2	Table 1.1 is poorly defined. It should say more clearly why the additional AFR capacity is required and should present the potential impact of transshipment. The case requiring additional capacity in 1976 should be amplified -- what actually happened? It should also be made clear whether or not the additional AFR storage needs are in addition to current capacity, and if so what storage is considered to be currently available.
2-4 X-12.3	The estimate of 22.4 MT/GWe for spent fuel discharged per year is lower than most other published estimates and conflicts with the 30 MT/GWe figure given on page 2-3. The recent waste management task force report used an estimate of 25.4 MT/GWe. Since a low estimate is a non-conservative assumption, this number should be more adequately justified.
2-5 X-12.4	The executive summary states that an inventory of 41,000 MT of spent fuel might require storage in the year 2000 -- "only" six times the capacity of the projected Exxon facility. On page 2-5 the statement is made that increasing the projected nuclear capacity "does not alter the conclusions of this study."

Richard Starostecki
May 12, 1978
Page 13

Page	Comments
X-12.4	Since the reference case would require approximately forty times the current AFR capability, and the GESMO "Low Growth" case would increase this by about another 40%, the question becomes "how large a storage requirement would be regarded as significant"?
2-6 X-16	The assumption that reactors coming on line from 1986-2000 will provide only 1.5 cores of storage capacity is clearly unwarranted. Most operators plan to build capacity sufficient for ten years or more. Even for existing reactors, the NRC staff estimates that compact storage can provide approximately 2.5 x 1.5 cores = 3.75 cores' worth of capacity. It is unclear, then, why new reactors would be built with so limited a capacity.
	It is recognized that this is intended as a conservative assumption; however, it drastically inflates the requirement for AFR storage. If it is assumed instead that post-1985 reactors will provide sufficient storage for ten years' discharge (still a conservative assumption), the year 2000 AFR requirement reduces from 41,000 MT to less than 11,000 MT.

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Richard Starostecki
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Page 14

Comments
NUREG-0404, Chapter 3

Page		Comments
3-3	X-12.5	A useful addition to Table 3.1 would be a column listing available pool capacity with compact storage. If the estimated 2.5 expansion factor is applied to the non-compact capacity figures presented, it appears that storage capacity exceeds discharge plus full core reserve in every year from 1976 to 2000. This seems to imply that allowing transshipment between reactor pools could limit the requirement for AFR storage to zero. (See comment referring to pp. 3-27 to 3-34.)
3-7 to 3-13	X-12.6	To set an upper limit on the potential for reactor-site storage, the highest possible expansion capability should be assessed. For example, Table 3.4 indicates that several reactors have exceeded the 2.5 expansion factor estimated for Alternative 1. If this is commonly achievable and if reactors are built with greater initial storage capacities, the requirement for AFR storage can be drastically reduced.
3-13	X-11.3	The statement, "Presently, there are several fuel storage pools functioning as ISFSI's, though their original purpose may have been different" is misleading. There are two facilities currently serving as ISFSI's -- GE Morris and NFS -- and neither was intended to serve as a storage-only facility.
3-14 to 3-24	X-2	The discussion of dry storage facilities is misleading in that it presents a large amount of detail on technologies which are today only in the conceptual design stage, but fails to justify the conclusion that environmental impacts from such facilities will be equivalent to or less than those from pool storage facilities.
3-27 to 3-34	X-3.3	The description of the transshipment alternative is confusingly presented, making it difficult to judge the validity of the assumptions, the analysis, or the conclusions. The assumptions appear to involve two major flaws:

Richard Starostecki
May 12, 1978
Page 15

Page		Comments
	X-3.3	1. Because it is assumed that the capacity of spent fuel pools would be the same as they were in January 1976 (over two years ago), no allowance is made for increased storage. Even those reactors which have already increased storage capacity are disregarded. As pointed out in the comment referring to p. 3-3, applying the 2.5 expansion factor to the storage capacity given in Table 3.1 implies that storage capacity can exceed requirements in each year from 1976 to 2000. Even with no transfers between PWRs and BWRs, this combination of compact storage and transshipment would lower the requirement for AFR storage. 2. No allowance is made for storage capacity at any reactors coming on line after 1986. If the GESMO "super low" growth projection is used (as it is elsewhere in the statement), spent fuel pools for several reactors other than those listed in Table 3.5 will become available for transshipment.
3-34	X-4.2	The conclusion that "...it seems unlikely that new reactors would be put into service..." if storage pools at old reactors fill up does not follow. The interim storage problem could be solved for new reactors by building large capacity pools from the outset. Thus, given the scenario presented here, replacement of old nonnuclear capacity with new nuclear capacity (with larger storage capacity) would be a feasible option. This points out the flaw in the reasoning behind the choice of this alternative -- in essence, an entire nuclear plant would be built for the sake of its associated storage pool. See general comments on choice of alternatives and on alternatives as presented.
3-36	X-17	The references cited do not support the conclusion that "[c]onservation is not expected to materially affect the projected need for electricity." Reference 14 projects that fuel requirements for central station electricity generation could be cut to less than half the "historical growth" scenario by increased conservation. This directly contradicts the NRC staff's interpretation

Page	Comments
X-17	of that study. (A Time to Choose: America's Energy Future, Ford Foundation Energy Policy Project, pp. 28-29, 76.)

CHAPTER 4: ENVIRONMENTAL IMPACTS

X-18 Environmental effects of having to de-commission and de-contaminate the nuclear facilities after termination should be discussed.

- The ecological section is incomplete in that it fails to adequately discuss the environmental impacts of: dry vs. wet storage, dispersed vs. centralized storage, and maximum vs. minimum transshipment of spent fuel. In addition to assessing these issues the document should discuss the following specific impacts.

X-19.1 4.1.1.1 Compact storage increases the extent of potential environmental impacts by increasing the amount of radioactive material at the storage facility. Specifically, the report should discuss the change in magnitude of impacts from additional waste heat and accidental or abnormal events.

X-19.2 4.1.1.2 Wet Storage Facilities. Discuss the ecological and health impacts from accidental loss of cooling water (Section 4.2.3.8).

X-19.3 4.1.1.3 Dry Storage. Identify, quantify and discuss the impacts from "above normal temperatures in soils immediately surrounding the storage area."

X-19.4
- Explain the area and impacts that may become sterile and the probability of it occurring.

X-19.5
- Since a potential for leaching does exist, the EIS should discuss the probable impacts on the environment. If leaching of radioactive materials from a dry storage facility does occur scenarios should be constructed that describe the various degrees of impacts from leaching, including surface and ground water contamination. References that present more in-depth information on potential ecological impacts should also be included.

Frank Goodson
Richard Starostecki
May 12, 1978
Page 18

Section 4.2.3.2 Low Probability Missile Accident

It is assumed that the missile enters the pool at an optimum angle of 45 degrees, a 45-foot row of fuel is attacked, resulting in a conservative release of radionuclides.

X-19.6 However, there may be more KR^{85} for dispersal if the "worst case" is used. What are the effects on the fuel rods; are they knocked over? Is their integrity diminished? Are the racks sufficiently rigid to withstand such an impact? (Although the racks may be designed to withstand a fuel rod drop, has it been designed for a 144 mile per hour missile?)

Secondly, because of the initiating event (tornado), ambient air or meteorological conditions will be far from normal, which might agitate the "ORIGEN Code" calculations." Under tornado conditions and with a

X-19.7 13½" hole in the side of the fuel pool, a situation may exist (and should be discussed) where radionuclides are readily dispersable into the atmosphere and release of the cooling and moderating medium may leave faster than the auxiliary pumps can handle.

Richard Maullin

RICHARD L. MAULLIN
Chairman

RLM:JT:rc

9032?0

Environmental Coalition
on Nuclear Power
119 E. Aaron Dr.
State College, Pa
16801

12 May 1978

Director, Div. of Fuel Cycle and
Material Safety
U.S, Nuclear Regulatory Commission
Washington, D.C. , 20555

Gentlemen:

Enclosed are my comments on the Draft NUREG - 0404.

Thank You.

1-63

Sincerely,

William A. Lochstet

Wm. A. Lochstet

Comments on Draft Environmental Impact
Statement on Handeling and Storage of
Spent Light Water Power Reactor Fuel
NUREG - 0404
by
William A. Lochstet
Environmental Coalition on Nuclear Powrr
May 1978

In the document NUREG-0404 (Draft), the NRC chooses to select a reference option of compact storage at reactor(AR), with full core reserve, with additional storage provided away from reactor(AFR), and compare it with filling up the AR pools to capacity and switching to coal plants. However, the document refuses to consider (section 7,4.1.1) the cost-benefit analysis of these two <u>chosen</u> options. It would
Y-1 seem appropriate to declare such a decision in the beginning, and devote the document to a sincere comparison.

Sections 4.2.1.1 and 4.2.5 present material from NUREG - 0332 (draft) x which compares the health effects of
Y-2 coal and nuclear. Attached as an appendix are my comments and on that draft document which should be considered for modifications to Tables 4.2 and 4.12.

In section 2.2.1 the need for storage capacity is introduced based on a projection of 414 GWe in the year 2000.
Y-3.1 Many possible alternative predictions, are of course available,

but the Department Of Energy suggests in its recent first annual report that 380 GWe for the year 2000 is a maximum.
Y-3.1 It might be possible to pick some number for projected capacity and show that the conclusion is independent of its exact magnitude. This might eliminate the awkward discussions of conservation's impact on projected growth as in section 3.3.3.

The airithmetic in section 4.1.2.2.2 seems to be in slight error. A 1GWe nuclear plant operating at 30% efficiency
Y-3.2 will produce 2.3 GW of waste heat, but a plant with 40% efficiency (coal) would produce 1.5 GW of waste heat, not 1.6 - 1.7 GW.

Chapter 3 of Appendix H x attempts to discuss the interaction of dissimilar metals in the presence of x an electrolyte of pool water. This topic needs considerable amplification. It appears necessary to extrapolate from limited experiences of time durations less than ten years to some assurance about being able to store fuel that is already a few years old for an additional 25 or so years. It would be unfortunate if leaks became as much a problem in this program as they are for the waste storage tanks at Hanford. It is also important
Y-4.1 to recognise that in this case there will be neutron and gamma irradiation from the spent fuel. This will help to enhance the chemical reactions. There are three classes of materials used, alloys of zirconium, aluminum and stainless steel. It would be useful to tabulate which alloys are involved, and the composition of each. With reference to section 3.1.2, it should be noted that zirconium sits between aluminum and the major elemental constituents of stainless steel in the series of oxidation potentials of elements. It would be useful to tabulate the various materials used as components of fuel assemblies and storage racks. This would be particularly useful for the experiences related in section 3.1.3 of appendix H.

963300

In section 1.5.2 of appendix B is a description of various shipping casks. The text suggests that there will be 13 truck and 6 rail casks available by late 1976. Table B-3
Y-5 also gives availability at Jan. 1976. A clear tabulation of present and expected availabilities of each cask type would make the calculation clearer.

Section 3.3.2.1 discusses increased burnup of the fuel. The fuel cladding integrity is not solely dependent on the irradiation time but ~~xx xxx~~ in large part to the cladding - fuel interactions brought about by ~~xxx~~ changes in power level.
Y-4.2 Consideration should also be given to regeneration of fuel by bombarding with neutrons from a large proton accelerator. In this way uranium - 238 can be bred into plutonium and the fuel reused without reprocessing.

It is suggested in section 3.1.2.1 that it would be ~~xx~~ possible to build an additional storage pool at some power plant sites. This should be considered in more detail. It is much easier to ship the spent fuel a hundred yards or so ~~x~~ than to ship it 1000 miles as AFR would require. The hazards of shipping would be eliminated. The discussion in section 3.2.2.2
Y-6 would suggest that there would be enough shipping casks to do the job. The objection raised in section 3.1.2.1 would seem to apply only to cases where the desire is to connect the two pools. If the existing building has facilities for long distance shipments, the <u>same</u> facility can be used to ship to the next building.

The dry caisson storage suggested in section 3.1.4.2.4 would subject large quantities of earth to neutron irradiation from the spent fuel. The activation products do not seem to
Y-7.1 have been evaluated. The temptation to ignore any leaks of activity into the soil is also large. The high temperatures in the earth near such a storage unit has the potential to vaporize ground

Y-7.1 water with results that may be explosive.

The RSSF discussed in section 3.1.4.2.2 would result in
Y-7.2 neutron ~~x~~ irradiation of concrete and the resulting activation products.

The 50 year dose commitment for 129-iodine in table 4.6 of section 4.2.3.2 is totally inadequate. The total dose should
Y-8.1 be projected for infinite time with the present world population as a first approximation.

The discussion of ruptured fuel needs a more solid numerical foundation from existing experience. This would
Y-8.2 seem to be a major expected release pathway. What fraction of the fuel can be expected to leak and how much would seem relevant here.

The conclusions in section 7.4.3 could use a little
Y-9 explanation and justification from the rest of the document.

Appendix: Comments on NUREG - 0332

November 1977

Comments on NUREG-0332

by

Dr. William A. Lochstet
The Pennsylvania State University

November 1977

In the document NUREG-0332 (Draft), the NRC estimates the excess deaths per 0.8 gigawatt-year electric (GWy(e)) to be about 0.5 for an all nuclear economy and about 15 to 120 for the use of coal (Ref. 1). These estimates are much too small because they ignore the health effects due to the slow release of radon-222 resulting from the decay of radioactive components of the coal, uranium mill tailings, and of the tailings from the uranium enrichment process. If the health effects are estimated by the procedure used by the NRC, then the excess deaths are about 600,000 in the nuclear case and twentythousand for coal. The estimates presented here are all based on the production of 0.8 GWy(e).

<u>Radon Produced by the Uranium Fuel Cycle</u>

The production of 0.8 GWy of electricity by a LWR will require about 29 metric tons of enriched uranium for fuel. With uranium enrichment plants operating with a 0.2% tails assay, 146 metric tons of natural uranium will be required. In the absence of the LMFBR, 117 metric tons of depleted uranium would be left over. With a uranium mill which extracts 96% of the uranium from the ore (Ref. 2), a total of 90,000 metric tons of ore is mined, containing 152 metric tons of uranium. The uranium mill tailings will contain 2.6 kilograms of thorium-230 and 6 metric tons of uranium. As Pohl has pointed out (Ref.3) the thorium - 230 decays to radium - 226, which in turn decays to radon - 222. This process results in the generation of 3.9×10^8 curies of radon-222, with the time scale determined by the 8×10^4 year half life of thorium - 230.

The 6 metric tons of uranium contained in the mill tailings decay by several steps to radon - 222 thru thorium - 230. This process occurs on a time scale governed by the 4.5×10^9 year half life of uranium - 238, the major isotope present (99.3%). The total amount of radon - 222 which will result from this decay is 8.6×10^{11} curies.

The 117 metric tons of depleated uranium from the enrichment process is also mainly uranium - 238 which also decays. The decay of these enrichment tailings results in a total of 1.7×10^{13} curies of radon - 222. This is listed in Table 1, along with the other radon yields.

It is instructive to compare these quantities of activity to the activity of the fission products which result from the use of the fuel which they are associated with. The total fission product inventory resulting from 0.8GWy(e) with half lives of 25 years or more is about 10^7 curies. This is much less than any of the numbers in Table 1. We should be more careful with these tailings.

Radon Produced by the Coal Fuel Cycle

Item 2 i of Appendix A of NUREG-0332 (Ref. 1) assumes a 75% capacity facto . hich for a 1000 MWe plant would produce only 0.75 GWy(e). A capacity factor of 80% will be used here. The production of 0.8 GWy(e) by a coal plant operating at 40% efficiency, using 12,000 BTU per pound coal would require 2.5 million short tons of coal. This is close to the value of 3 million tons suggested on page 9 of NUREG-0332 (Ref. 1).

There is great variability in the amount of uranium contained in coal. An analysis of coal samples at one TVA plant reported by the EPA (Ref. 4) indicates a range of almost a factor of ten in uranium content. Eisenbud and Petrow (Ref. 5) report a value of about 1 part per million. A recent survey by the USGS based on several hundred samples suggests that in the United States coal contains an average of 1.8 part per million of uranium(Ref. 6). Both values of 1.0 and 1.8 ppm will be used here. Thus 2.5 million tons of coal will contain between 2.3 and 4.1 thousand kilograms of uranium. Using the assumption of NUREG-0332 (Ref. 1) that there is 99% particulate removal from plant emissions, 1% of this uranium will be dispersed into the air and the remainder carted away as ashes for land burial. Table 1 indicates that with 1.0 ppm coal the uranium in the resulting ash will decay to a total of 3.2×10^{11} curies of radon - 222, while the stack emissions will lead to 3.2×10^{9} curies. For 1.8 ppm coal the values are 5.8×10^{11} curies from ash and 5.8×10^{9} curies from emissions.

Evaluation of the Health Effects

It is necessary to evaluate the number of deaths which result from the release of one curie of radon - 222. For the purpose of this evaluation the population and population distributions are assumed to remain at the present values. This should provide a good first estimate.

NUREG-0332 (Ref. 1) suggests that a release of 4,800 curies of radon - 222 from the mines (page 11) would result in 0.023 excess deaths (Table 1a, page 18). This provides a ratio of 4.8×10^{-6} deaths per curie. Data from Chapter IV of GESMO (Ref. 7) suggests a value of 1.7×10^{-6} deaths per curie as a lower limit. The value of 4.8×10^{-6} deaths per curie will be used here as the NRC estimate. It is understood that this is very approximate.

The EPA has evaluated the health effects of a model uranium mill tailings pile. They estimate a total of 200 health effects (Ref. 8, page 73) for a pile which emits at most 20,000 curies of radon - 222 for 100 years. The resulting estimate is 1.0×10^{-4} deaths per curie and will be used here as the EPA estimate.

Evaluation of Health Effects - Nuclear

At present some recent uranium mill tailings piles have 2 feet of dirt covering. In this case the EPA estimate (Ref. 8) is that about 1/20 of the radon produced escapes into the air. This factor of 20 is listed in Table 1 and is used to find the effective releases. Thus the 3.9×10^{8} curies of radon which results from thorium in the mill tailings results in a release of 1.9×10^{7} curies into the atmosphere, which with the NRC estimate of 4.8×10^{-6} deaths per curie results in 90 deaths. With the EPA estimate 1900 deaths result. A similar treatment applied to 8.6×10^{11} curies of radon from the uranium in the mill tailings results in 200,000 dead for the NRC estimate and 4.3 million for the EPA estimate. It is here assumed that no future generation will see fit to take any better care of the mill tailings than is presently practiced.

The uranium enrichment tailings are presently located in the eastern part of the country. It is assumed that these are buried near their present locations. Radon will not escape so easily through wet soil. A reduction factor of 100 is used to estimate this effect. The accuracy of this estimate depends on the particulars of the burial which can only be projected. An additional factor of 2 is used to reduce the effect due to the fact that much of this radon would decay over the ocean rather than populated land areas. No compensation is taken for the greater population density near the point of release as compared to the uranium mill tailings piles of the western states. With this total reduction factor of 200 the NRC estimate is 100,000 dead while the EPA value is 8 million.

Evaluation of Health Effects - Coal

It is assumed that the ashes from the coal plants will be buried in a manner similar to the tailings from the uranium enrichment process. Thus a reduction factor of 200 is used in this case also. Again the higher population density is ignored.

The particulate which is released into the air by the coal plant is taken to contain 1% of the contained uranium. Since most such plants are in the eastern part of the country it is estimated that half will fall into the ocean rather than onto land. A second factor of 2 is used to reduce the effect of the resulting radon due to the fact that some of this radon will decay over ocean as with the radon from the uranium in the enrichment tailings. Again no compensation is taken for the greater population density near the point of release. This gives the total reduction factor of 4 shown in table 1.

With these reduction factors applied to the radon released by the ashes and emissions, in the two cases of 1.0 ppm and 1.8ppm uranium content coal, the health effects are calculated. These are shown in Table 1, and range from 7,700 dead from ashes and 3,800additional dead from airborn emissions for 1.0 ppm coal in the NRC estimate to 290,000dead from ashes and 140,000 dead from airborn releases in the case of 1.8 ppm coal in the EPA estimate.

Discussion

It is obviously very difficult to estimate with any precision how many health effects result from the release of a given curie of radon - 222 from some specific site in the west. The estimates presented here differ by a factor of 20. This might best be used as a range of expected deaths. The reduction factors used here are crude estimates in some cases, and could be improved upon. Changes in public policy could also change the manner in which this material is disposed, thus greatly changing these factors. In particular deep burial could practically eliminate the escape of radon to the atmosphere (Ref. 8).

It is important to compare Table 1 here with Table 1 of NUREG-0332 (Ref. 1), which shows 0.47 dead for the nuclear case and at most 120 dead for coal. These last numbers totally ignore the effects of long term radon emissions, which result in at least 100 times higher mortality. These long term effects are not only significant, but dominate the effect.

It is important to use Table 1 to compare the relative risk of the nuclear and coal option in their present forms. In this case deaths due to all causes considered in NUREG-0332 can be ignored as insignificant, since they are so small. The absolute number of deaths per curie released is irrelevant since it enters in both cases. The relative risk is determined solely by the quantities of radon - 222 generated and the reduction factors. Unless there is a clear decision to treat coal ashes differently from uranium enrichment tailings, the health effects from the tailings will be 50 times greater since there is

50 times more uranium there. The nuclear option remains more hazardous than coal unless the releases from all of the tailings piles can be reduced below the releases from the airborn particulates of the coal plant. This is not the present policy.

Additional Comment

There is a typographical error on page 25 of NUREG-0332. Reference #33 is listed there as being in volume 148 of Science, whereas it appears in volume 144.

Acknowledgment

The above comments were inspired by the 5 July 1977 testimony of Dr. Chauncey R. Kepford in the matter of the Three Mile Island Unit 2 (Docket No. 50-320) operating license entitled: " Health effects Comparison for Coal and Nuclear Power".

Table 1

Energy Source Excess Mortality per 0.8 GWy(e) due to Radon - 222 emissions

Origin of Radon	Radon Generated Curies	Reduction Factor	Deaths NRC	Deaths EPA
Nuclear				
Thorium in Mill Tails	3.9×10^{8}	20	90	1900
Uranium in Mill Tails	8.6×10^{11}	20	200,000	4.3×10^{6}
Uranium in Enrichment Tails	1.7×10^{13}	200	400,000	8×10^{6}
Coal 1.0 ppm U				
Ashes	3.2×10^{11}	200	7,700	1.6×10^{5}
Air Particulate	3.2×10^{9}	4	3,800	8×10^{4}
Coal 1.8 ppm U				
Ashes	5.8×10^{11}	200	14,000	2.9×10^{5}
Air Particulate	5.8×10^{9}	4	6,800	1.4×10^{5}

References

1 "Health Effects Attributable to Coal and Nuclear Fuel Cycle Alternatives" NUREG-0332, Draft, U.S. Nuclear Regulatory Commission (September 1977)

2 "Environmental Analysis of The Uranium Fuel Cycle, Part I - Fuel Supply" EPA-520/9-73-003-B, U.S. Environmental Protection Agency, (October 1973)

3 R.O. Pohl, "Health Effects of Radon - 222 from Uranium Mining" Search, 7(5), 345-350 (August 1976)

4 P.W. Bedrosian, D.G. Easterly, and S.L. Cummings, "Radiological Survey Around Power Plants Using Fossil Fuel" EERL 71-3, U.S. Environmental Protection Agency, (July 1970)

5 M. Eisenbud, and H.G. Petrow," Radioactivity in the Atmospheric Effluents of Power Plants that Use Fossil Fuels," Science 144,:288-289 (1964)

6 V.E. Swanson et al,"Collection, Chemical Analysis, and Evaluation of Coal Samples in 1975", Open-file report 76-468, U.S. Department of the Interior, Geological Survey, (1976)

7 "Final Generic Environmental Statement on the Use of Recycle Plutonium in Mixed Oxide Fuel in Light Water Cooled Reactors," NUREG-0002, U.S. Nuclear Regulatory Commission, (August 1976)

8 See Ref. 2

8033307

Environmental Coalition on
Nuclear Power
119 E. Aaron Dr.
State College, Pa., 16801

24 May 1978

Director, Div. of Fuel Cycle and
Material Safety
U.S. Nuclear Regulatory Commission
Washington, D.C., 20555

Gentlemen:

Supplemental comment on NUREG - 0404 (Draft), Generic Environmental Impact Statement on Handling and Storage of spent Light Water Power Reactor Fuel.

1-10

The foreword indicates on pages i and ii that the National Environmental Policy Act of 1969 (NEPA) in section 102(2)(C) calls for the preparation of a detailed statement on "alternatives to the proposed action". The action being considered here is to build away from reactor storage facilities. The chief alternative is not to build AFR facilities. This is the "Termination Case" of section 7.4, with the construction of coal fired generating capacity. It would seem that NEPA would <u>require</u> that these be compared completely, which is in contradiction with section 7.4.1.1. In addition the comparison of the health impacts of ~~xxxxxx~~ Chapter 4 would also be required by NEPA. It may not be possible to resolve the health effects issue until the environmental impact of radon - 222 of table S-3 of 10C.F.R. 51.20 has been decided.

Sincerely,

William A. Lochstet

W.A. Lochstet

1-71

STATE OF ILLINOIS
EXECUTIVE OFFICE OF THE GOVERNOR
BUREAU OF THE BUDGET
SPRINGFIELD 62706

May 15, 1978

RECEIVED
MAY 2 4 1978
U.S. Nuclear Regulatory Commission
Mail Section

Mr. Richard W. Starostecki, Chief
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material
Safety
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Starostecki:

RE: Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel, #78-03-291

Pursuant to the National Environmental Policy Act (NEPA), OMB Circular A-95 (revised) and the administrative policy of the State, the referenced subject has been reviewed by the appropriate State agencies. No comments were made on this subject.

Thank you for your assistance.

Respectfully yours,

T. E. Hornbacker

T. E. Hornbacker, Director
Illinois State Clearinghouse

TEH/li

DOCKETED USNRC
MAY 2 4 1978
NMSS MAIL SECTION DOCKET CLERK

POOR ORIGINAL

7806080308

State of Missouri
OFFICE OF ADMINISTRATION
Jefferson City 65101

Joseph P. Teasdale
Governor

Gary O. Passmore, Director
Division of Budget and Planning

May 19, 1978

DOCKETED USNRC
MAY 2 6 1978
NMSS MAIL SECTION DOCKET CLERK

Mr. Richard W. Starostecki
Chief
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material
Safety
Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Starostecki:

Subject: 780300073

The Division of Budget and Planning, as the designated State Clearinghouse, has coordinated a review of the above referred draft environmental impact statement with various concerned or affected state agencies pursuant to Section 102(2)(c) of the National Environmental Policy Act.

None of the state agencies involved in the review had comments or recommendations to offer at this time.

We appreciate the opportunity to review the statement and anticipate receiving the final environmental impact statement when prepared.

Sincerely,

George Lineberry

George Lineberry
Chief, Grants Coordination

OFFICE OF THE GOVERNOR

DOLPH BRISCOE
GOVERNOR

May 2[illegible], 1978

Mr. Richard W. Starostecki, Chief
Fuel Reprocessing and Recycle
Branch
Division of Fuel Cycle and Material Study
United States Nuclear Regulatory
Commission
Washington, D.C. 20555

Dear Mr. Starostecki:

The Budget and Planning Office recently coordinated the review of the Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel. Subsequent to the completion of the review process, the enclosed comments were received from the Railroad Commission of Texas.

Please place this information with the original material. We regret any inconvenience this may cause. If this Office can be of further assistance, please contact us.

Sincerely,

Ward C. Goessling, Jr.

Ward C. Goessling, Jr., Coordinator
Natural Resources Section
Budget and Planning Office

Enclosure

RAILROAD COMMISSION OF TEXAS
SURFACE MINING DIVISION

MACK WALLACE, Chairman
JON NEWTON, Commissioner
JOHN H. POERNER, Commissioner

ROY D. PAYNE
Director

ERNEST O. THOMPSON BUILDING • CAPITOL STATION • P.O. DRAWER 12967 • AUSTIN, TEXAS 78711

May 17, 1978

Mr. Ward Goessling, Coordinator
Natural Resources Section
Budget and Planning Office
Office of the Governor
Austin, Texas 78701

Dear Mr. Goessling:

The Texas Railroad Commission holds that increased temporary Atomic Reactor (AR) storage of light water reactor wastes is a viable approach to extending the usable life of nuclear power plants, where the AR storage facilities are properly designed and constructed and where loading rates of storage pools are strictly monitored. Reserve space for a full core storage for inspection or emergency conditions should always be maintained in the storage pools.

Reactors which are not yet on-line should implement methods of increased fuel burnup to increase the amount of electric generation and decrease waste discharge frequency. In light of the new federal policy prohibiting waste recycling and reprocessing, greater emphasis should be put on effective fuel utilization. Implementation of revised fuel management strategies, design changes and adjusted safety analyses can and should be accomplished for all reactors which have not yet been constructed.

The economic comparisons between AR storage and coal-fired plants is unjustifiably biased against coal-fired plants. The use of coal as a power source is increasing and coal will supply a great percent of U.S. energy needs over the latter part of this century. If a true cost estimate of mining, processing and shipment of power plant coal feedstock versus uranium to be used and stored in AR pools were compared, coal would prove to be a more viable source of energy than is represented in this report. Plant construction and dismantling costs should be accurately reflected as well. The report Power Costs, of the House Environment, Energy and Natural Resources Subcommittee, should be considered in making these economic analyses.

Very truly yours,

Roy D. Payne

Roy D. Payne
Director

RDP:[illegible]

JAY S. HAMMOND
GOVERNOR

OFFICE OF THE GOVERNOR

STATE POLICY DEVELOPMENT AND PLANNING

POUCH AD – JUNEAU 99811
PHONE 465-3512

May 24, 1978

Mr. Richard W. Starostecki, Chief
Fuel Reprocessing & Recycle Branch
Division of Fuel Cycle and Material Safety
Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: DEIS Water-Power-Reactor-Fuel
State I. D. No: 28032901

Dear Mr. Starostecki:

The Alaska State Clearinghouse has completed review on the subject project.

The State Clearinghouse has no comment on this project.

This letter will satisfy the review requirements of the office of Budget and Management's Circular A-95.

Sincerely,

Jerry L. Madden
State-Federal Coordinator

JLM:jp

POOR ORIGINAL

903310

Southwest Research and Information Center
P.O. Box 4524 Albuquerque, New Mexico 87106

May 26, 1978

RECEIVED JUN 16 1978

GENERAL CRITIQUE OF NUREG-0404

<u>Draft GEIS on Handling & Storage of Spent LWPR Fuel</u>
<u>March 1978</u> <u>Project No. M-4</u>

General Comments:

1. There is no attempt to make a scientific presentation. There are no equations, formulae or any other evidence that a rigorous method was utilized in the DGEIS preparation.

2. Results of some analyses are presented in graphic, tabular and numerical forms, but neither the analyses nor the methodologies are presented with rigor.

3. There is no generic approach to the problem of human extinction, mortality, morbidity and economics for various spent fuel production rates and radioactive leak rates. Without systematic approaches to those dangers associated with a growing nuclear power industry, this GEIS has no hope of complying with the wisdom explicit in NEPA.

AB-1

4. NRC staff has an interesting interpretation of what is called for in NEPA. For example, their "<u>SAFETY ANALYSIS</u>" (pp. 3-28, v.1) in the "<u>TRANSSHIPMENT</u>" section:

> "Fuel transshipment does not generate new safety problems. However, the staff will perform site specific analyses on case-by-case actions to verify this conclusion."

Gadzooks, I'm speechless. Does the presence of "no new safety problems" preclude up-to-date presentations of scientific knowledge and understanding about the ageless problems of transportation safety? Does NEPA forbid transportation safety analyses? That clearly appears to be the case.

Then there's that "However". What magnificent graciousness. "Staff <u>will perform</u>" preempts the purpose of NEPA--to provide a safety analysis of the actions proposed. In this case, the safety problems generic to the handling and storage of spent fuel from LWR's must be discussed in as much detail as possible in this GEIS.

Then "the staff will perform site specific analyses on case-by-case actions <u>to verify this</u> conclusion." Why isn't NRC staff willing to just quote from NEPA's charge to U.S. agencies writing EIS's? Why shouldn't NRC analyze transportation actions <u>to determine</u> what safety conditions are rather than "to verify this conclusion." i.e. to prove or demonstrate anything?

DOCKETED USNRC JUN 26 1978 NMSS MAIL SECTION DOCKET CLERK

1-74

AB-1 5. Because of the above deficiencies, NUREG-0404 does not provide a legal or a scientific basis for a CGIS under NEPA.

Sincerely,

Charles L. Hyder

Charles L. Hyder, Ph.D.
Staff Scientist
Southwest Research and Information Center

CH/jm

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

May 26, 1978

Mr. Richard W. Starostecki, Chief
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material Safety
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

COMMENTS ON THE DRAFT GENERIC ENVIRONMENTAL IMPACT STATEMENT ON HANDLING AND STORAGE OF SPENT LIGHT WATER POWER REACTOR FUEL (NUREG-0404) PROJECT NO. M-4

Dear Mr. Starostecki:

We have received and reviewed the NRC's Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0404). In response to your invitation to comment on the statement, we would like to express our general support for the conclusions which were developed by the NRC staff; we also have several comments on the contents of the report which are provided in Attachment A to this letter. In particular, we agree with the staff that the storage of spent fuel in water pools is a well established technology, and under the static conditions of storage represents a low environmental impact, and low potential risk to the health and safety of the public. We also believe the use of alternative dry passive storage techniques for aged fuel is feasible and environmentally acceptable.

Therefore, we concur with the staff's finding that no modification on 10 CFR 51.20(e) (the summary for environmental considerations for the uranium fuel cycle) appears necessary for spent fuel storage considerations.

Very truly yours,

W. N. Thomas

W. N. Thomas
Vice President
Fuel Resources

(metric tons of heavy metal[4]/number of assemblies)

Reactor	Surry 1	Surry 2	North Anna 1	North Anna 2	North Anna 3	North Anna 4	TOTAL
1974	0.17/18	--	--	--	--	--	[illegible]/18
1975	32.96/73	11.87/26	--	--	--	--	4.23/99
1976	39.80/89	32.64/73	--	--	--	--	72.44/162
1977	--	36.43/81	--	--	--	--	36.43/81
1978	20.33/45	24.27/53	--	--	--	--	44.83/98
1979	--	--	24.32/53	--	--	--	24.32/53
1980	38.81/85	35.23/77	23.91/52	24.46/53	--	--	122.41/267
1981	31.16/68	--	23.92/52	24.00/52	--	--	79.08/172
1982	--	34.37/75	24.25/52	24.00/52	--	--	82.62/179
1983	31.21/68	31.21/68	24.15/52	24.25/52	--	--	110.82/240
1984	31.21/68	--	24.15/52	24.15/52	--	--	79.51/172
1985	--	31.21/68	24.15/52	24.15/52	22.35/49	--	101.86/221
1986	31.21/68	31.21/68	24.15/52	24.15/52	21.89/48	22.35/49	154.96/337
1987	31.21/68	--	24.15/52	24.15/52	21.89/48	21.09/48	122.29/268
1988	--	31.21/68	24.15/52	24.15/52	22.25/48	21.59/48	123.63/268
1989	31.21/68	31.21/68	24.13/52	24.15/52	22.04/48	22.25/48	155.01/336
1990	31.21/68	--	24.15/52	24.15/52	22.04/48	22.04/48	123.59/268

[1]All assemblies are pressurized water reactor types.

[2]Some assemblies are discharged and then reinserted for additional use at a later date. For this study we have reported only those assemblies which have been or will be permanently discharged.

[3]Based upon our current fuel management scheme and operational scheduling.

[4]Prior to initial irradiation.

DRF
1/12/78

Checked by: JRF
1/12/78

VEPCO COMMENTS ON THE DRAFT GEIS (0404)

POOR ORIGINAL

ATTACHMENT A

VEPCO COMMENTS ON THE DRAFT GENERIC ENVIRONMENTAL IMPACT STATEMENT ON HANDLING AND STORAGE OF SPENT LIGHT WATER POWER REACTOR FUEL (NUREG-0404)

In general, we believe several of the assumptions utilized in preparing this report are overly conservative (e.g., no increase in the size of spent fuel pools built between now and the year 2000); however, as such they do tend to strengthen the conclusions reached by the staff which were based upon information derived from these assumptions. We also believe it would be appropriate for the NRC to update the Statement to reflect the Federal Government's present spent nuclear fuel disposition policies (i.e., throwaway vs. reprocessing, and the construction and operation of an initial spent fuel repository during the time period 1988–1993). AC-1.1

Specific Comments

Pg. 1-2, Section 1.2; Spent Fuel Storage Requirements and Alternatives

The statement is made that "The disposition of spent nuclear fuel has not been determined". This is inconsistent with the present Federal Government policy which requires spent nuclear fuel to be stored indefinitely or disposed of as waste as a result of the indefinite deferral of the reprocessing of spent nuclear fuel.

Pg. 3-9, Table 3.4; Appendix E; and Appendix F

AC-1.2 The data utilized in preparing this table and the two appendices are incorrect with regard to Vepco's reactors and the information provided in the attached tables should allow the staff to regenerate the correct information for inclusion in the final Statement.

963312

SPENT FUEL POOL INVENTORIES* AS OF MAY, 1978

	Surry 1 & 2 Pool		North Anna 1 & 2 Pool	
	# Assy's	MTU [1]	# Assy's	MTU [1]
Permanently Discharged	405	178.2	0	0
Original Design Capacity	464	204.2	464	204.2
Expansion Capacity	1044 [5]	459.4	–	–
Remaining Capacity	639	281.16	400 [2]	176.0
Scheduled Expansion	–	–	966 [3]	425.0

The dates on which available design capacity will be exceeded are given below.

	With Full Core [4] Discharge Capability	Without Full Core Discharge Capability
Surry 1/2 (1044 Capacity)	October, 1983	April, 1986
North Anna 1/2 (400 Capacity)	November, 1981	September, 1983
North Anna 1/2 (966 Capacity)	September, 1987	November, 1988

(1) Based on an average of 0.44 MTU/Assembly.

(2) Currently there are no storage racks in the North Anna pool intended for spent fuel. Original design capacity was 464 spaces; however, this has been reduced to 400 spaces due to pool modifications.

(3) Scheduled to be available in 1978.

(4) Full Core discharge from any one reactor requires 157 additional storage spaces.

(5) On March 23, 1978, the NRC issued Amendments to each of Vepco's Surry facility operating licenses permitting the installation of new fuel storage racks in the common spent fuel pool thereby increasing the pool's storage capacity from 464 to 1044 fuel assemblies: the new storage racks have since been installed.

*Based upon our current fuel management scheme and operational schedules, no spent fuel [illegible].

963313

963314

PDR

POOR ORIGINAL

DEPARTMENT OF NATURAL RESOURCES

May 31, 1978

Mr. Richard W. Starostecki
Chief, Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material Safety
Nuclear Regulatory Commission
Washington, D.C. - 20555

Subject: Handling and Storage of Spent Light Water Power Reactor Fuel

E.I.S. 378-011 DC

Dear mister Starostecki:

In relation to the Draft Environmental Impact Statement mentioned above, we want to inform you that this Department has no objection to the proposed project. We agree with all the parts of the document.

Cordially yours,

Gabriel del Toro
Assistant Secretary
for Planning

EAC-lmr

SIGNOFF

OMB Approval No. 29-R0218

FEDERAL ASSISTANCE

1. Type Of Action (Mark appropriate box): ☐ Preapplication ☐ Application ☐ Notification Of Intent (Opt.) ☐ Report Of Federal Action

2. Applicant's application: a. Number; b. Date 19 Year Month Day

Leave Blank: May 31, 1978

3. State application identifier: a. Number AZ 78-80-0022; b. Date Year month day Assigned 1978 04 21

Joann Youngblood

4. Legal Applicant/Recipient

- a. Applicant Name: Nuclear Regulatory Commission
- b. Organization Unit: Office of Nuclear Material Safety and Safeguards
- c. Street/P.O. Box:
- d. City: Washington
- e. County:
- f. State: D.C.
- g. Zip Code: 20555
- h. Contact Person (Name & telephone no.): Mr. John P. Roberts, c/o Director, Div. of Fuel Cycle and Material Safety (301) 427-4205

5. Federal Employer Identification No.

6. Program (From Federal Catalog): a. Number 77 ; b. Title Unknown

Nuclear Regulatory Commission

RECEIVED 1978

7. Title and description: HANDLING AND STORAGE OF SPENT LIGHT WATER POWER REACTOR FUEL - PROJECT NO. M-4 - DRAFT GENERIC ENVIRONMENTAL IMPACT STATEMENT - 2 VOL. Storage of spent fuel addressed in this generic EIS is considered to be an interim action. Study is to examine the period through mid-1980s. In absence of a national policy directed to final disposition of spent fuel, staff extended the time period to year 2000. Scope of this statement examines alternative methods of spent fuel storage as well as possible restriction or termination of generation of spent fuel through nuclear power plant shutdown.

8. Type of applicant/recipient: A–State; B–Interstate; C–Substate District; D–County; E–City; F–School District; G–Special Purpose District; H–Community Action Agency; I–Higher Educational Institution; J–Indian Tribe; K–Other (Specify): Federal Agency. Enter appropriate letter: K

9. Type of assistance: A–Basic Grant; B–Supplemental Grant; C–Loan; D–Insurance; E–Other. Enter appropriate letter(s): E

10. Area of project impact (Names of cities, counties, states, etc.): Statewide, Arizona

11. Estimated number of persons benefiting:

12. Type of application: A–New; B–Renewal; C–Revision; D–Continuation; E–Augmentation. Enter appropriate letter: A

13. Proposed Funding

a. Federal	$	.00
b. Applicant		.00
c. State		.00
d. Local		.00
e. Other	1	.00
f. Total	$ 1	.00

14. Congressional Districts Of: a. Applicant; b. Project

15. Type of change (For 12c or 12e): A–Increase Dollars; B–Decrease Dollars; C–Increase Duration; D–Decrease Duration; E–Cancellation; F–Other Specify. Enter appropriate letter(s)

16. Project Start Date: Year month day 19

17. Project Duration: Months

18. Estimated date to be submitted to federal agency: Year month date 19

19. Existing federal identification number

20. Federal agency to receive request (Name, city, state, zip code)

21. Remarks added: ☐ Yes ☒ No

22. The Applicant Certifies That:

a. To the best of my knowledge and belief, data in this preapplication/application are true and correct, the document has been duly authorized by the governing body of the applicant and the applicant will comply with the attached assurances if the assistance is approved.

b. If required by OMB Circular A-95 this application was submitted, pursuant to instructions therein, to appropriate clearinghouses and all responses are attached:

	No response	Response attached
(1) Arizona State Clearinghouse	☐	☒
(2) Region II, III, V & VI Clearinghouses	☐	☒
(3) Region I & IV Clearinghouse responses to be forwarded	☒	

23. Certifying representative: a. Typed name and title; b. Signature; c. Date signed Year month day 19

24. Agency name

25. Application received Year month day 19

26. Organizational Unit

27. Administrative office

28. Federal application identification

29. Address

30. Federal grant identification

31. Action taken: ☐ a. Awarded ☐ b. Rejected ☐ c. Returned for amendment ☐ d. Deferred ☐ e. Withdrawn

32. Funding

a. Federal	$	.00
b. Applicant		.00
c. State		.00
d. Local		.00
e. Other		.00
f. Total		.00

33. Action date 19 Year month day

34. Starting date 19 Year month day

35. Contact for additional information (Name and telephone number)

36. Ending date 19 Year month day

37. Remarks added ☐ Yes ☐ No

DOCKETED USNRC JUN 23 1978

38. Federal agency A-95 action: a. In taking above action, any comments received from clearinghouses were considered. If agency response is due under provisions of Part 1, OMB Circular A-95, it has been or is being made.

b. Federal Agency A-95 Official (Name and telephone number)

424-101

Standard Form 424 Page 1 (10-75)
Prescribed by GSA, Federal Management Circular 74-7

Dr. William H. Dresher, Director
Arizona Bureau of Geology & Mineral Technology
University of Arizona
Tucson, Arizona 85721

From: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

State Application Identifier (SAI)

APR 21 1978 State AZ No. 78-80-0022

Mineral Resources
Indian Affairs
Game & Fish
Az. Mining Ass'n
Transportation
Civil Rights
Energy Programs
Az. Atomic Energy
Environmental Studies
Renewable Natural Resources
Center for Public Affairs
U of A College of Medicine
ASU Center for Health Services
Oil & Gas Conservation Comm.
Bu of Geology & Mineral Tech.
Salt River Indian Clearinghouse
Navajo Indian Clearinghouse
OEPAD: T. Murray
R. Kingery

Ag. & Hort.
Power
Health
Water
Land
Parks
AORCC

6 Regions

This project is referred to you for review and comment. Please evaluate as to:

(1) the program's effect upon the plans and programs of your agency
(2) the importance of its contribution to State and/or areawide goals and objectives
(3) its accord with any applicable law, order or regulation with which you are familiar
(4) additional considerations

Please return THIS FORM AND ONE XEROX COPY to the clearinghouse no later than 17 working days from the date noted above. Please contact the clearinghouse if you need further information or additional time for review.

☒ No comment on this project
☐ Proposal is supported as written
☐ Comments as indicated below

-----For a complete copy of the Draft Environmental Impact Statement, please get in touch with the contact person as shown on Line 4.h.

Comments: (Use additional sheets if necessary)

POOR ORIGINAL

Reviewer's Signature: William H. Dresher Date 5-9-78

Title: Director Telephone 884-1943

963315

Dr. James Becker
Center for Public Affairs
Arizona State University
Tempe, Arizona 85281

State Application Identifier (SAI)
APR 21, 1978 State AZ No. 78-80-0022

TO: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

Mineral Resources	Ag. & Hort.
Indian Affairs	Power
Game & Fish	Health
Az. Mining Ass'n	Water
Transportation	Land
Civil Rights	Parks
Energy Programs	AORCC
Az. Atomic Energy	
Environmental Studies	
Renewable Natural Resources	
Center for Public Affairs	
U of A College of Medicine	
ASU Center for Health Services	
Oil & Gas Conservation Comm.	
Bu of Geology & Mineral Tech.	
Salt River Indian Clearinghouse	
Navajo Indian Clearinghouse	
OEPAD: T. Murray	
R. Kingery	

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Comments: (Use additional sheets if necessary) The (almost only!) clear communication of this document is "without significant effect on public health and safety." I cannot imagine that such language can be in any document dealing with nuclear reactor matters.

I suggest that such references/language be minimized to the point of non-use in an environmental impact statement.

I suggest that the actual communication quality of such documents be improved.

963316

Reviewer's Signature: R. J. Becker
Date: 5-2-78
Title: Prof. Center for Public Affairs
Telephone: 965-3926

Mr. John Jett, Director
Mineral Resources Department
Fairgrounds, Mineral Building
1826 West McDowell Road
Phoenix, Arizona 85007

State Application Identifier (SAI)
APR 21, 1978 State AZ No. 78-80-0022

TO: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

Mineral Resources	Ag. & Hort.
Indian Affairs	Power
Game & Fish	Health
Az. Mining Ass'n	Water
Transportation	Land
Civil Rights	Parks
Energy Programs	AORCC
Az. Atomic Energy	
Environmental Studies	
Renewable Natural Resources	
Center for Public Affairs	
U of A College of Medicine	
ASU Center for Health Services	
Oil & Gas Conservation Comm.	
Bu of Geology & Mineral Tech.	
Salt River Indian Clearinghouse	
Navajo Indian Clearinghouse	
OEPAD: T. Murray	
R. Kingery	

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Comments: (Use additional sheets if necessary)

POOR ORIGINAL

Reviewer's Signature: J. Jett
Date: 4-28-78
Title:
Telephone:

Mr. Donald C. Gilbert, Exec.Dir.
Arizona Atomic Energy Comm.
2929 West Indian School Rd.
Phoenix, AZ 85017

From: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

State Application Identifier (SAI)

APR 21, 1978 State AZ No. 78-80-0022

Mineral Resources	Ag. & Hort.
Indian Affairs	Power
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ASU Center for Health Services	
Oil & Gas Conservation Comm.	
Bu of Geology & Mineral Tech.	
Salt River Indian Clearinghouse	
Navajo Indian Clearinghouse	
OEPAD: T. Murray	
R. Kingery	

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☑ Proposal is supported as written
☐ Comments as indicated below

Comments: (Use additional sheets if necessary)

POOR ORIGINAL

RECEIVED
APR 2 1978
ARIZONA ATOMIC ENERGY COMMISSION

Reviewer's Signature Donald C. Gilbert Date 4-24-78

Title Exec Dir AAEC Telephone 271-4845

Mr. Ronald D. McCready, Mgr.
Program Evaluation Section
Transportation Planning Division
Arizona Dept. of Transportation
206 South 17th Avenue, Room 310
Phoenix, Arizona 85007

From: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

State Application Identifier (SAI)

APR 21, 1978 State AZ No. 78-80-0022

Mineral Resources	Ag. & Hort.
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Navajo Indian Clearinghouse	
OEPAD: T. Murray	
R. Kingery	

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☑ No comment on this project
☐ Proposal is supported as written
☐ Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature Ronald D. McCready Date 5/15/78

Title Telephone 261-74

963317

Mr. Arthur G. Garcia, Exec. Dir.
Assistant Attorney General
Arizona Civil Rights Division
1645 West Jefferson Street
Phoenix, Arizona 85007

State Application Identifier (SAI)
APR 21, 1978 State AZ No. 78-80-0022

From: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

Mineral Resources | Ag. & Hort.
Indian Affairs | Power
Game & Fish | Health
Az. Mining Ass'n | Water
Transportation | Land
Civil Rights | Parks
Energy Programs | AORCC
Az. Atomic Energy
Environmental Studies
Renewable Natural Resources
Center for Public Affairs
U of A College of Medicine
ASU Center for Health Services
Oil & Gas Conservation Comm.
Bu of Geology & Mineral Tech.
Salt River Indian Clearinghouse
Navajo Indian Clearinghouse
OEPAD: T. Murray
R. Kingery

6 Regions

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APR 26 1978

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←←←←←For a complete copy of the Draft Environmental Impact Statement, please get in touch with the contact person as shown on Line 4.h.

- [x] No comment on this project
- [ ] Proposal is supported as written
- [ ] Comments as indicated below

Comments (Use additional sheets if necessary)

POOR ORIGINAL

8003318

RECEIVED

Reviewer's Signature Arthur G. Garcia
Date
Title Executive Director
Telephone 271-5263

Dr. Suzanne Dandoy, Director
Department of Health Services
1740 West Adams Street
Phoenix, Arizona 85007

State Application Identifier (SAI)
APR 21, 1978 State AZ No. 78-80-0022

From: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

Mineral Resources | Ag. & Hort.
Indian Affairs | Power
Game & Fish | Health
Az. Mining Ass'n | Water
Transportation | Land
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Center for Public Affairs
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Bu of Geology & Mineral Tech.
Salt River Indian Clearinghouse
Navajo Indian Clearinghouse
OEPAD: T. Murray
R. Kingery

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- [ ] No comment on this project
- [ ] Proposal is supported as written
- [x] Comments as indicated below

AD-1

Comments (Use additional sheets if necessary)

The concern of the Solid Waste Section, Bureau of Sanitation is whether or not the low level radioactive on-site waste storage will require a hazardous waste permit under our proposed regulations.

The low level waste is the result of water being used in the moderation of the nuclear process and also in cooling and handling procedures of the spent fuel storage.

Waste water from these processes is ponded on-site. The solids accumulated after evaporation are containerized and shipped to approved nuclear wastes disposal sites.

In the near future the Environmental Protection Agency will publish criteria on the handling and disposal of hazardous wastes. Low level radioactive waste may be considered a hazardous waste and, as such, final disposal would be required to be in a Class I landfill. The criteria may also require that the evaporation ponds be under permit as a hazardous waste disposal facility or as a solid waste disposal facility if they provide more than 90 days storage time.

The report identifies the two approved high level radioactive disposal sites, but does not identify the five approved sites for low radioactive waste disposal.

The report also does not address the resulting level of radioactivity of the concentrated solids, (after evaporation).

Reviewer Signature R.L.Mill for
ASSISTANT DIRECTOR
ARIZONA DEPT. OF HEALTH SERVICES
Date MAY 9 1978
Title
Telephone

VIII-81

Dr. Louis Kettel, Dean
University of Arizona
College of Medicine
Arizona Medical Center
Tucson, Arizona 85724

State Application Identifier (SAI)

APR 21 1978 State AZ No. 78-80-0022

Mineral Resources	Ag. & Hort.
Indian Affairs	Power
Game & Fish	Health
Az. Mining Ass'n	Water
Transportation	Land
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Oil & Gas Conservation Comm.	
Bu of Geology & Mineral Tech.	
Salt River Indian Clearinghouse	
Navajo Indian Clearinghouse	
OEPAD: T. Murray	
R. Kingery	

TO: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

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6 Regions

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- [ ] Comments as indicated below

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Comments: (Use additional sheets if necessary)

POOR ORIGINAL

963319

Reviewer's Signature Louis J. Kettel
Dean

Date 4/24/78

Telephone 882-7393

Michael A. Ramnes, Director
Arizona State Parks Board
1688 W. Adams Room 109
Phoenix, Arizona 85007

State Application Identifier (SAI)

APR 21 1978 State AZ No. 78-80-0022

Mineral Resources	Ag. & Hort.
Indian Affairs	Power
Game & Fish	Health
Az. Mining Ass'n	Water
Transportation	Land
Civil Rights	Parks
Energy Programs	AORCC
Az. Atomic Energy	
Environmental Studies	
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Center for Public Affairs	
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Bu of Geology & Mineral Tech.	
Salt River Indian Clearinghouse	
Navajo Indian Clearinghouse	
OEPAD: T. Murray	
R. Kingery	

TO: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

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6 Regions

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- [x] No comment on this project
- [ ] Proposal is supported as written
- [ ] Comments as indicated below

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Comments: (Use additional sheets if necessary)

Reviewer's Signature Allen W. [illegible]

Title [illegible]

Date 25 APR 78

Telephone 271-4174

Mr. James R. Carter, Director
Agriculture & Horticulture Dept.
421 Capitol Annex West
Phoenix, Arizona 85007

State Application Identifier (SAI)

APR 21, 1978 State AZ No. 78-80-0022

To: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

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APR 21 1978

Mineral Resources	Ag. & Hort.
Indian Affairs	Power
Game & Fish	Health
Az. Mining Ass'n	Water
Transportation	Land
Civil Rights	Parks
Energy Programs	ACRCC
Az. Atomic Energy	
Environmental Studies	
Renewable Natural Resources	
Center for Public Affairs	
U of A College of Medicine	
ASU Center for Health Services	
Oil & Gas Conservation Comm.	
Bu of Geology & Mineral Tech.	
Salt River Indian Clearinghouse	
Navajo Indian Clearinghouse	
OEPAD: T. Murray	
R. Kingery	
6 Regions	

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- [x] No comment on this project
- [ ] Proposal is supported as written
- [ ] Comments as indicated below

Comments: (Use additional sheets if necessary)

POOR ORIGINAL

Reviewer's Signature ____________ Date ____________

Title ____________ Telephone ____________

963320

Mr. Robert Jantzen, Director
Game and Fish Dept.
2222 W. Greenway
Phoenix, Arizona 85023

State Application Identifier (SAI)

APR 21, 1978 State AZ No. 78-80-0022

To: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

Mineral Resources	Ag. & Hort.
Indian Affairs	Power
Game & Fish	Health
Az. Mining Ass'n	Water
Transportation	Land
Civil Rights	Parks
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Salt River Indian Clearinghouse	
Navajo Indian Clearinghouse	
OEPAD: T. Murray	
R. Kingery	
6 Regions	

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- [ ] Proposal is supported as written
- [ ] Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature [illegible] Date Apr 26-78

Title [illegible] Game & Fish Telephone 942-3000

Mr. John Bannister
Oil & Gas Conservation Commission
1645 W. Jefferson, Suite 420
Phoenix, Arizona 85007

State Application Identifier (SAI)
APR 21, 1978 State AZ No. 78-80-0022

To: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

RECEIVED
APR 24 1978
O & G CONS. COMM.

Mineral Resources	Ag. & Hort.
Indian Affairs	Power
Game & Fish	Health
Az. Mining Ass'n	Water
Transportation	Land
Civil Rights	Parks
Energy Programs	AORCC
Az. Atomic Energy	
Environmental Studies	
Renewable Natural Resources	
Center for Public Affairs	
U of A College of Medicine	
ASU Center for Health Services	
Oil & Gas Conservation Comm.	
Bu of Geology & Mineral Tech.	
Salt River Indian Clearinghouse	
Navajo Indian Clearinghouse	
CEPAD: T. Murray	
R. Kingery	
	6 Regions

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- [ ] No comment on this project
- [ ] Proposal is supported as written
- [ ] Comments as indicated below

Comments: (Use additional sheets if necessary)

POOR ORIGINAL

963321

Reviewer's Signature John Bannister Date 4-24-78

Title Ex. Sec. Telephone 271-5161

Tom Lynch, Chief
Energy Programs
Room 507
Phoenix, Arizona 85007

State Application Identifier (SAI)
APR 21, 1978 State AZ No. 78-80-0022

To: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

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R. Kingery	
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- [x] No comment on this project
- [ ] Proposal is supported as written
- [ ] Comments as indicated below

Comments: (Use additional sheets if necessary)

Reviewer's Signature T. Lynch Date 4-24-78

Chief Energy Programs Telephone 271-3303

Mr. Clinton M. Pattea
Executive Secretary
Indian Affairs Commission
1644 West Jefferson St.
Phoenix, AZ 85007

TO: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

State Application Identifier (SAI)
APR 21, 1978 State AZ No. 78-80-0022

Mineral Resources	Ag. & Hort.
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OEPAD: T. Murray	
R. Kingery	
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Comments: (Use additional sheets if necessary)

POOR ORIGINAL

963322

Reviewer's Signature Clinton M. Pattea Date 4-25-78

Telephone

Mr. Les Ormsby, Admin.
Arizona Power Authority
1810 West Adams Street
Phoenix, Arizona 85005

TO: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

State Application Identifier (SAI)
APR 21, 1978 State AZ No. 78-80-0022

Mineral Resources	Ag. & Hort.
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OEPAD: T. Murray	
R. Kingery	
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☐ Comments as indicated below

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Comments: (Use additional sheets if necessary)

Reviewer's Signature L. Ormsby Date 4/24/78

Telephone

Dr. Charles Eveland
ASU College of B.A.
Center for Health Serv.
Tempe, Arizona 85282

To Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

State Application Identifier (SAI)

APR 21, 1978 State AZ No. 78-80-0022

Mineral Resources	Ag. & Hort.
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CEPAD: T. Murray
R. Kingery

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Comments: (Use additional sheets if necessary)

POOR ORIGINAL

963323

Reviewer's Signature [signature] Date 5/2/78

[illegible] Telephone [illegible]

Mr. Andrew L. Bettwy
Comm., Department of Land
1624 W. Adams St., 4th Floor
Phoenix, Arizona 85007

To Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

State Application Identifier (SAI)

APR 21, 1978 State AZ No. 78-80-0022

Mineral Resources	Ag. & Hort.
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CEPAD: T. Murray
R. Kingery

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- [ ] Comments as indicated below

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RECEIVED
APR 24 1978
STATE LAND DEPT.
135

Comments: (Use additional sheets if necessary)

Reviewer's Signature Kelley R. Johnson Date 5/3/78

Telephone

Mr. Roland H. Sharer
State Liaison Officer, AORCC
4433 N. 19th Ave., Suite 203
Phoenix, Arizona 85015

State Application Identifier (SAI)
APR 21, 1978 State AZ No. 78-80-0022

Mineral Resources	Ag. & Hort.
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Bu of Geology & Mineral Tech.
Salt River Indian Clearinghouse
Navajo Indian Clearinghouse
CEPAD: T. Murray
R. Kingery

TO: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

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RECEIVED
APR 24 1978
A.O.R.C.C.

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- ✓ No comment on this project
- ☐ Proposal is supported as written
- ☐ Comments as indicated below

Comments: (Use additional sheets if necessary)

POOR ORIGINAL

963324

Reviewer's Signature R. H. Sharer Date May 3, 1978

Title State Liaison Officer Telephone 271-5013

Mr. Tom Swanson, Exec. Dir.
Pima Association of Governments
405 Transamerica Building
Tucson, Arizona 85701

State Application Identifier (SAI)
APR 21, 1978 State AZ No. 78-80-0022

Mineral Resources	Ag. & Hort.
Indian Affairs	Power
Game & Fish	Health
Az. Mining Ass'n	Water
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CEPAD: T. Murray
R. Kingery

TO: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

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- ✓ No comment on this project
- ☐ Proposal is supported as written
- ☐ Comments as indicated below

Comments: (Use additional sheets if necessary)

APR 1978
RECV'D.
Pima Assoc. of Govts.

Reviewer's Signature Kenneth Moye Date 4/24/78

Title A-95 Reviewer Telephone

Northern Arizona Council of Governments

P.O. BOX 57 • FLAGSTAFF, AZ - 86001 • (602) 774-1895

WILLIAM C. WADE
EXECUTIVE DIRECTOR

Regional A-95 Review

TO: Ms. Jo Youngblood
Arizona State Clearinghouse
1700 W. Washington, Room 505
Phoenix, AZ 85007

RE: Project: Nuclear Regulatory Commission
Handling & Storage of Spent Light Water Power Reactor Fuel
S.A.I. #: 78-80-0022

The Northern Arizona Council of Governments (NACOG) has completed its A-95 Review and Comment upon the above project. Action taken on this project notification is as follows:

☐ Proposal supported as described on the SF-424 and any attachments.

☐ Proposal is supported with certain recommendations, provisions, etc.

X No comment

☐ Proposal is not supported.

Please be aware that NACOG reserves the prerogative of making additional comments should new information become available to the Agency.

The Northern Arizona Council of Governments has appreciated this opportunity to review and comment on this project.

Thank you.

William C. Wade
William C. Wade
Executive Director

Date: May 11, 1978

THIS A-95 REVIEW IS SUPPORTED IN PART BY A HUD 701 PLANNING GRANT.

Mr. George Kruse, Executive Dir.
Central Arizona Association
of Governments
P.O. Box JJ(512 E. Butte Ave.)
Florence, Arizona 85232

To: Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

State Application Identifier (SAI)
APR 21, 1978 State AZ No. 78-80-0022

Mineral Resources	Ag. & Hort.
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CEPAD: T. Murray	
R. Kingery	

6 Regions

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☐ Comments as indicated below

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Comments: (Use additional sheets if necessary)

POOR ORIGINAL

Reviewer's Signature [illegible]

Date 5-9-78

Telephone [illegible]

1-88

Mr. David Landrith, Exec.
Director, SEAGO
118 Arizona Street
Bisbee, Arizona 85603

Arizona State Clearinghouse
1700 West Washington Street, Room 505
Phoenix, Arizona 85007

State Application Identifier (SAI) APR 24 1978

APR 21, 1978 State AZ No. 78-80-0022

Mineral Resources
Indian Affairs
Game & Fish
Az. Mining Ass'n
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OEPAD: T. Murray
R. Kingery

Ag. & Hort.
Power
Health
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Parks
AORCC

078127

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Comments: (Use additional sheets if necessary)

none

POOR ORIGINAL

963326

Reviewer's Signature: RW Holland

Chairman

Date: 5/16/78

Telephone: 432-47

UNITED STATES OF AMERICA
Nuclear Regulatory Commission NUREG-0404

RECEIVED JUN 16 1978 U.S. Nuclear Regulatory Commission

In the Matter of	)	
Draft Generic Environmental Impact	)	COMMENT
Statement On Spent Fuel	)	of the Massachusetts Energy Facilities Siting Council

The Energy Facilities Siting Council is a regulatory agency which licenses major electric, gas, and oil facilities proposed for construction in the Commonwealth of Massachusetts. Among the facilities currently before this agency is the proposed 2300 MWe Montague nuclear station. Massachusetts is also the site of Yankee Rowe, Pilgrim 1, and the proposed Pilgrim 2 nuclear generating stations.

The Commonwealth is heavily dependent upon nuclear capacity which is provided through the New England Power Pool. We are concerned, however, that our continued reliance upon nuclear power is threatened by the chronic failure to address and resolve safety and fuel cycle issues. Regrettably, the Generic Environmental Impact Statement (GEIS) continues a 25 year practice of pursuing one "interim" solution after another, all the while failing to develop and implement a long term spent fuel program

AE-1

DOCKETED USNRC JUN 16 1978 MAIL SECTION DOCKET CLERK which is politically acceptable and technically functional. Like earlier Atomic Energy Commission reviews of the fuel cycle, it fails to acknowledge the simple reality that there can be no interim solution when there is no acceptable program for long term spent fuel storage or reprocessing. See generally NRDC v. NRC, ___ U.S. ___, 46 L.W. 4301 (3 April 1978).

The GEIS assumes the development of long term storage and reprocessing facilities and thus proposes expansion of onsite reactor storage of spent fuel as a practical, environmentally acceptable, interim device. This assumption cannot be fairly or reasonably made because it ignores the fact that a long term spent fuel program has not been developed, funded, tested, or implemented. There simply is no basis from which to assume a resolution of long term fuel cycle issues in the mid-1980's when there was no basis in 1960 or 1970. It is self deception for us to continue to describe and analyze onsite storage as an eight to ten year interim solution when it has been the only "solution" for 25 years and when it remains as the only device for spent fuel management in the absence of a practical long term program. For 25 years, the commercial nuclear power program has summarily assumed

AE-1

that the fuel cycle will be resolved. Nevertheless, it is indisputed fact that there has been no resolution; approaches ranging from reprocessing to long term storage have failed politically and technically. In the face of this, the GEIS asks for one more leap of faith with a promise of fuel cycle resolution before 1990. What are we to do in 1990 when more than 100 commercial reactors will have exhausted the expanded onsite storage facilities which were urged in 1978?

Uncritical acceptance of the GEIS assumption may well lead to the conclusion that short term onsite storage of spent fuel will be environmentally acceptable and economic. This conclusion is meaningless, however, because short term, onsite storage has not been and is not the issue; the issue is indefinite storage of increasing volumes of toxic nuclear waste at an ever increasing number of commercial reactor sites. Without a demonstrated solution to the fuel cycle which will provide for offsite storage or reprocessing, the issue cannot be framed otherwise. Consequently, the GEIS should have considered the environmental impact and cost of indefinite onsite storage. And in this context, it cannot be said that onsite storage is technically functional, safe, or economic.

AE-1

We urge the Nuclear Regulatory Commission to openly recognize the dilemma which this nation faces with a nuclear power program that has failed to resolve the fuel cycle. We cannot continue with a program which generates thousands

AE-1 of tons of the most toxic waste known to this earth if we fail to develop and imp'ement a long term program of storage or reprocessing. The GEIS failure to address this issue renders it useless to the continuation of commercial nuclear power in the United States.

Christine B. Sullivan

CHRISTINE B. SULLIVAN
Chairman
Energy Facilities Siting Council
Commonwealth of Massachusetts

Dated: 1 June 1978

TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
268 401 Building
June 2, 1978

Director, Division of Fuel Cycle and Material Safety
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Sir:

TVA has reviewed the draft generic environmental impact statement on handling and storage of spent light water power reactor fuel (NUREG-0404, Volume 1, March 1978). TVA believes that the document fulfills the basic purpose for which it was written—to assist in the preparation of long-range policy. Specific spent fuel storage issues must still be handled on a case-by-case basis.

TVA supports the basic conclusions of the document contained in Chapter 8.0, "Findings," except with respect to portions of number 7. That finding concludes that nuclear-generated power plants could be replaced with coal-fired plants, albeit at high economic and environmental costs. The evaluation which supports this opinion is incomplete, because the capital cost of a coal-fired replacement plant is understated. The cost of the plant should include

AF-1 the equipment or design options necessary to meet today's stringent air quality criteria. This would bring the cost per kilowatt up to about $665-$676 (see Tennessee Valley Authority, Final Environmental Statement, Yellow Creek Nuclear Plant, Units 1 and 2, Volume 2, Table 9-1). The cost of replacement power during plant construction is also not included in the benefit cost analysis.

Moreover, TVA does not believe that such replacement power would be available. The original Federal Register notice for the preparation of this statement contemplated a discussion of the socio-

AF-2 economic impact of the unavailability of replacement power. We would like to see such a discussion. Proper discussion of these aspects would reveal that replacement is not a viable, reasonable option to consider.

Sincerely,

Harry G. Moore, Jr.
Acting Director of Environmental
Planning

Allied-General Nuclear Services
Post Office Box 847
Barnwell, South Carolina 29812

R. C. Baxter
President

(803) 259-1711

June 2, 1978

RECEIVED
JUN 13 1978
U.S. Nuclear Regulatory Commission

Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Director, Division of Fuel
Cycle and Material Safety

Dear Sir:

NRC News Release No. 78-58 announced the issuance for public comment of a "Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Reactor Fuel" (NUREG-0404). We are pleased to offer the following specific comments keyed to particular portions of NUREG-0404:

(1) Page ES-3, Section 2.1 - Assumed capacity factor of 60% seems too conservative when compared to recent utility operating records.

AG-1 (2) Page ES-3, Table ES-1 - ERDA 77-25 report showed totals
of 7700 MTU for 1980 and 22,170 for 1985, as compared with 7200
and 18,000 MTHM, respectively.

(3) Page ES-5, Section 3.2 - The first paragraph of this sec-
tion comments as to limited potential fuel storage spaces at
the Barnwell Plant, which is stated to have capacity for about
400 metric tons. It should be pointed out, however, that this
limited storage corresponds to an operational mode in which fuel
would be marshalled at the Plant immediately prior to reprocessing.
AG-2 With commercial reprocessing indefinitely deferred, it would be
technically possible to expand the Barnwell Plant's capacity for
storage only. Allied-General Nuclear Services has provided the
DOE with a report on the technical feasibility of such expansion
(Report No. AGNS/DOE-01-PTR 1.4-78/1).

(4) Page ES-12, 1st Paragraph - Because the "serious slippage
in the start-up date" for the geological repository has now been
documented in DOE/ER-004/D, we suggest that the paragraph be
revised to emphasize the number of storage pools required. In
AG-3.1 this context it would also be appropriate to delete the first
sentence, which states that the amount of spent fuel requiring
away-from-reactor storage is not great.

DOCKETED
USNRC
JUN 26 1978
NMSS
MAIL SECTION

June 2, 1978
NRC
Page 2

(5) Page S-2, Section 2.0, Subsections 1 and 2 - The "Findings"
regarding modifications of at-reactor spent fuel storage pools
and the licensing of these modifications appear to be valid,
but do not consider the possibility of intervention and the re-
AG-4.1 sulting complications. Intervention against Portland General
Electric on its spent fuel storage expansion plans has created
a potentially very severe situation for them. Other similar
problems may be forthcoming.

(6) Page 1-1, Section 1.1 - First sentence of second paragraph
AG-4.2 should continue along the lines, "due to a change in policy by
the present Administration".

(7) Page 1-2, 2nd Paragraph of Section 1.2 - Based upon utility
response to the DOE's December 20, 1977 request for expressions
AG-5 of interest, it is apparent that power plant owners do (not "may")
consider the maintenance of full core reserve capacity desirable.

(8) Page 1-3, Table 1.1 - The 41,000 total seems too low when
AG-3.1 compared to other estimates. Also, some adjustment should be
made for the possibility of intervention success (see comment
5 above).

(9) Page 3-3 - ERDA 77-25 shows higher cumulated discharge values
AG-3.2 than those set forth in Table 3.1. For example, the 1986 value
from ERDA is 26,500 MTU as opposed to 20,000 MTHM.

(10) Page 3-8, Paragraph 2 - BWR fuel elements contain more nearly
AG-3.3 one half the fuel of a PWR rather tha one third. (Avg. PWR -
450 kg; Avg. BWR - 200 kg = 0.44.)

(11) Page 3-15, Section 3.1.4.2.1, Paragraph 1 - In the last sen-
tence, it would be desirable to quantify the time of "several
AG-6 months". Note that in the previous sentence a heat generation
rate of 5 kw per canister is given.

(12) Page 3-36, Section 3.3.3, first paragraph - The 0.59 capacity
factor for nuclear facilities seems low (and the 0.67 for coal
fired generating facilities seems high) when compared to recent
plant operating history. The reference noted here is a 1976 pub-
AG-7 lication and would not consider 1976 and 1977 operating history.
According to the AIF's annual utility survey, the net capacity
factors for these two years for nuclear plants were 0.62 and 0.66,
respectively; for coal units, the corresponding net capacity factors
were 0.59 and 0.57 (Atomic Industrial Forum "INFO" 117).

(13) Page 4-2, 1st paragraph - The rationale of why an AFR storage facility requires 600 acres of land is not discussed; if this is a correct assumption, it would be appropriate that justification be included.

AG-8

(14) Page 4-13, Section 4.2.1.3, Paragraph 1 - The restriction of large independent spent fuel storage facilities to multiple units of 500 tonnes each seems unnecessary. We understand that Regulatory Guide 3.24 is being revised to remove this restriction.

(15) Pages 4-20 and 4-21, Sections 4.2.3.5 and 4.2.3.6 - Activity levels are given in mCi/ml as opposed to either uCi/ml or mCi/liter. As a consequence, the stated values are three orders of magnitude too high.

(16) Page 7-6, Section 7.4.1.2 - The first part of the third sentence ("The failure of the reprocessing industry to develop as expected ...") is misleading. We suggest that it be replaced by "The current Administration's decision to defer indefinitely commercial reprocessing ...".

AG-9 (17) Page B-37, Section 1.5.2.2 - Under NLI 10/24 it is stated that, "No casks have been delivered yet, ...". This should now be revised to reflect the recent delivery of the first of these casks for testing.

(18) Page D-13, Section 1.3.5 - This section does not appear to add anything of substance to the report. We suggest that it be deleted.

(19) Page D-13, Section 1.3.6 - Under "Other practices", item A refers to movement of racks or mate ial over stored fuel. We note that Safety Guide 13 does not address "material", and suggest that "material" either be deleted or defined.

(20) Page G-15, Table G.8 - The half life of ^{237}Np should be 2.16 x 10^6 y rather than 4.1 x 10^6 Y. The half life of ^{242m}Am is 152 y. The specific activity for ^{242m}Am also appears to be in error by several orders of magnitude. Other actinide half lives are shown to be slightly different. We suggest that all the numbers in this table be rechecked, and if used for calculating dosages, than all other tables, such as G-9 and G-10, be recalculated.

We trust that the above listed comments may be helpful.

Sincerely yours,

Raymond C. Baxter

R. C. Baxter

RCB/gm

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POOR ORIGINAL

KAMAN SCIENCES CORPORATION A KAMAN COMPANY

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June 5, 1978

Director, Division of Fuel Cycle
and Material Safety
Office of Nuclear Material Safety
and Safeguards
U.S.Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: NUREG-0404, DGEIS on Handling and Storage of Spent Light Water Power Reactor Fuel

Dear Sir:

I have recently completed some work for the Fuel Cycle Program Office of SROO/DOE which may be of interest to you with regard to the DGEIS. A copy of K77-91U(R), "Final Report, Preliminary Risk Analysis of a Spent Fuel Receiving and Storage Facility Using the GO Methodology" is enclosed for your information.

While reading Section 4.2, I found several items that you may wish to consider when preparing the Final Statement. Although I agree that the radiological risk is small, these points could be challenged by others, and you may want to prepare answers to the usual "what if" questions before they are asked.

1. Radon-222 effects (Table 4.2) are quoted as 0.023 excess deaths per 0.8 GWy(e). The radon effect has recently been challenged (reported in Nucleonics Week) as being 80,000 times too low because the effect is calculated per year instead of per 80,000 years. I do not have a copy of the reference (NUREG-0332), so I can't tell how the figure here was derived, but you will undoubtedly run into the same challenge. AH-1.1

2. Page 4-14, last paragraph. Iodine-129 is casually dismissed with the comment "it is physically impossible to absorb enough to give a dose that is more than a small fraction of that from natural radionuclides". If this is true, why is EPA sufficiently concerned that they propose a limit (40 CFR 190) of 5 mCi/GWy(e) for release? Also the use of a reference (ER from NFS) which is not easily available and old implies the absence of a thorough literature search. There must be better references on this subject. A recent report by J. W. Poston at Georgia Tech (Y/OWI/SUB-7298/1) should provide some good information.

AH-1.2

3. Page 4-15, 4.2.2.2. The discussion of ^{85}Kr seems a bit too casual. Reg. Guide 1.25 requires the assumption that 30% is released. Again, EPA is sufficiently concerned to propose a release limit.

AH-1.3

4. Page 4-16, 4.2.2.4. References and quantitative data are needed. Why not reference and discuss Johnson's report (BNWL-2556)? He is given a footnote, but relative to a different subject in 4.2.2.5.

AH-1.4

5. Page 4-17, 4.2.2.7, third sentence. Just how large can the total inventory be in the ion exchange Unit? I could have used this information, but didn't find it.

AH-1.5

6. Page 4-19, 4.2.3.2. If the release fractions are 10% for ^{85}Kr and 1% for ^{129}I, why does Reg. Guide 1.25 specify 30% and 10%, respectively? Also the pool decontamination factor of 100 for iodine applies to depths of 23 feet or more. A storage pool might well be designed with less depth for shielding due to the longer decay and lower activity.

AH-1.6

7. Page 4-20, 4.2.3.3. This ignores fires in waste cleanup systems and consequence limiting systems. Although material in ion exchange units is wetted, a fire could volatilize some of the material. Fires in the air filters or control system wiring could disable this equipment. Also wiring fires tend to cause "failure shorted" before "failure open". Thus a fuel assembly might be lifted too high with no operator control.

AH-1.7

8. Page 4-19, 4.2.3.2. Aircraft impact might be a better choice than tornado, since the frequency tends to be the same or a little higher (heavily site-dependent), the aircraft or an engine could be larger than a utility pole, the velocity could be higher, and the aircraft could contain a large source of fuel to produce a major fire.

AH-1.8

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9. Page 4-20, 4.2.3.4. The problem with criticality is not the low-power operations, but the initial bursts which could fracture cladding in several assemblies and release fission gases. Also the heat generated might cause large steam bubbles and reduce iodine retention.

AH-1.9

10. Page 4-21. I don't understand the first line.

AH-1.10

11. Page 4-22, paragraph 5. "loss of water should not result in fuel failure due to high temperatures". A conclusion of this importance deserves a reference or a detailed discussion. I have asked this question of a few experts who were unable to confirm this conclusion. Can you provide a reference to me?

AH-1.11

12. Receipt of "early" or off-spec fuel could be considered as a result of errors at the shipping point. Fuel with only 1 or 2 months decay would require more consideration of other halides as well as potential fuel melt. Off-spec fuel (research or test reactor) might change thermal or criticality considerations.

AH-1.12

13. These are some formal studies in risk assessment which could be applied (at least in part) and referenced. These include EPA--520/3-75-003, RHO-C-4, and WASH-1400.

AH-1.13

14. The study leans heavily on experience at Morris and West Valley, instead of on the much more extensive experience at Savannah River, Idaho Falls, and Hanford. Perhaps this is due to the emphasis on commercial storage, but the extensive Government experience and data should be considered

AH-2

My comments are intended to be constructive, and I hope that they will be useful, although I realize that some of them would be more appropriate to an SAR instead of an EIS.

Could I ask you to provide me with 2 references which I did not have available? These are NUREG-0252 and NUREG-0332 (Draft).

Sincerely,

D. E. Wood

D. E. Wood
Sr. Research Scientist

DEW:ld
cc: John Geiger, FCPO/SROO/DOE
Enclosure

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June 6, 1978

Mr. Richard W. Starostecki, Chief
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material
Safety
Nuclear Regulatory Commission
Washington, DC 20555

Subj: Comments on Draft Environmental Impact State on Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0404)

Dear Sir:

We are pleased to submit comments on the above referenced subject draft report. The comments were prepared by the Subcommittee on Spent Fuel Storage of the AIF's Committee on Nuclear Fuel Cycle Services.

In our opinion, the document provides a substantial treatment of the fuel storage concern and generally has sufficient scope and depth to serve as a basis for further federal agency actions on alleviating the fuel storage shortage. We are supportive of the general conclusions of the statement.

The observations in the draft report which we believe to be most significant are:

(1) Storage of spent LWR fuel in water basins has an insignificant effect on the environment.

(2) Reactor storage basin modifications accomplished are technically acceptable and economically justified.

(3) There is continuing need for away from reactor (AFR) storage basins to assure continued LWR operation and these "storage only" facilities are technically feasible and economically acceptable.

There are a number of areas in the GEIS that should be modified to better represent the industry position. They are as follows:

AI-1 (1) We suggest that reprocessing be listed as a possible alternative to alleviating the spent fuel storage problem. While the scenario of no reprocessing as stated in the GEIS does indeed place an upper bound on the magnitude of the spent fuel storage problem, it does not address the effects which reprocessing might have on the storage of spent fuel. If reprocessing of commercial spent fuel is allowed to begin in the future, it could serve as a means of not only recovering valuable energy resources, but also substantially reducing spent fuel storage concerns.

AI-2 (2) While stating that there is indeed a need for AFR storage and that it is not desirable to force shutdowns of nuclear plants, the GEIS does not emphasize the need for timely completion of these AFR facilities. If an AFR facility is to be on line by 1983, as indicated to be necessary by the responses to the DOE questionnaire of December 20, 1977, prompt action must be taken to avoid unnecessary and significant losses in nuclear generating capacity.

AI-3 (3) There seems to be a marked discrepancy between the GEIS' reference case requirements for AFR storage and the responses the utilities recently made to the DOE. It is our concern that the GEIS may be significantly underestimating the need for AFR storage (e.g. DOE response of 1700 MTHM versus the GEIS value of 980 MTHM in the year 1983).

AI-4 (4) The GEIS appears to use very conservative capacity and efficiency factors for nuclear power plants and very optimistic capacity and efficiency factors for coal fired power plants. The result, although conservative from an analysis point of view, gives this document a negative cast with respect to nuclear power.

With adequate treatment of the above concerns in the final GEIS, the AIF would have no reservations on the statement.

Comments on specific sections of the draft GEIS are attached.

Sincerely,

Ellis T. Cox

Ellis T. Cox
Chairman, AIF Committee
on Nuclear Fuel Cycle Services

EC:gde
Attachment

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Specific Comments on Draft "Generic Environmental Impact Statement on Handling of Spent Light Water Power Reactor Fuel" (NUREG-0404)

Volume 1

1. Page ES-5, Paragraph 3.1

AI-5.1 Reference is made to increased at-reactor spent fuel storage involving only aged fuel. The meaning of this statement is unclear since each year freshly discharged fuel is placed in the spent fuel pool.

2. Page ES-7, Paragraph 3.5

AI-6 The first sentence of this paragraph states, "The replacement of nuclear power generating capacity by coal fired plants because of reactor plant storage pools is technically feasible". What is meant by "technically feasible"?

3. Page ES-11, Paragraph 8.1

AI-7.1 It should also be pointed out that some older plants were built with excess capacity which could also be used on a limited basis to provide temporary relief for plants with spent fuel storage problems.

4. Page ES-12, Paragraph 8.2

AI-7.2 The fourth finding should also mention that there are some plants which utilize stainless steel clad fuel.

5. Page S-2, Paragraph 2.0

AI-3 Finding number 3 states that the requirements for AFR storage with compact storage and the FCR option is 1900 MTHM in the year 1985 and 5800 MTHM in the year 1990. However, the responses the utilities made to the DOE letter of December 20, 1977, indicated a need to store 3,000 MTHM in the year 1985 and 14,000 MTHM in the year 1990.

6. Page S-3, Paragraph 2.0, Item 4

AI-8 This item states that there will be no discharge of radioactive liquid effluent from a spent fuel storage operation. This may be possible, but to prohibit any discharge is unrealistic and should not be required.

7. Page 1-1, Paragraph 1.1

AI-9 This section states that the reprocessing part of the fuel cycle has not reached successful commercial development. This subcommittee believes

that reprocessing has reached successful development as demonstrated by the operation of Nuclear Fuel Services, Inc.'s facilities and various government reprocessing facilities. The restriction to the continued operation
AI-9 of Nuclear Fuel Services was initially a lack of available spent fuel to be reprocessed and subsequently a prohibitively costly retrofit requirement imposed by NRC to meet newly evolving seismic design criteria. This problem is unrelated to basic reprocessing technology.

8. Page 2-3, Paragraph 2.1.3

AI-10 This section indicates that G. E. has proposed to increase the capacity of its Morris facility to 1850 MT. This proposed expansion request has been withdrawn.

9. Page 2-5, Table 2.1

There appears to be some inconsistencies regarding plant factors used for various tables in the GEIS. A footnote to Table 2.1 states that a plant factor of 0.6 was used for the period 1976-1985 and 0.7 for 1986-2000.
AI-3 Yet, the note for column 5 and column 6 on Page F-4 indicates 0.6 was used for RB* reactors only and 0.7 for those reactors starting up after 1985. Furthermore, Section 3.2.2 states that spent fuel discharges were based on historical information where possible, and for other reactors a 0.6 plant factor was used.

10. Page 3-8, Paragraph 3.1.1.1

The last sentence of the second paragraph on Page 3-8 should also mention boron carbide plates as a neutron absorbing material.

AI-11

11. Page 3-9, Table 3.4

This table should be updated to reflect more recent applications for pool modifications, or alternatively place a reference date on the table.

12. Page 3-27, Paragraph 3.2

It is not clear in Section 3.2 when the proposed transhipment process is to occur. Does a utility "tranship" when one of its plants has a full pool,
AI-12 a full pool less one core, or during the reload before either of the preceeding options? Also, in regard to spent fuel transhipment, it is felt that the case of compact and no compact storage should be considered.

*"Rainbow Books"

AF

13. Page 3-35, Paragraph 3.3.2

AI-11 The first sentence should contain a range of specific powers to cover older plants, 19 MWth/MTU for the BWR and 28 MWth/MTU for the PWR.

14. Page 3-37, Paragraph 3.3.3

AI-4 Section 3.3.3 indicates that coal fired generating facilities operate closer to their nameplate capacity than do their nuclear counterparts and that the replacement of retired nuclear capacity with coal fired capacity could result in a 13% increase in delivered electric power. This is contrary to recent experience when comparing large size coal and nuclear generating units.

15. Page 4-2, Paragraph 4.1.1.2

AI-13 This section discusses the impact of cooling towers on the environment. While a cooling tower may be used for an AFR facility it is not the only means of cooling. This section should indicate that the facility is not restricted to using cooling towers. A discussion of cooling towers is presented in several other sections of this report and this applies to these sections also.

16. Page 4-5, Paragraph 4.1.2.2.2

AI-4 This section uses values of thermal efficiency for nuclear and coal fired power plants which represent extremes.

17. Page 4-21, Paragraph 4.2.3.7

AI-14 A 30' depth for a spent fuel pool is too shallow for most pools.

18. Page 4-27, Paragraph 4.3.2.1

AI-15 This section states that the labor force in a nuclear plant is about one-fourth the labor force of a coal fired plant. Utility's experience with multiple units of nuclear and coal fired plants is that nuclear plants employ either the same number or up to twice as many personnel as multiple unit coal fired plants.

19. Page 6.2, Table 6.1

AI-5.2 In table 6.1 and the accompanying text, it is not clear why the modification cost for a BWR under construction is greater than that of an operating BWR. Intuitively, it would seem likely that since an operating plant would have to:

(1) perform extensive fuel movements in order to install new racks,

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(2) have to install the racks underwater, and

(3) have to decontaminate and dispose of old racks

AI-5.2 that this modification cost would be more for operating plants than for plants under construction.

20. Page 6-3, Figure 6.1

AI-5.3 This figure indicates that the NRC will require only six months for approval of a request to modify an existing spent fuel storage pool from the time discussions are begun between the utility and the NRC. This appears to be a very optimistic schedule and requires additional definition of the contents of the application if it is to be met.

21. Page 6-9, Paragraph 6.2

AI-6 This paragraph indicates that the national average fuel price for coal is 8.1 mills per KWhr. We feel the price for coal is as much as 50% higher per KWhr. This difference significantly affects the cost calculations in this section.

22. Page 8-2, Item 4

AI-8 This item indicates that there will be no need for any discharge of radioactive liquid effluents from a spent fuel storage operation. This statement should be modified to indicate a minimal discharge requirement.

<u>Volume 2</u>

1. Page B-8, Paragraph 1.2.4.b

AI-16.1 This section indicates that the design of the storage racks is such that a fuel assembly cannot be inserted anywhere other than in a design location. There are designs which will allow a fuel assembly to be located in other than a permanent storage location and these conditions have been analyzed to prove that they do not affect the safety margins in these analyses.

2. Page B-12, Paragraph 1.3.1

AI-16.2 This section states that 3.3% enriched fuel is representative of the fuel used in the Zion reactor. Fuel enriched to 3.1% is considered to be the maximum which could be used in the Zion plant on an equilibrium fuel cycle basis.

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3. Page B-15, Paragraph 1.3.2

AI-16.3 This section states that rack designs require bracing from walls or anchors in the floor. This appears to rule out free standing rack designs which are currently being used and will be used in the future.

4. Page B-19, Paragraph 1.3.5

AI-16.4 When discussing the storage of non-fuel items, this section should be expanded to include items such as fuel handling tools which may be stored in the pool.

5. Page E-3, Table E.1

AI-16.5 The title of this table should be changed to "Remaining Spent Fuel Storage Capacity".

6. Page E-9, Table E.2

AI-17 Table E-2 does not agree in several cases with know plant discharge schedules. The basis for the table would explain the discrepancies and, therefore, should be stated.

7. Page E-21, Table E.4

This table, along with Table E.5 should also indicate which units are receiving the transferred fuel. In cases where there are more than two units on the same site, it is not clear which unit was receiving the fuel indicated to be transferred.

AI-12

8. Page E-21, Table E.4

Table E.4 indicates that Millstone Unit 1's pool will become full under the transhipment option in 1982, without any transfers indicated. Table E.3 indicated Millstone Unit 1's pool would be full in 1981, in the no transhipment case.

This is inconsistent.

9. Page E-16, Table E.3

AI-17 The Millstone Unit 1 spent fuel pool is indicated to be filled in 1981. Based on the licensed spent fuel pool capacity of 2184 assemblies, current projections indicate that the pool will not be filled without fuel transfers until the refueling in 1992.

10. Page E-18, Table E.3

The Connecticut Yankee spent fuel pool is indicated to be filled in 1977. Based on the licensed spent fuel pool capacity of 1172 assemblies, current projections indicate that the pool will not be filled without fuel transfers until the refueling of 1999.

AI-17

11. Page E-19, Table E.3

The Millstone Unit 2 spent fuel pool is indicated to be filled in 1986. Based on the installed capacity of 667 assemblies, current projections indicate that the pool will not be filled without fuel transfers until the refueling in 1989.

12. Page F-9, Table F.1

AI-7.3 The storage capacity listed in Table F.1 is not consi.tent with that given in Table 3.4 under the heading "Pool Size". Also, the discharge schedule used in Table F.1 is not consistent with that used in Table E.2 for at least one reactor (Millstone Unit 2).

13. Page H-4, Paragraph 1.3

This section discusses the use of cooling towers. As previously mentioned, cooling towers are n't the only method of cooling and this section should 'ndicate that this is only one method of providing cooling.

AI-13

[illegible]. Page H-5, Paragraph 1.3

This section discusses design details of the AFR cooling water and air systems. If this facility were incorporated with an operating plant, some of these systems might not be required. This report should indicate that the detailed system designs mentioned are only examples and not the only ways of meeting the requirements.

15. Page H-12, Paragraph 1.7

AI-2 States that about five years will be required for completion of an AFR facility, assuming a one year NRC review. It is our hope that this type of project could be completed in 3 1/2 to 4 years.

16. Page H-22, Paragraph 3.1.2

AI-16.6 Indicates that the use of boral is unacceptable in spent fuel pools for PWRs. Boral is currently used in PWR pools and this is noted on page D-12 where it

1-98

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AI-16.6 states that the NRC accepted a high density fuel storage design for Maine Yankee incorporating Boral. Another utility intends to use Boral in its high density absorber racks for its nuclear plant.

POOR ORIGINAL

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Chas. F. Whitmer
Vice President
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Georgia Power
the southern electric system

June 6, 1978

U. S. Nuclear Regulatory Commission
ATTN: Director, Division of Fuel Cycle and Material Safety
Washington, D. C. 20555

Dear Sir:

AJ-1 Enclosed are the corrected Plant Hatch spent fuel storage data in Appendices E and F from the NRC's "Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0404)". Please incorporate these changes into the Final Environmental Statement along with our other comments submitted to you through the Utility Waste Management Group.

If we can be of further assistance in this matter, please let us know.

Yours very truly,

Chas. F. Whitmer

Chas. F. Whitmer

CLS/mb

Enclosure

DOCKETED
USNRC
JUN 14 1978
NMSS
MAIL SECTION
DOCKET CL

TABLE	76	77	78	79	80	81	YEAR 82	83	84	85	86
E.1 (Hatch 1)	840										
(Hatch 2)			1120								
E.2 (Hatch 1)	0	92	168	184	156	144	144	144	144	144	144
(Hatch 2)	0	0	0	0	208	160	124	156	148	140	152
E.3 (Hatch 1)									F		
(Hatch 2)									F		
E.4 (Hatch 1)									F		
(Hatch 2)									F		
E.5 (Hatch 1)							T				
(Hatch 2)									F		
E.7*											

*1982 Reactor Site (Hatch), Number of Assemblies (336)

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TABLE F.1
SPENT FUEL STORAGE OF INDIVIDUAL REACTORS
NO COMPACT STORAGE, WITHOUT FULL CORE RESERVE

AVAILABLE STORAGE (ASSEMBLIES)

ID	REACTOR	MW	76	77	78	79	80	81	82	83	84	85	86	YEAR OUT	STOR. CAP.	IN STR. 12/75
16	Hatch 1	786	840	748	580	396	240	96	(-48)	-	-	-	-	1981	840	0
17	Hatch 2	795	-	-	1120	1120	912	752	580	280	(-8)	-	-	1983	1120	0
Share Pool Data			840	748 *	1700	1516	1152	848	580	280	(-8)	-	-	1983	1960	0

TABLE F.2
SPENT FUEL STORAGE OF INDIVIDUAL REACTORS
NO COMPACT STORAGE, WITH FULL CORE RESERVE

AVAILABLE STORAGE (ASSEMBLIES)

ID	REACTOR	MW	76	77	78	79	80	81	82	83	84	85	86	YEAR OUT	STOR. CAP.	IN STR. 12/75
16	Hatch 1	786	840	748	580	396	240	96	(-48)	-	-	-	-	1981	840	0
17	Hatch 2	795	-	-	1120	1120	912	752	580	-	-	-	-	1982	1120	0
Share Pool Data			840	748	1700	1516	1152	848	580	-	-	-	-	1982	1960	0

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5/15/78

TABLE F.3
SPENT FUEL STORAGE OF INDIVIDUAL REACTORS
COMPACT STORAGE = 2.5, WITHOUT FULL CORE RESERVE

AVAILABLE STORAGE (ASSEMBLIES)

ID	REACTOR	MW	76	77	78	79	80	81	82	83	84	85	86	YEAR OUT	STOR. CAP.	IN STR. 12/75
16	Hatch 1	786	2100	2008	1840	1656	1500	1356	1212	1068	924	780	636	1990	2100	0
17	Hatch 2	795	-	-	2800	2800	2592	2432	2308	2152	2004	1864	1712	1997	2800	0
Share Pool Data			2100	2008	4640	4456	4092	3788	3520	3220	2928	2644	2348	1994	4900	0

TABLE F.4
SPENT FUEL STORAGE OF INDIVIDUAL REACTORS
COMPACT STORAGE = 2.5, WITH FULL CORE RESERVE

AVAILABLE STORAGE (ASSEMBLIES)

ID	REACTOR	MW	76	77	78	79	80	81	82	83	84	85	86	YEAR OUT	STOR. CAP.	IN STR. 12/75
16	Hatch 1	786	2100	2008	1840	1656	1500	1356	1212	1068	924	780	636	1987	1540	0
17	Hatch 2	795	-	-	2800	2800	2592	2432	2308	2152	2004	1864	1712	1994	2240	0
Share Pool Data			2100	2008	4640	4456	4092	3788	3520	3270	2928	2644	2348	1992	4340	0

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5/15/78

TABLE F.10

REACTOR	TYPE	MEGAWATTS	YEAR OUT
Hatch 1	B	786	1983
Hatch 2	B	795	1983

TABLE F.11

REACTOR	TYPE	MEGAWATTS	YEAR OUT
Hatch 1	B	786	1982
Hatch 2	B	795	1982

TABLE F.12

REACTOR	TYPE	MEGAWATTS	YEAR OUT
Hatch 1	B	786	1994
Hatch 2	B	795	1994

TABLE F.13

REACTOR	TYPE	MEGAWATTS	YEAR OUT
Hatch 1	B	786	1992
Hatch 2	B	795	1992

CLS/mb
5/15/78

Natural Resources Defense Council, Inc.

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June 6, 1978

Mr. Clifford Smith
Office of Nuclear Material
Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: Comments on NUREG-0404

Dear Mr. Smith:

Attached to this letter is a copy of the NRDC comments on the draft GEIS on handling and storage of spent fuel. The comments consist of a general statement and five attachments. It is our purpose to integrate thoroughly with the comments themselves the five attachments and it is our expectation that if NRC is to adequately deal with the issues we are raising here, it will have to deal with the issues specifically addressed in the attached documents. We have taken this step in order to obviate any questions along the lines of those raised by the Supreme Court in the recent decision in Vermont Yankee Nuclear Power Corporation v. Natural Resources Defense Council, 46 U.S.L.W. 4301 (April 3, 1978), indicating that to raise issues under NEPA it is necessary for a party to come forward with a certain threshold of information. By appending this information, it is not our purpose to either excuse the NRC from its independent obligation under NEPA to thoroughly investigate alternatives and to thoroughly explore the environmental implications of the proposed action and all alternatives. Our purpose, rather, is to alert the NRC to competent technical opinion clearly at variance with opinions expressed in the original document and to call upon the NRC in carrying out its affirmative duties to fully respond to and take account of these expert views.

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We would be delighted to meet with those preparing the draft environmental impact statement at any time to discuss our concerns in more detail.

In light of the major modifications that will be required to adequately address the issues that NRDC is raising here, and in light of the overall poor quality of the draft document, we believe it is essential that NRC prepare and recirculate a new draft GEIS. The principles laid down by the Commission in Philadelphia Electric Company (Limerick Units 1 and 2), ALAB-262, 1 NRC 163, 195, 197 (1975), and Allied-General Nuclear Services (Barnwell), ALAB-296, 2 NRC 671, 680 (1975), clearly require that in a case such as this one the draft GEIS must be recirculated.

Sincerely,

Anthony Z. Roisman
Staff Attorney

Enclosures:

NRDC Comments on NUREG-0404, Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel
"Away From Reactor Storage Facilities: Our Next Nuclear Waste Blunder?" (NRDC June 6, 1978, report)
"A Time to Choose, America's Energy Future," Final Report by the Energy Policy Project of the Ford Foundation, Ballinger Publishing Co., Cambridge, Mass., Chapter 3, pp. 45-111
"Solar Energy, Progress and Promise," Council on Environmental Quality, April 1978
Testimony on Behalf of the State of Wisconsin, Witnesses Von Hippel and Williams, and Testimony of NRDC, witnesses Tamplin and Cochran, In the Matter of Generic Environmental Statement on Mixed Oxide Fuel (GESMO), Docket No. RM-50-5, dated March 4, 1977.

Natural Resources Defense Council, Inc.

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NRDC Comments on NUREG-0404
Draft Generic Environmental Impact
Statement on Handling And Storage
Of Spent Light Water Power Reactor Fuel

Introduction

The genesis of this impact statement was the realization that the waste disposal problem had gotten out of control and new actions have to be taken or reactors would have to be shut down. This should be ample warning of the danger in failing to thoroughly analyze the implications of waste disposal efforts, even efforts that are billed as interim. Nonetheless, the draft GEIS suffers from the identical problems that inflicted the FES for the Barnwell Fuel Receiving and Storage Facility -- both documents stretch facts and logic beyond all reason in order to justify actions to which a pre-NEPA commitment has been made.

In October, 1977, without any previous NEPA analysis the Department of Energy announced a national spent fuel policy. This event has turned the staff from a legally required independent regulatory look at spent fuel policy into a post hoc rationalizer for the illegal actions of the

DOE. Unless the draft GEIS on spent fuel is totally revamped and recirculated, it will not form a legally supportable document for NRC action. In the end, this will only serve to delay implementation of act[illegible] on the spent fuel storage problem.

As the following comments make clear, the principal flaw in the draft GEIS is the unwarranted favoritism to the precipitous DOE proposal -- AFR's -- without a thorough and objective look at the costs and benefits of that action as contrasted to the use of ARs or to limitations on the production of spent fuel. Waste disposal, even interim solutions, are far too important to be handled in this manner.

General Comments

The draft GEIS appears to have been written with the preconceived intent to justify expanded storage capacity in reactor pools and away-from-reactor storage facilities. It even fails to meet the directive of the Commission as stated on page ES-1:

> The Generic Environmental Impact Statement on spent fuel storage was prepared by the Nuclear Regulatory Commisson staff in response to a directive from the Commissioners published in the Federal Register, September 16, 1975 (40 FR 44801). The Commission directed the staff to analyze alternatives for the handling and storage of spent light water power reactor fuel with particular emphasis on developing long range policy.

Although the Commission asked for emphasis on long range policy, the Staff indicates at the bottom of page ES-1 that the impact statement addresses only an interim action. Failure to consider the long range implications of this interim action is one of the major flaws in this draft statement.

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In our letter to Gossick (Anthony Z. Roisman to General Lee V. Gossick, May 20, 1975) we pointed out the importance of considering the long-term implications (pp. 5-6):

> c. the long-term environmental and safety implications of facilitating the production of radioactive materials through authorization of increased spent fuel storage capacity, including the NRC's ability to assure the public that the health and safety of this and future generations will be fully protected from injury from such materials. The NRC obviously should not facilitate the production of radioactive wastes unless it can demonstrate that these materials will be contained both in the near future and in some form of ultimate storage or disposal. It is thus incumbent upon NRC, should it opt for short-term measures to increase spent fuel storage capacity, to set out in detail a plausible scenario for the back end of the fuel cycle (i) which is consistent with these short-term measures, (ii) which is fully protective of public health and safety, and (iii) which NRC would be prepared to enforce. This description must set out the regulatory-type criteria which NRC would impose to regulate industry activities in the various fuel cycle stages.

On page ES-1, the Staff states

> In the absence of a national policy directed to final disposition of spent fuel, the staff extended the time period of this study to year 2000. This extension provided a conservative upper bound to the interim spent fuel storage situation at a date that constituted a practical limit to the forecasting that may logically be used as a basis for today's decisionmaking.

We are at a loss to understand what is meant by a "conservative upper bound." No basis for this statement can be found in the remainder of the impact statement. Since the Staff did not consider the long-term implications of the ultimate disposal of the spent fuel or the timing of such disposal, the use of a word such as conservative is totally meaningless.

In its ardent endeavor to support the AFR storage concept, the Staff appears to have concluded that it is preferable to build a separate spent fuel storage facility at a different site 300 miles from a reactor rather than build a separate facility 100 yards from the reactor on the same site. See our discussion below re: p. 3-12.

In examining the possible alternatives to expanded spent fuel storage, the Staff only looks at a total ban on nuclear power use. It does not consider plausible alternatives based on an application of the principle that nuclear power be used as a last resort. Application of that principle would warrant running a nuclear reactor only if no other existing facility could meet the need and building a nuclear reactor only if no other option existed. Thus an analysis of this option would require a thorough look at the existing reserve margins of utility systems and a thorough look at the availability of conservation, cogeneration, geothermal and solar, including small-scale hydro and other small scale applications.

The Staff has merely assumed that the GESMO "super low" scenario is appropriate. This assumption is not defended in the DEIS. Moreover, we propose that it is neither current nor accurate. The Staff must justify this assumption in the FEIS.

The Staff also makes the comparison between nuclear and coal based upon a biased and unreliable analysis of the nuclear costs. The Commission's ongoing proceeding on the S-3 Table provides substantial new and important information on the economic cost of waste disposal and the magnitude of uncertainties associated with presumed waste disposal solutions. The recent Commission action in withdrawing the Radon-222 value from the S-3 Table also dislodges that figure as a reliable estimate. There is no logic to a cut-off short of 120,000 years, for the health effects of Radon-222 from tailing piles (or a major cost increase for implementation of an 120,000 year tailings stabilization program). The only reasonable assumption that we can now accept is that humans will survive during the lifetime of these health effects but for the adverse consequences of the nuclear program itself. A life lost 10,000 years from now is no less valuable than one lost today -- unlike dollars, we cannot discount human life. When coal and nuclear are evaluated on the basis of their full health effects absent serious nuclear accidents, both are extremely injurious to human life and health, but nuclear is substantially worse.

In the following "Specific Comments" we will address these matters again and will make reference to supporting documents that are intended to be an integral part of our comments. It is essential, for an adequate FEIS, that the NRC respond fully and candidly to these documents.

In the past the indivuduals preparing the various parts of an impact statement have done so in an atmosphere of anonymity. This we feel, has materially contributed to the poor quality of the statements. The U.S. Code at 18 U.S.C. § 1001 states:

> Whoever, in any matter within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals or covers up by any trick, scheme, or device a material fact, or makes any false, fictitious or fraudulent statements or representations, or makes or uses any false writing or document knowing the same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.

We therefore request that this state of anonymity be ended and that those who prepare the various parts of the FEIS be fully identified.

Specific Comments

The headings here will refer to the page numbers in the DEIS that are pertinent to the comments.

page ES-7.

Section 3.5 here implies that the only approach to replacing nuclear power is to order a suspension in the generation of spent fuel and the replacement of nuclear power by coal fired central power stations. As we have stated above and will discuss below, this alternative is not justified in the DEIS and, we propose, can not be justified by a full and candid discussion of the various alternatives in the FEIS.

AK-1.1

page 1-4.

The reference case (Alternative 1) should be increased storage at reactor pools and the construction of additional storage capacity on-site. Such additional storage could either be integral to existing pools or a separate facility.

a) A separate on-site storage facility would be preferable to transshipment (Alternative 2)

POOR ORIGINAL

to another reactor site or shipment to an AFR
(Alternative 1)

AK-1.1

The termination case (Alternative 3) is a totally inadequate treatment of the options related to the termination of the use of nuclear power plants. The FEIS must consider:

1. Increasing the AR storage for the lifetime fuel use of existing reactors and those under construction.
2. Limiting nuclear power production to existing reactors and those under construction (except as a last resort). Future power needs would be met by alternative energy sources such as coal, geothermal and solar.

page 3-1 to 3-2.

Here it is stated:

> Also, solely for purposes of conservatism, the largest magnitude of the storage problem over the period 1976-2000 is projected, that is, no reprocessing and no permanent disposal of spent fuel are assumed through year 2000.

The purpose of this DEIS is to examine the alternatives to the spent fuel storage problem. Maximizing the storage problem represents only one of the alternatives - the least desirable at that. We have commented above on the alternatives discussed on these pages and have pointed out that there are alternatives that can substantially reduce the number of reactors and hence the storage problem. Table 3-1 must be revised to reflect these alternatives. The FEIS will be totally inadequate unless it fully and candidly discusses these alternatives. (See our discussion below relative to page 3-36.)

AK-2

page 3-5.

The significance of maintaining a full core reserve in

AR storage should be discussed in more detail. In particular, the value of FCR in reducing occupational exposure during various repair and maintenance operations should be evaluated. Also a detailed discussion should be presented of the value of a FCR in "facilitating" reactor vessel inspection. In other words, the discussion here should evaluate whether Option 3 is really an acceptable option.

AK-3

page 3-12.

The discussion here of volume expansion at existing reactor pools is ridiculous. For example it is stated:

> Transfer between the two storage pools would be accomplished by a transfer cask. The add-on facility is not a practical consideration where the existing pool is elevated in a building or the building arrangement does not provide reasonable access between the existing facility and the available space for a new facility.

This statement would seem to imply that if the existing pool is elevated, it is better to remove the fuel from the elevated pool and ship it a hundred or more miles to an AFR if one desires to have reasonable access. If the fuel can be shipped off-site, it is eminently reasonable to suggest that it can be more easily transferred on-site.

Moreover, transshipment between pools on the same or different reactor sites is considered as an alternative in this DEIS. Clearly, a separate AR storage facility could be made as accessible (even more so) as pools of other on- or off-site reactors.

As we stated relative to page 1-4, it is essential that this EIS consider additional (separate or otherwise) on-site storage as the reference case.

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pages 3-25 to 3-33.

These pages discuss, albeit superficially, the transportation requirements for spent fuel storage. But regardless of the superficiality, no discussion is presented wherein

AK-4 expanded storage, separate or contiguous, at reactor sites represents the reference case. Transshipment is recognized to require distance up to 150 miles and AFR shipments must involve larger distances. On-site transfer must represent the lowest transportation and cask requirements. Again, it is essential that this EIS consider on-site storage as the reference case.

pages 3-28 and 3-29.

AK-5 The comments above demonstrate that the treatment of on-site fuel transfer given here is totally inadequate.

page 3-36.

This page contains the abysmally brief and erroneous discussion of replacement power for LWR-produced electricity. It is stated here that the replacement would be coal-fired plants because there are no alternate energy sources. All this

AK-1.2 of course is predicated upon the "super low" growth scenario of GESMO and it is stated that conservation will not affect this projection. It is implied incorrectly here that this approach was taken by the Ford Energy Policy Study. We propose that these statements and assumptions are neither accurate nor current.

Alternative 3 of this DEIS implies that the termination of the nuclear option must occur as the sole result of a

shortage of spent fuel storage capability. We have already stated that the DEIS is inadequate in that it did not consider the complete storage of the lifetime spent fuel at the reactor sites. But even setting this aside, the DEIS fails to consider the orderly transition to a non-nuclear future. A transition that is preferred for a variety of reasons. This is where the DEIS misrepresents the Ford Foundation's Energy Policy Study. We are including as an integral part of our comments Chapters 3 and 4 of that study, "A Time to Choose - America's Energy

AK-1.2 Future." The chapters deal with the "Technical Fix" and "Zero Energy Growth" scenarios. Both chapters discuss an orderly transition to a non-nuclear future - a transition that is motivated by environmental concerns, not the shortage of spent fuel storage facilities. It is essential that the FEIS discuss these scenarios fully and candidly.

The Ford Foundation Energy Policy Study submitted above also discusses the role of energy conservation. It is essential that the NRC Staff discuss this matter fully and candidly in the FEIS. As additional material on conservation that should be considered, we are attaching, as an integral part of our comments, the testimony submitted in the GESMO proceedings by Frank von Hippel and Robert H. Williams. Without considering other alternatives and only "moderate" conservation methods, they demonstrated that the nuclear projections in the DEIS could be cut in half.

The Ford Energy Policy Study was published in 1974. The von Hippel - Williams testimony updates the energy conservation considerations in the Ford Study. Beside conservation, there exist the geothermal and solar energy alternatives. With respect to geothermal energy, GESMO (NUREG-0002, pp. III-22 and III-23) indicates a potential capacity of 100 Gwe by the year 2000. The DEIS fails to indicate how this capacity is factored into its projections of needed nuclear capacity. The FEIS must present and justify fully the basis for its energy projections and the technology utilized to meet these projections. In this respect, it must justify its allocation of solar technology to meeting these projections.

AK-1.2

With respect to solar energy we are attaching as an integral part of our comments, the CEQ publication, "Solar Energy: Progress and Promises." This report suggests that by the year 2000 some 20-30 quads (~ 250 GWe) of energy could be realized from solar energy. Among other things this report discusses the potential of utilizing small-scale hydropower and of upgrading existing hydropower facilities. The FEIS must fully and candidly discuss these alternatives.

We propose that a full and candid examination of these alternatives will demonstrate (as the Ford Energy Policy Study demonstrated) that the U.S. can make a safe and orderly transition to a non-nuclear future. This would substantially reduce the spent-fuel storage problem and alter the conclusions of this DEIS. Unless the appropriate analysis of alternatives is undertaken, the FEIS will be totally inadequate.

pages 4-7 and 4-8.

The treatment of coal cycle wastes and of uranium cycle wastes in this DEIS is prejudicial. The message of the DEIS is that the government will take charge of uranium cycle wastes while the coal cycle wastes are left to nature or to private interests. The pertinent analogy and comparison should be relative to the same degree of governmental and private participation and responsibility. Moreover, the treatment of mine and mill tailings must consider the entire environmental lifetime of the precursors of Ra-222.

AK-6

page 4-10.

The entries in Table 4.2 are substantial underestimates of the effects of the nuclear fuel cycle. We are appending, as an integral part of these comments, NRDC's testimony in the GESMO proceedings relative to Chapter IV of NUREG-0002. This testimony treats the problem of Ra-222 that was discussed above.

pages 6-1 to 7-11.

The cost comparisons in this section do not include the expansion of on-site storage (either separate or contiguous) as an alternative. At the same time, the comparison base is an independent 1,000 MTHM storage facility. Such a facility could well be an independent on-site storage unit. An on-site facility would have significantly lower transportation requirement, would most likely involve less land resources and would have lower environmental consequences. Moreover, since the various licensing parameters of reactor sites have been determined, including those for spent fuel storage, the licensing of on-site facilities

AK-1.1

AR-1.1 should be expeditious. It is difficult to see how AFR storage could be preferable to AR storage. This EIS must discuss this AR storage option in detail unless it is to be judged totally inadequate.

Concluding Comments

Because of its significant inadequacies this DEIS should be withdrawn and a new one prepared and circulated for comment. Unless this is done, it will not form a legally supportable document for NRC action. In the end, this will only serve to delay implementation of action on the spent fuel storage problem.

Also attached herewith and made an integral part of our comments is a report prepared by NRDC entitled "Away From Reactor Storage Facilities: Our Next Nuclear Waste Blunder?" dated May 24, 1978.

Respectfully submitted,

Arthur R. Tamplin

Arthur R. Tamplin

Anthony Z. Roisman

Anthony Z. Roisman

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YANKEE ATOMIC ELECTRIC COMPANY

YANKEE

20 Turnpike Road Westborough, Massachusetts 01581

United States Nuclear Regulatory Commission
Washington, D.C. 20555

June 7, 1978

Attention: Director, Division of
Fuel Cycle and Material Safety

re: Draft Generic Environmental Impact Statement
on Handling and Storage of
Spent Light Water Power Reactor Fuel (NUREG-0404)

Dear Sir:

We are writing to you on behalf of the Utility Waste Management Group (UWMG), a group of twenty-one investor-owned and publicly-owned utilities throughout the United States.* Collectively, the member utilities represent more than one-half of the installed and planned nuclear power plants in the nation. The UWMG was formed in 1976 in order to monitor and assess Federal programs which deal with radioactive wastes. It is our firm belief that prompt, effective action must be taken by the Federal government to overcome the administrative and institutional roadblocks which impede a resolution of the nuclear waste issue.

Among several specific task forces set up within the UWMG is one which deals with Spent Fuel Management. This task force has reviewed NUREG-0404. Based on our review, the UWMG is in general agreement with the "findings" set forth in section 8 and the Executive Summary. However, we believe that several of the findings require special emphasis, namely:

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* Arizona Public Service Company; Boston Edison Company; Commonwealth Edison Company; Department of Water & Power City of Los Angeles; Duke Power Company; Florida Power & Light Company; Georgia Power Company; Houston Lighting and Power Company; Illinois Power Company; Iowa Electric Light and Power Company; Long Island Lighting Company; Nebraska Public Power District; Northeast Utilities Service Company; Pacific Gas & Electric Company; Portland General Electric Company; Power Authority of the State of New York; Sacramento Municipal Utility District; San Diego Gas & Electric Company; Tennessee Valley Authority; Virginia Electric & Power Company; Yankee Atomic Electric Company.

- We concur that "the storage of LWR spent fuels in water pools has an insignificant impact on the environment, whether at AR or AFR sites". It should be emphasized that this impact is insignificant in both an absolute sense and relative to other sectors of the nuclear fuel cycle. Furthermore, since many readers of the final GEIS may focus only on the findings, section 8 of the final GEIS and the Executive Summary should make clear that, as found in section 5, the incremental environmental impact of spent fuel transportation associated with AFR storage is also insignificant and that, as found in section 7, the potential risk to the public health and safety due to accidents or acts of sabotage during storage or transportation is extremely small. AL-1

- We also recognize the need for a more definitive regulatory basis for the licensing of future "storage-only" facilities. The UWMG urges the NRC to expedite the publication and establishment of proposed rule 10 CFR Part 72 and supporting regulatory guides. This regulatory framework is needed now so that both the Federal government and private industry can better plan for new spent fuel storage space. AL-2

- The UWMG agrees that "curtailment of the generation of spent fuel by ceasing the operation of existing nuclear power plants when their spent fuel pools become filled" is "undesirable." While we agree that measures to increase spent fuel storage space are economically and environmentally preferable to replacing nuclear-generated power with coal-fired power plants, the UWMG does not believe that the case for increasing storage should rest solely on a coal versus nuclear comparison. In addition, the final GEIS should reflect that increasing storage results in virtually negligible environmental and economic impact while an enormous negative economic impact would result from premature termination of nuclear generation because of a lack of storage capability. Furthermore, we suggest that this finding should reflect that "prohibition of construction of new nuclear plants" on the basis of spent fuel storage considerations is not only "not necessary" but also "undesirable." The GEIS clearly shows that the insignificant environmental or economic impacts of the storage of spent fuel cannot be the determining factor in the selection among various alternative methods for adding to electricity generation capacity. AL-3

In addition to these comments on the findings in NUREG-0404, our review found several places in the document where minor corrections or further comments are warranted. These further comments and corrections are contained in an attachment to this letter.

In summary, the UWMG believes that NUREG-0404 confirms our own assessment that the continued expansion of spent fuel storage space at reactor sites and at AFR sites is fully warranted and environmentally acceptable. Because of the growing need for additional space, we encourage the NRC to expedite the regulatory process in this area so that the Commission does not unnecessarily impede the implementation of further spent fuel storage additions.

Very truly yours,

Alan S. Hanson

Alan S. Hanson, Ph.D.
Chairman, UWMG Task Force on
Spent Fuel Management

A T T A C H M E N T

COMMENTS ON THE
DRAFT GENERIC ENVIRONMENTAL IMPACT STATEMENT
ON HANDLING AND STORAGE OF SPENT LIGHT WATER POWER REACTOR FUEL
(NUREG-0404)

Page 1-2: In section 1.2 it is stated that " . . . power plant owners may consider the maintenance of full core reserve capacity desirable for operational flexibility". The word "may" should be changed to "do". All utilities subscribe to the operational policy (for purposes of flexibility in oper-
AL-4 ation, not safety-related reasons) of maintaining at least a full core reserve (FCR) capacity. Some utilities have been forced to maintain less than FCR capability due to a lack of storage space; however, this has only been done reluctantly because of a lack of other immediately available storage alternatives.

Page 3-7: Section 3.1 discusses options for increasing spent fuel storage capacity in existing pools. Several options are listed here. However, no mention is made of the possibility
AL-5 of double-stacking of the fuel in a two tier rack. Although such a storage scheme has not yet been attempted, it has been previously proposed and should be considered briefly in the final GEIS.

Page 3-36: The discussion of replacement power is too cursory. The final GEIS should clearly state why nuclear plants
AL-6 cannot be replaced with oil or natural gas fueled plants and why exotic alternative energy systems will not be available. More discussion on the inability of conservation to significantly alter projected needs should also be included.

Page 4-27: The estimate of the labor force required for a nuclear plant is probably low. New requirements for security staffing have increased on-site staff. Often utilities which own nuclear plants have a separate engineering support staff
AL-7 located away from the actual site but dedicated solely to supporting operation of the nuclear units. The employment estimates in NUREG-0404 also ignore the necessary supplementary fuel cycle employment.

Page 6-6: The estimated capital costs for independent storage facilities appear to be too low. This is probably due in part to the use of estimates made prior to 1976. It may also be due to the use of unescalated costs. Because of the long lead time for the design, licensing, and construction of an indepen-
AL-8.1 dent facility, cost estimates should reflect escalation.

Page 6-6,-7: The costs for dry storage concepts could be better documented. The information on dry storage missing from Table 6.2 should be included in the final GEIS.

<u>Page 6-8</u>: If a nuclear power plant was forced to shut down by a lack of storage space, there would be a significant additional cost to the electricity consumer which is not in-
AL-3 cluded in the termination case. This extra cost would be the increase in the price of electricity needed to recover the nuclear plant capital cost over a shorter amortization period than originally planned.

<u>Page 7-7</u>: It should be made clear under the Reference Case description that "perpetual storage" at away-from reactor
AL-C.2 storage facilities is conservatively assumed for cost-analysis purposes <u>only</u>. (See Table 2.3 on page 2-10). The text should make clear that no such perpetual storage at AFR's is planned.

<u>Page 7-9</u>: The capital cost listed in Table 7.1 for a 1000 MWe coal-fired power plant is low since it is based on a plant at the mid-point of construction in 1976. The coal plants which
AL-9 are postulated in the termination case to replace nuclear plants are not yet under construction and will be more expensive due to inflation.

<u>Page B-3</u>: It should be made clear that the assembly data and
AL-10 storage capacities in Table B.1 are only approximations.

<u>Page D-47</u>: The statement that "modification for both the NFS and Barnwell pools are projected which would result in in-
AL-11 creased storage capability" should be deleted or substantially altered to reflect the fact that such modification is no longer planned at either facility.

<u>Page H-21</u>: The section on cladding stability during storage should be expanded to include a summary of the work done by
AL-12 A. B. Johnson of BNWL and reported in BNWL-2256, "Behavior of Spent Nuclear Fuel in Water Pool Storage".

Department of Energy
Washington, D.C. 20545

JUN 8 1978

Mr. Richard W. Starostecki, Chief
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material Safety
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Starostecki:

This is in response to your transmittal dated March 17, 1978, requesting review and comment on the U. S. Nuclear Regulatory Commission's draft generic environmental impact statement on handling and storage of spent light water power reactor fuel.

We have reviewed the statement and have determined that it addresses the environmental impacts expected from spent fuel handling and storage in a reasonable manner. We agree that the spent fuel can be handled and stored for an interim period with acceptably low environmental impacts. Staff comments are enclosed, which you may wish to consider in the preparation of the final statement.

Thank you for the opportunity to review and comment on the draft NRC statement. Please send us six copies of the final statement.

Sincerely,

W. H. Pennington, Director
Division of Program Review and Coordination
Office of NEPA Affairs

Enclosure:
DOE Staff Comments

U. S. DEPARTMENT OF ENERGY STAFF COMMENTS
U. S. NUCLEAR REGULATORY COMMISSION DRAFT GENERIC
ENVIRONMENTAL IMPACT STATEMENT
HANDLING AND STORAGE OF SPENT LIGHT WATER POWER REACTOR FUEL
NUREG-0404, MARCH 1978

General Comments:

AM-1.1 The Department of Energy (DOE) analyses indicate that larger independent spent fuel storage installations (ISFSI) may be required (5,000 to 10,000 MTHM) and, therefore, a brief discussion and analysis of environmental impacts related to this size of ISFSI's may be appropriate.

AM-1.2 The treatment of reactor storage basin capacity is appropriate for generic environmental impact statements. It should be recognized, however, that actual storage capacity for individual reactors will be determined on a case-by-case basis.

AM-2 The reference to an operational geologic repository for high level nuclear wastes by 1985 (page ES-12) is currently recognized to be too optimistic. The earliest date for an operating permanent repository is now estimated to be 1988.

AM-3 It is suggested that the statement does not address the subject of, nor the responsibility for, decontamination and decommissioning the Away-From-Reactor (AFR) storage basins after the spent fuel has been shipped from the AFR for either reprocessing or for terminal disposal.

Specific comments follow:

AM-4 Page ES-3
The quantities of spent fuel projected (Table ES-1) are substantially higher than those used in DOE/ER-0004/D, Draft Waste Management Task Force Report (February 1978).

AM-5.1 Page ES-5, paragraph 2
How much additional storage capacity does this provide?

AM-5.2 Page 3-1, paragraph 1, line 4
Suggest inserting "interim" prior to "storage" to clarify why geologic disposal is not shown as being under consideration.

Page 3-15, Section 3.1.4.2.1, line 1
Suggest replacing "has" with "had previously" to indicate this is not a newly developed concept.

AM-5.2 Page 4-4, Section 4.1.2.2, next to last sentence
Suggest including a reference to Appendix C (termination case impacts).

Section 7.1
Inclusion of a summary of the excess mortality data (presented in tables 4.2 and 4.12) in the evaluation section would seem appropriate.

AM-6.1 Page 7-2, Section 7.1.3
Suggest that a Summary Statement regarding the radiological impact of coal fired replacement plants (discussed on pages 4-5 and 4-7) be included.

Table 4.2
AM-6.2 This estimate of health effects seems narrow in scope and at the low end of the range of estimates used in the literature. This is especially true in the light of the lung cancer data for uranium miners.

Table 4.3
AM-6.3 It looks like there is possibly a reversal of two columns in this table. Does the Occupational Dose Total Body Person-Rem really match the Population Dose-Skin-Person-Rem for foreign countries?

AM-6.4 Is information available on the operation of reactors that would give real numbers of person-rem/unit of electricity produced that could replace those in the current models? It requires a certain level of human exposure to operate equipment which handle levels of activity such as 10^6 curies/metric ton. These known values should be utilized.

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POWER AUTHORITY OF THE STATE OF NEW YORK
10 Columbus Circle New York, N. Y. 10019
(212) 397-6200

June 8, 1978

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
Attention: Director, Division of Fuel Cycle and Material Safety

RECEIVED
JUN 19 1978

Subject: Comments on Draft Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel

Gentlemen:

Attached are the Power Authority of the State of New York's comments on the subject draft environmental statement.

Very truly yours,

Vito J. Cassan
Vito J. Cassan
Assistant General Counsel

DOCKETED
USNRC
JUN 26 1978
NMSS
MAIL SECTION
DOCKET CLERK

COMMENTS ON THE

DRAFT ENVIRONMENTAL IMPACT STATEMENT

ON

HANDLING AND STORAGE

OF

SPENT LIGHT WATER POWER

REACTOR FUEL

	PAGE	SECTION		COMMENT
1.	ES-9	5.0	AN-1	Further definition of transshipment licensing requirements are needed.
2.	2-4	2.2.1	AN-2.1	The latest D.O.E. "maximum achieveable" estimate for installed nuclear capacity is 380 GWe by the year 2000.
3.	2-5	2.2.2	AN-3	Storage capacity estimates may be conservative as substantial use of "stacked-storage" is possible within the industry.
4.	2-6	2.2.2	AN-2.2	Although in the past, utilities did provide spent fuel storage capacity for about 1.5 cores, the basis for this practice (i.e. a viable spent fuel reprocessing segment of the nuclear industry) no longer exists. Due to the questionable status of spent fuel reprocessing and an absence of adequate storage away from the reactors, present designs call for spent fuel storage capacities significantly higher than the 1.5 core storage capacity assumed in Table 2.2. To insure that a reasonable analysis of alternatives available for storage of spent fuel is performed, the use of 1.5 core storage capacities for reactors coming on line from 1986 to 2000 should be re-examined.

	PAGE	SECTION		COMMENT
5.	3-1	3.0	AN-2.3	It is not clear how D.O.E. storage scheduled for 1987 to 1993 startup will impact on the storage requirements.

Telephone 617 366-9011
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YANKEE ATOMIC ELECTRIC COMPANY

YANKEE

20 Turnpike Road Westborough, Massachusetts

June 8, 1978
NED-78-276

United States Nuclear Regulatory Commission
Washington, DC 20555

Attention: Director, Division of Fuel Cycle and Material Safety

Reference: Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0404)

Dear Sir:

Yankee Atomic Electric Company is a member of the Utility Waste Management Group (UWMG) which is a group of 21 investor-owned and publicly-owned utilities formed in 1976 to monitor and assess Federal programs which deal with nuclear waste. The UWMG is submitting separate comments on the Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor fuel. By this letter, Yankee Atomic Electric Company, Maine Yankee Atomic Power Company and Vermont Yankee Nuclear Power Corporation subscribe to and endorse those comments filed by the UWMG.

AO-1

In addition to endorsing the UWMG comments, we wish to suggest several specific corrections with regard to the nuclear units in New England for which we are responsible. These follow:

Page 3-9: In Table 3.4 the data for Yankee Rowe should be corrected. The core size is 76 assemblies, not 74. The pool size is 176, not 172. The planned and authorized increases are both 215, not 219. The percentage increase is 122% not 130%. And the compact storage factor is 2.22, not 2.30.

Page 3-29: The two units under construction for Public Service Company of New Hampshire at Seabrook are missing from Table 3.5. These units are scheduled to operate before 1986.

Appendix E: (1) In Table E.1 the spent fuel storage capacities for our reactors in 1976 should be:

Vermont Yankee	88
Maine Yankee	94
Yankee-1	104

(2) In Table E.2 the discharge data for our reactors are very low by historical standards. This is undoubtedly due to the assumption in NUREG-0404 of a very low capacity factor. The capacity factor assumed and used to calculate Table E.2 should be clearly identified in the appendix and on the table.

AO-1

(3) The calculated storage situations in Tables E.3, E.4 and E.5 should be corrected to reflect those changes in storage capacity outlined above in (1).

Appendix F: (1) On page F-3 it should be pointed out that the assumed compact storage is with a compaction factor of 2.5.

(2) On page F-12 the storage capacity for Yankee-1 should be 176 instead of 216.

(3) On page F-16 the storage capacity for Yankee-1 should be 100 instead of 140.

(4) On page F-20 the storage capacity for Yankee-1 should be 440 instead of 540.

(5) On page F-24 the storage capacity for Yankee-1 should be 364 instead of 464.

(6) The changes specified in (2)-(5) will affect subsequent tables in Appendix F. In particular Tables F.10, F.11, F.12 and F.13 will be changed.

None of these suggested corrections will materially affect the findings in NUREG-0404, but they will help to assure accuracy.

We appreciate the opportunity to comment on NUREG-0404. It is our hope that the NRC will now move expeditiously to issue proposed regulations on spent fuel storage so that the regulatory framework for continued storage can be assured.

Sincerely,

YANKEE ATOMIC ELECTRIC COMPANY

Louis H. Heider

Louis H. Heider
Assistant Vice President -
Engineering and Operations

ASH/mrt

Commonwealth Edison
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JUN 26 1978
U.S. Nuclear Regulatory Commission
Mail Section

June 8, 1978

Secretary of the Commission
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Director, Division of Fuel Cycle
and Material Safety

Dear Sirs:

Commonwealth Edison Company, which operates seven nuclear power reactors and holds construction permits for six others, submits these comments in respect of the "Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel," NUREG 0404. See 43 Fed. Reg. 12402 (March 24, 1978). In addition, Commonwealth Edison subscribes to and endorses the separate comments which are being submitted by the Utility Waste Management Group, of which it is a member.

We strongly support the findings of NUREG 0404 that:

> At-reactor spent fuel storage can be increased, and one acceptable method of doing this is through the use of neutron-absorbing materials in storage racks;
>
> The necessary actions can be taken without risk to public health and safety;
>
> The environmental impact of the proposed increase of at-reactor spent fuel storage will be negligible.
>
> The manner in which spent fuel is stored on an interim basis does not foreclose any options with respect

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> to the ultimate disposal or long-term storage of nuclear waste in geologic repositories or otherwise.
>
> The costs of doing without nuclear power capacity because of the lack of adequate spent fuel storage facilities would be undesirable and inexcusable, and far outweigh the minimal environmental impact associated with spent fuel storage.

AP-1 We also agree with the conclusion reached by NUREG 0404 that the storage of spent fuel in away-from-reactor facilities is economically, environmentally and technically acceptable. However, we believe that NUREG 0404 does not sufficiently emphasize its most important conclusion: that both expansion of at-reactor storage facilities and the construction of AFR facilities will be needed. A strong statement of this finding can make a significant contribution in helping to avoid unnecessary delays in the planning, expansion and construction of spent fuel storage facilities.

AP-2 In addition, NUREG 0404 should be accompanied by a statement describing how it will be used. While NUREG 0404 could provide the basis for a rulemaking, which would make its findings legally binding in subsequent licensing proceedings, no such proceeding is required to make the statement useful. NUREG 0404 should immediately be employed to prevent redundant NEPA reviews in individual licensing proceedings. For example, NUREG 0404 will provide the basis for a negative declaration with respect to the environmental impact of a proposal to increase spent fuel capacity at a particular reactor. No supplemental environmental impact statement is necessary for a particular action when all of the environmental analysis required has been conducted in the programmatic statement. Natural Resources Defense Council v. Administrator Energy Research and Administration (Slip opinion, D.C. Civ. Action No. 76-1691, May 8, 1978). In addition, NUREG 0404 should form the framework for the staff's position in any contested proceeding with respect to the licensing of new spent fuel storage facilities.

We believe that clarification of these points is important to reduce the likelihood of unnecessary duplication of NEPA reviews and to ensure that the licensing of spent fuel facilities is to proceed in a timely manner.

Commonwealth Edison Company

Secretary of the Commission
June 8, 1978
Page Three

In addition, Commonwealth Edison Company submits the following specific comments:

Page 3-36/37 and Appendix C

This section discusses the potential for replacement power from coal-fired stations in the so called "termination case." There is no compelling evidence to use a significantly different capacity factor for nuclear units and coal-fired units. The 1977 data for nuclear units show an average capacity factor of 62.5% for licensed nuclear plants in the U.S. The 10-year average capacity factor for coal-fired plants larger than 400 megawatts is 60%. Ac-
AP-3 cordingly, we recommend that all reference to different capacity factor projections be deleted from the report and that a single capacity factor or range of construction permit be chosen and used for both types of units. Seve.-l specific criticisms dealing with Appendix C follow:

1. Coal units do not run closer to their nameplace capacity than do their nuclear counterparts.

2. The EIS should be updated to reflect recent amendments to the Clean Air Act that may require use of scrubbers on plants burning low sulfur coal.

Page C-1, Section 1.1

Cyclone furnaces probably cannot meet emission standards.

AP-4

Page C-1, Section 1.1

Fourth sentence should read 60-70% ash content, rather than 80%.

Page C2-6

This curve should be clarified and updated. It is not clear to us where the ash content figures for Wyoming and Illinois coal came from.

Commonwealth Edison Company

Secretary of the Commission
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Page Four

Page C-8

The 17% figure for auxiliary power is too high.

Page C-9, Section 3.0

2.5% moisture content is too low. It should be 12 to 15% for high sulfur coal and 15 to 20% for low sulfur coal. Also, 15,000 BTU/lb heating value is too high; experience indicates that it is more like 9,500 to 10,500 BTU/lb.

AP-4

Page C-11, Section 5.1.1, Third Paragraph

Maintenance on electrostatic precipitators is not "relatively low."

Page C-12, Section 5.1.1, Last Paragraph, Last Sentence

Cold precipitators and SO_2 burners are used more frequently.

Page 4.2, Section 4.1.1.2, and H-4, Section 1.3

This section discusses the impact of cooling towers on the environment. While a cooling tower may be used for an AFR facility, it is not the only means of cooling. This section should indicate that the facility is not
AP-5 restricted to using cooling towers. The cooling requirements are small and have little environmental impact.

The discussion of cooling towers is presented in several other sections of this report and this comment applies to these sections also.

Page 4-27, Section 4.3.2.1

This section states that the number of employees
AP-6 in a nuclear plant vs. a coal-fired plant is significantly different and indicates that the coal-fired plant requires about four times the number of personnel of a nuclear plant.

AP-6 For a multiple unit plant, Commonwealth Edison requires approximately the same number of personnel for the plant regardless of whether it is nuclear or coal-fired, with one exception: nuclear plant security now calls for a larger number of personnel.

Page 6-3, Figure 6.1

AP-7 This section indicates that the NRC will require only six months for approval of a request to modify an existing spent fuel storage pool from the time discussions are begun between the utility and the NRC. While experience to date has not supported this statement, proper reliance on NUREG 0404 and an efficient review process should result in meeting the objection.

Page 6-9, Section 6.2

AP-8 This section indicates that the national average fuel price for coal in 1976 was 8.1 mills per kilowatthour. In 1977, Commonwealth Edison found that the price for coal was 11.5 mills per kilowatthour. This difference is primarily due to the use by Commonwealth Edison of higher-priced low-sulfur coal to meet emission standards. The use of the 8.1 mill figure is an underestimate which significantly affects the cost calculations in this section. These figures should be updated.

Page B-8, Section 1.2.4.h

AP-9 This section indicates that current design criteria for storage racks require that a fuel assembly cannot be inserted anywhere other than a design location. However, the Commonwealth Edison designs make provision for the unlikely event that a fuel assembly may be misplaced in other than a permanent storage location. Such occurrences have been analyzed to determine that they do not affect the safety margins in the analyses.

Page B-12, Section 1.3.1

AP-10 This section states that 3.3% enriched fuel is representative of the fuel used in the Zion reactor. 3.1% enriched fuel is considered to be the maximum enrichment which would be used in the Zion plant on an annual fuel cycle basis.

Page B-15, Section 1.3.2

AP-9 This section states that rack designs require bracing from walls or anchors in the floor. Free standing racks are currently being used by several plants and are being included in Commonwealth Edison designs. Because such racks can be moved more easily within the pools, they provide useful flexibility in the handling and storage of spent fuel. There is no reason to rule out the use of free standing racks where analyses show that such racks can withstand design-basis seismic events. This discussion should be modified accordingly.

Page B-19, Section 1.3.5

When discussing the storage of nonfuel items, this section should be expanded to include items such as fuel handling tools which may be stored in the pool.

Page H-2, Section 1.1

AP-5 This section indicates that an AFR will have an interim location for storage in the pool. Commonwealth Edison is reviewing AFR designs and does not comtemplate necessarily using an interim storage location. There is no technical or safety reason why spent fuel could not be transferred directly from its shipping cask to its permanent storage location in the pool. This section should be expanded to indicate that the interim fuel storage location may be a convenience, but is not a requirement.

Page H-5, Section 1.3

This section discusses design details of the AFR cooling water and air systems. If this facility were incorporated with an operating plant, some of these systems might not be required. This report should indicate that the detail system designs mentioned are only an example and not the only way of meeting the requirements.

Commonwealth Edison Company

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Page Seven

Page H-22, Section 3.1.2

This section indicates that the use of BORAL is unacceptable in spent fuel pools for PWRs due to the possibility of galvanic corrosion. This statement is too broad. BORAL is presently being used in PWR pools, as is noted on page D-12 where it states that the NRC has accepted a high density fuel storage design for Maine Yankee incorporating BORAL. Commonwealth Edison intends to use BORAL in its high density absorber racks for Zion Station with stainless steel cladding which precludes the possibility of galvanic corrosion. AP-9

We appreciate the opportunity to comment on this draft generic environmental statement.

Respectfully submitted,

C. Reed

Cordell Reed
Assistant Vice President

kna

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160 NORTH LA SALLE ST.
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U.S. Nuclear Regulatory Commission
Mail Section

June 8, 1978

Mr. Clifford Smith
Office of Nuclear Material
Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Re: Comments on NUREG-0404

Dear Mr. Smith:

Enclosed are the comments of the States of Illinois, Ohio, Wisconsin and New York on NUREG-0404.

Very truly yours,

Dean Hansell

DEAN HANSELL
Assistant Attorney General
Environmental Control Division
188 West Randolph Street
Suite 2315
Chicago, Illinois 60601
[312] 793-2491

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Enclosure

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COMMENTS OF THE PEOPLE OF THE STATE OF ILLINOIS, OHIO, NEW YORK, AND WISCONSIN, ON NUREG 0404: GENERIC ENVIRONMENTAL IMPACT STATEMENT ON HANDLING AND STORAGE OF SPENT LIGHT WATER POWER REACTOR FUEL

INTRODUCTION

In 1975 the Nuclear Regulatory Commission directed its staff to develop a Generic Environmental Impact Statement on Spent Fuel Storage, to analyze alternative methods of handling spent light water power reactor fuel and to consider other alternatives which would result in a reduction in the amount of spent fuel created. See Federal Register, September 16, 1975 (40 F.R. 44801).

In March of 1978 the staff released a Draft Generic Environmental Impact Statement on the Handling and Storage of Spent Light Water Power Reactor Fuel. The following comments are submitted by the State of Illinois, Ohio, New York and Wisconsin on behalf of the citizens of these states pursuant to the request of the Nuclear Regulatory Commission for comments.

GENERAL COMMENTS

AQ-1

The development of the Generic Environmental Impact Statement on spent fuel by the Nuclear Regulatory Commission has been done in a way which effectively circumvents the entire NEPA process. Under NEPA the environmental consequences of a proposed action must be considered prior to undertaking such a procedure. The GEIS attempts to avoid such a choice by casting the alternative to continued generation of spent fuel as being limited to shutting down existing nuclear plants and instead building coal fired

plants. This approach not only incorrectly ignores viable alternatives such as conservation, alternative energy sources, and precluding additional nuclear plants from coming on line but considers the environmental consequences of the handling of spent fuel only after major federal actions having a significant impact on the environment have taken place.

AQ-2

The Draft Generic Environmental Impact Statement (hereinafter "DGEIS") presents many questions in a rule making proceeding which are adjudicatory in nature. There is today only one facility which accepts spent fuel, GE Morris, and NUREG 0404 attempts to resolve many site specific, adjudicable issues regarding the impact of this facility on the health and safety of the people of that area in a rule make proceeding.

AQ-3

The Draft Generic Environmental Impact Statement does not address the development of an interim storage policy which would avoid the creation of independent spent fuel storage installations (hereinafter "ISFSI's")*, through the use of compacted storage, interim transshipment, conservation and increased reliance upon alternative energy sources. The avoidance of ISFSI's reduces transportation risk, avoids the environmental and safety harms from the creation of additional facilities containing radioactive material, helps to minimize the significant and potentially escalating cost of decommissioning

*Sometimes referred to an an "AFR".

and decontamination of nuclear facilities, and avoids the
AQ-3 risk of turning facilities designed for interim or independent
storage into long-term storage facilities.

The DGEIS fails to explore and figure into its fuel
AQ-4 storage analysis all credible options for compacted at-reactor
storage (hereinafter "AR Storage"), including 2-tiered stacking,
fuel disassembly and storage of rods and other more compact
configurations. The DGEIS does not deal with the problems
AQ-5 associated with the possible conversion of an ISFSI into a
long-term spent fuel disposal facility.

The DGEIS does not analyze the costs, and environmental
AQ-6 harm associated with the decommissioning and the decontamination
of ISFSI's.

The DGEIS does not seriously consider energy conservation as a means of reducing the quantity of spent fuel. Further,
AQ-7.1 it has not considered the impact a spent fuel policy which relies
upon stringent conservation measures would have upon the
development of a national energy conservation policy.

The DGEIS does not seriously consider alternative
energy sources other than coal. It dismisses the potential of
AQ-8 alternative fuel sources in one sentence, referencing several
previous NRC reports of questionable sufficiency. The referenced
NRC Reports underestimate the potential of solar, hydro-electric,

oil, coal gasification, wind, and geothermal power. Further,
there is no analysis of the impact a spent nuclear fuel policy
AQ-8 which relies upon alternative energy sources would have on the
development of such alternative energy sources.

The DGEIS assumes that dry storage is a viable alter-
AQ-9 native but provides no analysis to support this statement.

There is no analysis of the possibility that an ISFSI
might become de facto a long-term disposal facility. In view
of the limited experience of the nuclear industry with wet
storage of spent fuel and certain questions raised by all sides
about hazards associated with long-term fuel storage (for
example, concerns about the integrity of zircaloy cladding)
AQ-5 there is more than a remote chance that once spent fuels are
stored for a certain number of years they may not be capable of
being moved without significant environmental harm. If that
possibility is not deemed likely the DGEIS must at least develop
procedures for insuring such facilities do not become long term
disposal facilities.

There is no analysis of the use of transshipment and
compacted storage as interim solutions to provide short-term
relief from the fuel storage problem until the creation of a
AQ-10.1 viable national policy on long-term storage. It is not sufficient
to dismiss transshipment as merely a means for postponing the

AQ-10.1 problem since all spent fuel storage techniques discussed are merely interim solutions.

AQ-11 The options of continuing to operate existing reactors but of not permitting reactors under construction from coming on line or of not granting additional construction permits have not been considered.

AQ-12 There is no comparative analysis under the "Safeguards Considerations Section", Chapter 5, of the relative vulnerability of AFR storage, no discussion of the environmental consequence of sabotage attempts and no economic analysis of the impact of physical protection measures on storage cost. Further, discussion of the environmental impact of safeguard failure should be analyzed.

AQ-13 The DGEIS economics analysis does not address relative costs of significant conservation techniques sufficient to educe energy demand to a level to which the spent fuel which is created can be stored in AFR storage facilities v. the costs for generating nuclear waste at levels projected in the DGEIS.Costs to store fuel and decommissioning and decontamination under each alternative should also be analyzed.

The economic feasibility of each alternative must be examined. The DGEIS does not analyze the issues surrounding the choice between centralized and decentralized storage technologies.

SPECIFIC COMMENTS

AQ-14.1 ES-3. A growth projection of 414 GWe by the year 2000

may not be a realistic figure in view of the postponement or delay of many nuclear plants. The GESMO 1 proceeding raised many questions about the validity of this "super low" growth projection.

AQ-15.1 ES-4. The statement is made that full core discharge capability is "not a safety matter." The basis for this statement is not substantiated in the text. Has a detailed fault tree analysis or similar failure mode analytical technique been utilized to verify this position? Given the current conditions of storage space and shipping cask availability, how long might it take to recover from a refueling-out-age-type accident that might require unloading the core and complete draining of the reactor vessel before corrective action could take place? Apart from the fact that full core discharge capabilities do not appear to have been fully addressed as a safety issue, it is desirable that a utility operator have FCD capability from an operational flexibility standpoint. Therefore, it should not be dismissed as a requirement so casually. Also full core discharge may be required for routine repair, maintenance, and inspection which might otherwise be discouraged.

AQ-15.2 Table ES-2 does not explicitly state the basis upon which it makes its compact storage analysis.

AQ-16.1 ES-5. The NRC's conclusion that at-reactor storage capacity expansion can take place "without significant effect on health and safety"prejudges the conclusions of its generic environmental impact statement on that question and the importance

AQ-16.1 of individual licensing proceedings in assessing whether a particular expansion can be done without harm to health or safety.

AQ-14.2 The Exxon licensing proceeding has been terminated. This has not been explicitly stated.

ES-6. The statement is made that General Electric's operation of the processing plant at Morris as an independent spent fuel storage facility has demonstrated that an ISFSI can be operated with adequate protection of the health and safety of the public. The statement is misleading. The Morris operation has operated on an extremely small scale (handling only several
AQ-16.2 hundred tons of fuel) for a short time period in terms of probable storage times of spent fuel. It should be recognized that neither Morris nor NFS West Valley were designed to be ISFSI's nor is it reasonable to assume that an ISFSI would be constructed or operated in a way similar to these facilities. Additionally, significant questions have been raised in In The Matter of The General Electric Company (Docket No. 70-1308) regarding the health and safety aspects of the Morris facility.

AQ-6 There is no analysis of the significant costs and potential dangers associated with the decontamination and the decommissioning of independent spent fuel storage installations and of at-reactor storage pools.

AQ-10.1 ES-6,7. The alternatives of transshipment of fuel from one reactor to another and of a reduction in nuclear power generation are dismissed on the bases that transshipment provides only temporary relief and nuclear power generation restriction

requires full replacement by coal fired power plants. It does not appear that these alternatives or combinations thereof have been given a real evaluation, especially if AR and AFR spent fuel storage is regarded only an an interim solution. For
AQ-10.1 example, alternatives such as transshipment could provide essential short term relief from the fuel storage problem until the formulation of long-term policy so as to avoid the creation of additional facilities which are merely "interim". The alternatives to continued nuclear power generation of combinations of conservation, load management, plant conservation, alternative energy sources, etc., appear not to have been addressed at all.

AQ-12 ES-7. The statement is made that physical security measures would be expected to be essentially the same at both at-reactor and away from reactor sites. While the same regulations apply, it is questionable whether the security at a small ISFSI at a remote location would be as effective as might be found at a large nuclear power generating facility. In addition, each ISFSI creates yet another potential nuclear target for terrorists. Comparatively, construction of an ISFSI will have a greater impact on the need for security and thereby be more costly than will expansion of an existing facility.

AQ-17 To say that the environmental impact of independent facilities is about the same as that of at-reactor storage assumes that these facilities will not become long-term disposal sites. It also assumes that the same requirements of geologic, seismic and hydrologic integrity will apply to ISFSI's as currently applies to reactor sites.

IMAGE EVALUATION TEST TARGET (MT-3)

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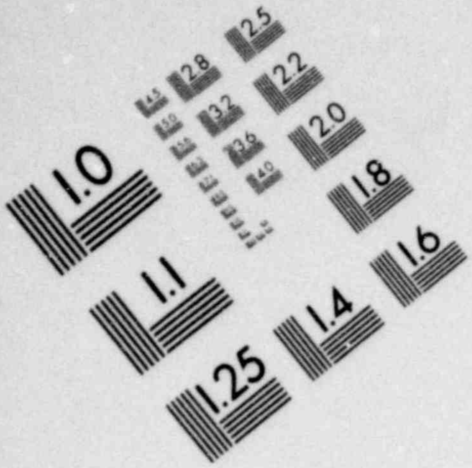

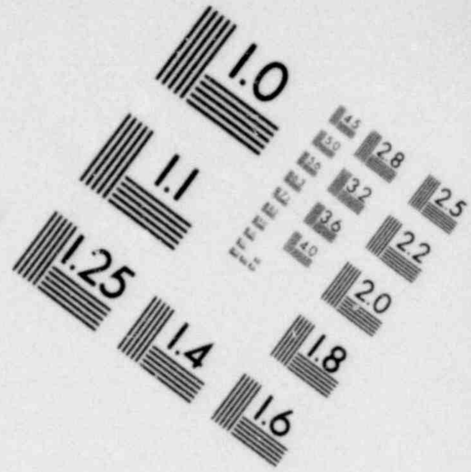

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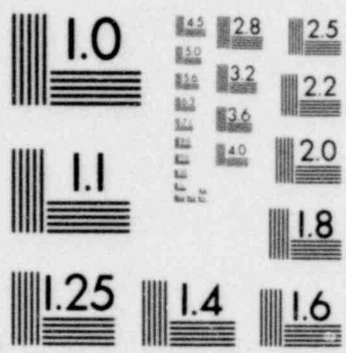
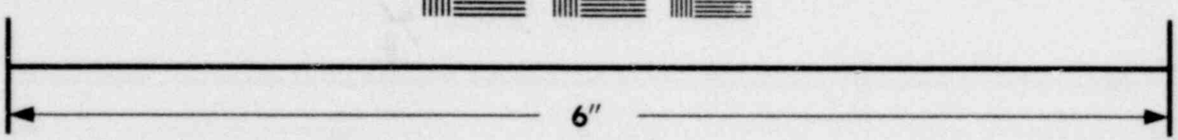
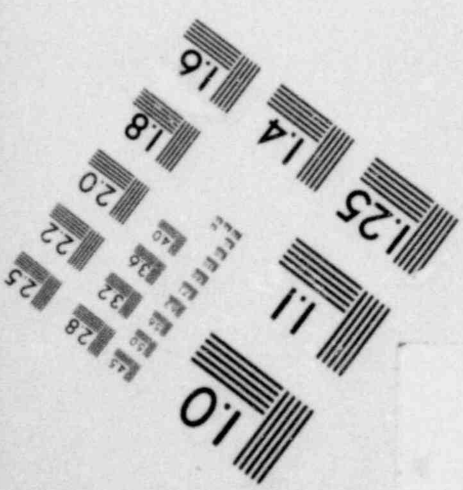
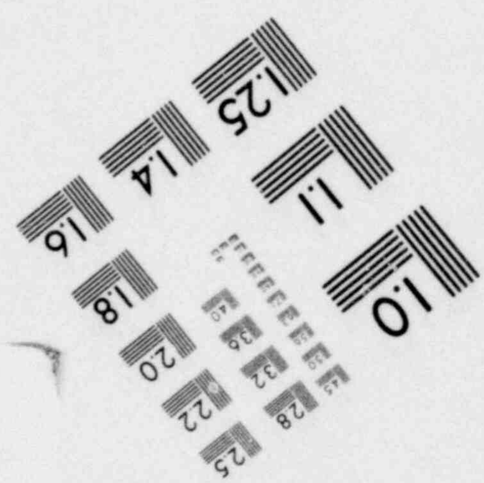
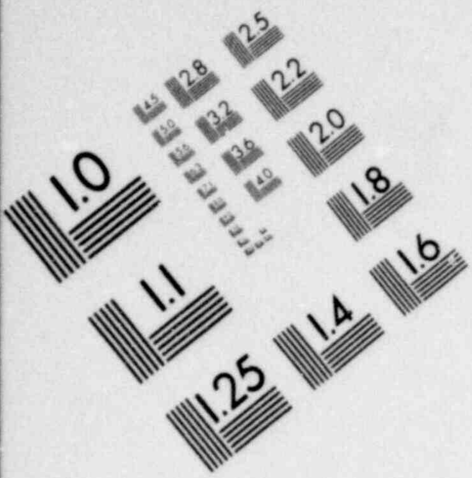










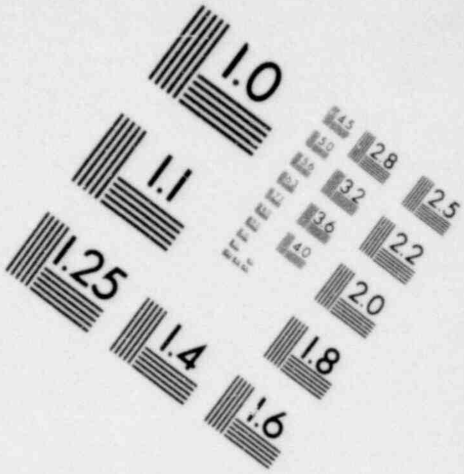
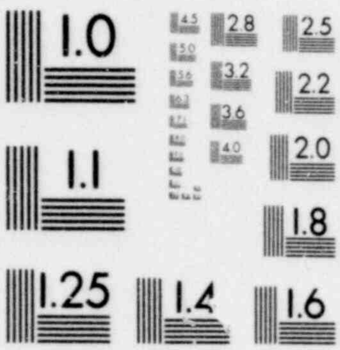


IMAGE EVALUATION TEST TARGET (MT-3)



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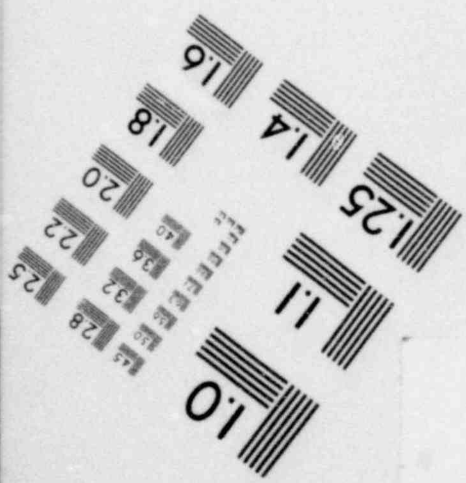

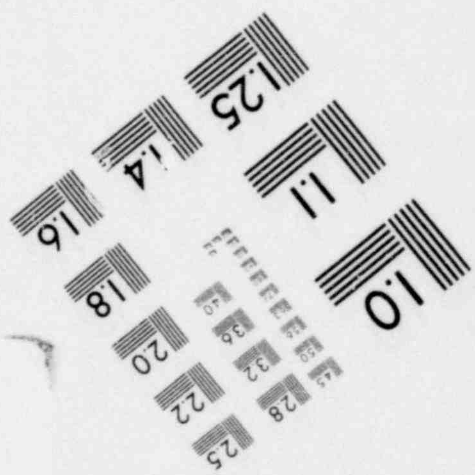

There is the unwarranted assumption that conservation
AQ-7.1 or alternative energy systems are not viable.

ES-8. Table ES-3 provides a comparision of potential excess mortality of nuclear v. coal power generation. Presentation of the mortality statistics for nuclear to three decimal places implies a great deal more certainty than can be statistically justified. In contrast, presentation of coal mortality
AQ-10 figures for power generation as a range of 3-100 deaths per .86WY(e) is more realistic. Major accident cases appear to be omitted from the nuclear column. Nuclear mortality appears to be underplayed and coal mortality over-stated. For example, the impact of radon release from mining operations is understated.

Section 4.1.2. The economic calculations in this paragraph do not consider other energy systems and conservation.
AQ-13 They assume that the only real option is to close nuclear power plants down.

Section 4.1.3. There is no analysis of the committment of resources for all viable options including alternative energy
AQ-19 sources other than coal, conservation, and centralized v. decentralized spent fuel storage.

Section 4.1.4. If a subsequent determination is made that movement of spent fuel from an ISFSI for environmental
AQ-5 reasons would create significant harm such a facility could become a de facto long-term disposal facility. This would have the affect of limiting future options.

Section 4.1.5. Statements regarding the importance of
AQ-20 a nuclear power energy base are unsubstantiated.

ES-9. The need for more definitive regulations for new "storage only" facilities is indicated. The planned regulations 10 CFR 72 and associated regulatory guides should be
AQ-21.1 expedited if, in fact, early commitment to ISFSI facilities is to be made. The findings of this environmental impact statement should be made conditional upon the early issuance of such regulations.

Consideration was given to modifications that might be required to 10 CFR 51, including the S-3 table. The DGEIS indicates no modifications are necessary, including no changes
AQ-22 to the S-3 table. Since the adequacy of the S-3 is currently in question, and proceedings are underway which will probably result in changes, this fact should be noted.

ES-9. In Paragraph 5.0 no analysis is referenced in the text to support the statement that increased spent fuel transportation will have an insignificant impact on the environment. There is significant evidence that the creation of ISFSI's will create increased environmental harm through increased trans-
AQ-10.2 portation risk. Spent fuel will have to be transported over long distances in the transportation of unirradiated fuel. Also spent fuel transportation is not subject to the same safety standards in transportation as unirradiated fuel because it is exempted by 10 CFR 73 sec. 73.6(b) from the safety requirements of 73.30-73-36 and 73.72.

Revised - 5/ letter of 6-21-75 from Dean Hansell, Asst. Att. G.n.

ES-10. Paragraph 7.0. The analysis fails to adequately deal with consequences of terrorist attacks. The Rand Corporation states that a terrorist attack by well armed and trained terrorists is reasonable to assume. The Office of Technology Assessment in a 1977 report, Nuclear Proliferation Safeguards considered as credible the use of missiles and anti-tank weapons by terrorists. Keeny et al., in the report of the Ford Foundation, Nuclear Power Issues And Choices (1977) acknowleges the possibility of the use of missiles and atomic weapons in a terrorist attack.

AQ-23 Section 8.1. The introductory paragraph states that dry storage technology assumptions are based on the existence of aged spent fuel. This assumption is not clear in the text. Further, the introductory paragraph states that storage of spent fuel and water pools is a well established technology. On the contrary, the nuclear industry's experience with storage of spent fuel on water pools is limited and only about 25 years old. We do not know what the long-term consequences of such storage are.

AQ-24 ES-11. One of the key assumptions on which the findings are based is that spent fuel storage situation is "manageable" provided that "the planning for AFR storages is initiated in a timely fashion." How unmanageable does the situation become if AFR initiation does not occur in a "timely fashion?" What is the definition of "timely fashion?"

AQ-25 ES-12. The storage of spent fuel in water pools is stated to have an insignificant environmental impact, primarily because of the high resistance to corrosion attributed to

AQ-25 zircaloy. This finding avoids addressing the uncertainties expressed in one of the key reference reports, BNWL 2256, "Behavior of Spent Nuclear Fuel in Water Pool Storage." While this report does find that "prospects are favorable to extend storage of spent nuclear fuel in water pools" it also indicates that "detailed systematic examinations of fuel bundle materials have not been conducted specifically to define storage behavior, because of the expectation that the fuel be reprocessed after relatively short residence." It goes on to state that "however, it is not how clear how long pool storage of spent fuel may be extended. If storage times of this spent fuel inventory are expected to extend into the 20 to 100 year frame, there is an increasing incentive to determine whether any slow degradation mechanisms are operative." This technical uncertainty has not been addressed by the DGEIS.

AQ-9 ES-13. Finding 5. There is no analysis in the text to support the statement that the use of dry storage is environmentally acceptable or feasible.

AQ-18 Finding 7. The key finding seems to be that the costs and the excess mortality rates and environmental impacts of coal-fired power generation are much higher than those for nuclear power. This may be true providing the scenarios evaluated are in fact the only scenarios viable and providing that major nuclear power accidents can be successfully avoided, and that additional serious problems do not develop, (such as non-linear low level radiation effects, substantial changes to the occupational

AQ-13 radiation limits, etc.). Some indication that uncertainty exists and that continuing evaluation is necessary should be made.

AQ-22 Finding 8. This finding should state that the sufficiency of the S-3 table is currently being challenged and consequently 10 CFR 51 may have to be changed.

AQ-26 S-2. It is now obvious that the "national objective of an operational and geologic depository for high level nuclear waste and possible disposal of spent fuel by 1985" will not be attained. The recent DOE Task Force Report has indicated that 1989 will be the earliest date such a depository could be established. Therefore, the amount of spent fuel which would be placed in AFR storages will likely be increased.

AQ-25 S-3. Finding 4. As previously indicated, the long term corrosion resistance of zircaloy has not been adequately tested. Also since KR 85 can be released from defective fuel elements, and since the length of time of the interim storage has not been defined the desirability of (a) encapsulating all fuel elements or (b) developing sensitive monitoring techniques to identify leakers and encapsulate all leaking fuel elements where potential leakers should be analyzed.

AQ-21.2 Finding 6. Finding 6 indicates that Morris and West Valley are licensed under 10 CFR 70. Part 70 regulations address the requirements for record keeping of special nuclear materials and to license such nuclear waste facility under such a procedure is a manipulation of those regulations.

AQ-15.1 1-2. As previously indicated, there is a serious question of whether operation of a reactor without FCR is desirable.

AQ-5 Further, a geologic repository seems out of the question by the mid-1980's. The recent DOE Task Force Report indicates that a basic waste management policy is just now beginning to be formulated and that 1989 would be the earliest such a facility could be established.

AQ-8 1-3. Alternative 3. The option of halting new plant construction rather than closing down existing plants is an option that should be considered. Further, there is no justification for assuming that coal is the only replacement energy source.

AQ-11 Table 1.1. Table 1.1 does not consider the option of preventing new plants from coming on line or of not granting any additional construction permits.

AQ-5 1-4. The scope of the assessment is indicated to consider the impact of storage of spent fuel through the end of the century. Consideration should be given to the possibility that safeguarded storage of spent fuel may develop into a "perpetual" requirement.

AQ-8 Alternative 3. Coal is listed here as an "example" of an alternative energy source, but on page 1-3 and elsewhere in the text it is listed as the alternative energy source.

AQ-11 2-2. Paragraph 2.2. If no reactors were permitted to come on line after 1985 this would have an impact on the generation of spent fuel through 2000. (See comments about ES-3 regarding

AQ-11 growth projection).

2-4. In the description of demand for storage capacity, an assumption of the 70% capacity factor from the period of 1986 through 2000 is stated and an annual discharge of fuel by the reactors was estimated to be 22.4 MT per GWe. (On page 2-3 the annual discharge of fuel by the reactors is estimated to be 30 MT per GWe). The capacity factor assu d is probably conservative in the calculation but the discharge quantity is non-conservative, particularly if design exposures are not achieved for reason of unanticipated fuel failure mechanism, etc. The recent DOE Task Force Report assumed a discharge figure of 26 MT per GWe. However, uncertainty of the total installed capacity by the year 2000 is probably a larger factor.

AQ-27

2-6. Table 2.2. Storage Capacity is misleading, it presents available basin storage capacity without compact storage. As indicated in other sections of the DGEIS (specifically Table 3.4 on page 3-9) compact storage is a fact at many reactors and will change the storage capacity listed in Table 2.2 significantly. It is not realistic to assume that only 1.5 cores of storage capacity will be provided for reactors coming on line after 1985. The storage capacity will probably be much larger.

AQ-4

3-1 and 2. (See previous comments on limited alternatives assessed). The remaining spent fuel capacity at each individual facility should be listed and analyzed on a geographic basis. Alternative 1 does not examine the option of even more compacted storage at reactor sites. Testimony presented at

hearings held at the California Energy Commission in March, 1977 (Rubinstein of Nuclear Services Corporation) indicated that at-reactor storage compaction is probably feasible by more dense racking and on double-deck racking so that interim storage of a reactor's 40 year discharge of spent fuel might be feasible in existing AR pools. Volume 2 of the generic environmental impact statement indicates (page D-43) that two-tiered stacking of fuel racks is a possible method at reprocessing plants. While these alternatives present certain problems they do not appear to have been considered by the DGEIS at all for reactor storage pools. Another alternative for more compact storage is a possibility of fuel bundle disassembly and storage of rods in more compact configurations.

AQ-4

3-3. Table 1-1 should also include analysis for listing additional full capacity with compact storage. Such a change together with the use of transshipment could reduce or eliminate any need for AFR storage until after the year 2000.

3-7. Paragraph 3.1.1.1. Double deck racking is also an option for compacted storage.

3-8. The third paragraph indicates that PWR can increase at-reactor storage capacity by a factor of 3 through the use of compact storage. Table 3.4 on page 3-9 however, indicates that one reactor, Three Mile Island Number 1 has achieved a compact storage factor of 4.36.

AQ-28

3-10. The use of boral as a neutron absorber for more compact storage is described. Has boral been subject to long-term

qualification testing under the conditions of open-pool spent fuel storage (high oxygen content)? Where is such a qualification testing documented? Boron carbon is subject to swelling.
AQ-28 Problems of swelling have been experienced at Connecticut Yankee with swelling of the boron carbide walls of the spent fuel storage racks. These difficulties should be examined.

3-13. The characterization of Morris and West Valley
AQ-14.3 as ISFSI's alone is misleading.

3-14. Paragraph 3.1.3.3. The paragraph in the middle of the page points out that "in general, the safe storage of irradiated fuel depends on maintaining the integrity of the
AQ-25 fuel cladding as the primary barrier to the release of radionuclides." This statement emphasizes the necessity to conduct complete and thorough testing of the long-term corrosion resistance of fuel clad materials commented on previously. Additionally, the statement fails to analyze the possibility that no method of dealing with the spent fuel storage problem may
AQ-5 be found which is superior to wet pool storage and therefore ISFSI's could become de facto long-term storage facilities.

3-14 through 24. As previously discussed, dry storage of spent fuel is not a demonstrated technology. There is no
AQ-9 evidence to support the conclusion that the environmental impact from dry storage facilities will be equivalent to or less than those from pool storage facilities.

AQ-10.3 3-27 through 34. This description on transshipment

possibilities is difficult to follow and adds little to the DGEIS. Transshipment could be used a interim solution to spent fuel storage capacity problems and could also be used to resolve full core discharge capability problems that might arise at special plant situations. Further, the analysis fails to consider the possibility of increased storage capacity making transshipment
AQ-10.3 viable and the fact that those reactors which are on line after 1986 will have additional storage capacity. Therefore spent fuel pools for reactors other than those listed in Table 3.5 will be available for transshipment. There is no analysis of the increased transportation risks and other harms associated with transshipment.

3-36. Paragraph 3.33. The three sentence consideration of alternative energy sources and conservation made on page 3.33 hardly seems consistent with the Commission directive in the Federal Register, September 16, 1975 (40 FR 42801) that alternatives to the present system be examined. Further, the references cited in support are somewhat questionable. The staff cites a
AQ-7.2 Ford Foundation study (Ford Foundation, "A Time to Choose America's Energy Future," Energy Policy Project, Ballinger Publishing Co., Cambridge, 1974) as evidence that conservation will not have a material impact on the need for electricity. However, that study estimates that the growth in electrical needs could be cut by more than 50 percent through increased conservation. Further, the Commission's statement that conservation will not be a reasonable alternative contradicts principle number 6 of the National Energy Policy which states that

AQ-7.2 conservation is essential to an energy program in the United States.

The conclusion of the DGEIS that conservation and alternative energy sources are not viable fails to take into account conclusions as these made by other federal government agencies such as the Council on Environmental Quality. The CEQ predicted
AQ-7.3 in a recent study that current energy consumption can be reduced 20 to 40 per cent through conservation and that if conservation measures were taken by the year 2000 solar technology could meet 25% of our energy needs and 50% of our energy needs by the year 2020. Solar Energy: Progress and Promise Council on Environmental Quality, April, 1978.

Chapter 4. Chapter 4 fails to discuss the environmental effects on decommissioning and decontaminating additional nuclear
AQ-6 facilities, dry storage, centralized v. proliferated storage, and the degree of transshipment of spent fuel.

4-1. There is no analysis of the statement that energy
AQ-20 demand will continue to increase at the rate projected.

4-2. Paragraph 4.1.1.2. The health and environmental
AQ-29 aspects of a loss of cooling water accident should be analyzed. (See section 4.2.3.8).

4-3. In the last paragraph of the page, alternative coal utilization technologies are dismissed due to the uncer-
AQ-8 tainties involved with projection into the future. Several technologies such as onsite gasification or liquification appear to show promise and their potential should be seriously analyzed.

4-4 through 27. This section describing severe environmental impacts of coal fired power plants is exceedingly lengthy and out of proportion to the amount of space allocated
AQ-18 to the description of major nuclear plant accidents. It describes the worst of coal and the best of nuclear. If the worst coal accidents are to be described, the catastrophic nuclear accidents should also be considered.

4-26 through 27. The socio - economic analysis is inadequate and lacks a data base. For example, there is no
AQ-30 analysis that socio-economically a community would find an ISFSI to be as acceptable as a power plant.

4-28. The bald statement that the replacement of nuclear
AQ-13 energy with coal will result in higher utility bills lacks substantiation.

Chapter 5. The Safeguards Consideration section is short and should be expanded. For example, no comparison of varying safeguards requirements for such alternative considered has been done. Further, there has been no analysis of whether security hazards are greater at centralized or decentralized nuclear facilities nor is there any analysis of the adequacy of these security requirements.

AQ-12

Physical protection of spent fuel at spent fuel storage sites is implied to be the same as for physical protection at reactor sites. The regulations are not clear but the physical security requirements for reactors (10 CFR 50.34) probably would not be applied to AFR's. In view of the probable remote location of an AFR, consideration should be given to additional security requirements. For example, is it desirable to require a "hardened" facility to insure that off-site assistance response time is adequate? In addition, with the common pooling of fuel from many different licensees, accountability should also be reevaluated.

AQ-12

6-4. The case examples express results in percentage increase in storage capacity and costs. These comparisons are meaningless since they cannot be related directly to the total light water reactor problem. They should be expressed in tons of fuel or a percentage of spent fuel on an annualized GWe basis.

AQ-27

6-5. Paragraphs 6.1.1.6, 6.1.3. The DGEIS has failed to figure in comparative decommissioning and decontamination costs in its analysis.

AQ-6

7-3. The basis for assessing the impact of spent fuel storage only through the year 2000 is not clear.

AQ-31

7-4. Paragraph 7.2.4. This section fails to state anything. The section ignores the potentially vast irresponsible commitment of resources to the nuclear waste problem over thousands of years if a safe alternative is not developed.

AQ-19

7-10. The method of discounting the cost of perpetual AFR storage after 25 years is a questionable accounting technique in view of the large degree of uncertainty on inflation, not to mention possible societal changes in periods that far in the future.

AQ-6

Volume 2-Appendices. Page B-34. If, in fact, (as indicated in the last paragraph) 2 round trips of 177 KM each were made in four hours with a truck shipping cask, conditions must have been so ideal (i.e., nothi t in cask or nonradioactive material) that any generalization based on this example is unrealistic.

AQ-10.4

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June 21, 1978

RECEIVED
JUN 26 1978
U.S. Nuclear Regulatory Commission

Mr. Clifford Smith
Office of Nuclear Materials
  Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: Corrections to Comments on NUREG-0404

Dear Mr. Smith:

The first paragraph on page eleven, dealing with section ES-10, Paragraph 7.0. Of the comments submitted on NUREG-0404 by the States of Illinois, Ohio, New York, and Wisconsin should be corrected to read as follows:

AQ-12 "The analysis fails to adequately deal with consequences of terrorist attacks. The Rand Corporation states that if a terrorist attack would occur it is a prudent estimate that such an attack would consist of seven to ten well armed and trained terrorists. The Office of Technology Assessment in a 1977 report, Nuclear Proliferation Safeguards considered as creditable the use of missles and anti-tank weapons by terrorists. KENNYETAL., in the report of the Ford Foundation, Nuclear Power Issues and Choices (1977) acknowledges the possibility of the use of anti-aircraft weapons and rockets in a terrorist attack.

We apologize for any inconvenience this may cause you.

Very truly yours,

Dean Hansell

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STATE OF NEW YORK
DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
ALBANY, NEW YORK 12233

LANGDON MARSH
FIRST DEPUTY COMMISSIONER

JUN 1 9 1978

RECEIVED
JUN 26 1978
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Mail Section

Mr. Richard W. Starostecki
Chief
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material Safety
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Starostecki:

Enclosed are the comments of the State of New York with respect to the "Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel" (NUREG-0404, March, 1978). In preparing these comments, we have considered the views of all concerned State Agencies.

AR-1 Although this DGEIS is directed toward an interim solution extending only to the year 2000, the status of the studies which are directed toward a final solution should be mentioned. The transfer of wastes from reactor spent fuel storage pools to interim storage facilities and finally to ultimate (geological) disposal areas adds a transportation step to the waste disposal process which increases the possibility of environmental impact. This emphasizes the need for identifying the ultimate disposal areas to allow spent fuel to be shipped from the reactor site directly to the final repository.

We appreciate the opportunity to comment on this draft and we look forward to obtaining your final GEIS.

Sincerely,

Langdon Marsh

Langdon Marsh
First Deputy Commissioner

Enclosure

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Comments of the

State of New York

on the

U. S. Nuclear Regulatory Commission

"DRAFT GENERIC ENVIRONMENTAL IMPACT STATEMENT

ON

HANDLING AND STORAGE

OF

SPENT LIGHT WATER POWER

REACTOR FUEL"

(NUREG-0404, Issued March, 1978)

June 6, 1978

AR-1

1. General Comments - This GEIS should summarize the status of research into final (long-term) repositories.

AR-2

2. General Comment - This environmental impact statement is limited to spent light water power reactor fuel. Spent fuel storage from research, test and training reactors is probably a smaller problem. However, this should be discussed or referenced in NUREG-0404.

AR-3.1

3. General Comment - When reviewing power generating facilities, the major concerns in air pollution control are the pollutants associated with fossil fuel burning facilities. Considering only these pollutants, the utilization of at reactor storage and away from reactor storage will have much less of an impact on the environment than the termination case of replacing nuclear plants with coal plants. However, Congress has mandated under the 1977 Clean Air Act Amendments that EPA review all available relevant information and determine whether or not emissions of radioactive pollutants into the ambient air will cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health. If EPA determines that the above is true, regulations will be promulgated to control such emissions. In light of this determination, this draft GEIS might have to be reevaluated.

4. General Comment - In discussions of the various types of storage facilities, repeated reference is made to accidental contamination cleanup, and normal maintenance contamination. It is stated that low level contaminated materials (spilled pool water, cleanup materials, etc.) will be disposed of off-site in low level disposal facilities. A statement should be made in regard to the anticipated increase in generation of low level wastes created by the transportation and storage of spent reactor fuels. This should include an estimate of the number of additional low level burial sites that will be required to dispose of these wastes and the anticipated environmental impacts of these sites.

AR-4

5. General Comment - Off-site doses for the fuel storage accidents analyzed are stated as being a fraction of the annual radiation background dose. This indicates that elaborate State and local emergency response plans to protect the off-site population is not warranted. This should be discussed and verified in the GEIS.

AR-5.1

6. General Comment - The transportation accident calculations are based on "normal distributions of weather and population densities." This analysis should be expanded to include transportation through highly urbanized areas (New York City metropolitan area, for example) and possible unique transportation problems associated with the Long Island area.

AR-5.2

7. General Comment - The concept of shipping fuel from one place to another seems to be inefficient. Not only are extra personnel required to ship and inspect the waste, additional fuel and equipment, but the probability of a transportation accident increases. A plan which minimizes the movement of the fuel, both from place to place and within the storage facility, is preferable. In particular, AFR storage should be permanent to avoid further shipment.

AR-6.1

Specific Comments

8. P. ES-1 - Executive Summary - Scope - The last paragraph should be more emphatic about "not a final solution." It should be made clear that interim storage does not reduce need for a secure geological formation for the ultimate disposal of high level wastes. Further, if the Federal Government has any other policy for the disposal of spent fuel other than in a secure geological formation, it should be described.

AR-1

9. P. ES-5, Section 3.1 - It is stated that increased at-reactor spent fuel storage involves only aged fuel (at least one year since discharge). It is recognized that the longer the spent fuel is stored at the reactor site, the lower the transportation hazard will be because of decay of radioisotopes such as ruthenium-106. A cost benefit study should be considered in order to establish a recommended storage period on site prior to transportation to the ultimate disposal areas.

AR-6.1

AR-7 10. P. ES-8 - Table ES-3 - It should be stated whether this table includes the health effects from uranium mill tailing piles and from carbon-14 discharges. If so, the population affected and the period of time for the environmental dose commitment should be stated.

AR-8 11. P. ES-10, Section 7.0 - Accidents and Safeguards Considerations - The assertion that those who try to disassemble casks will receive lethal doses of radiation should be qualified. It is difficult to imagine that a terrorist or thief who is sophisticated enough to successfully steal spent fuel would not take the necessa y safety precautions to insure that his/her objectives are met. Furthermore, those foolish enough to use spent fuel in an anti-social act will probably not be dissuaded by the risk of lethal exposure. It is somewhat specious to argue that the risk of such lethal exposure will either minimize the likelihood of theft or reduce the effectiveness of the ultimate plan of such thieves or terrorists.

AR-9 12. P. ES-11, Section 8.1 - The statement was made that AFR storage should be initiated "in a timely fashion." This should be explained.

AR-10 13. P. 3-23, Fig. 3.9 (Caisson Temperature Distribution...) - This shows a plot of temperature variations away from a Charged Caisson. Although specific ambient air temperature and solar insulation factors are shown, there is no indication of the soils minerology (composition), groundwater chemistry, bedding characteristics, moisture contents, relative densities, organic contents, etc., at various depths.

It is true that in a generic statement such as this, no one could expect all of these soil "variables" to be indicated. However, the authors should give some indication that they understand and appreciate the complex and highly variable nature of the soil medium, and recognize the fact that the nature of the soil and groundwater surrounding each Caisson will be one of the critical factors in determining whether or not a successful disposal chamber has been established.

AR-10 It is also readily apparent from this Figure that a "boil zone" will exist for several meters around a Caisson. Within this zone of +212°F. temperature, all soil moisture will be boiled off, and a thermal convection cycle may be set up whereby additional groundwater may be continuously drawn into this zone, boil, pass into the atmosphere as a gas capable of transporting radionuclides, and leave behind any minerals which were held in suspension or solution in the natural groundwater. Thus, over a period of time, a mineralized zone could be created around a Caisson, with a potential for possible accelerated corrosion of the Caisson. I believe this factor needs further discussion in the GEIS.

AR-11.1 14. P. 4-2, Section 4.1.1.3 - Dry Storage - The following statement is made: "While a potential for leaching of radioactive materials from these facilities exists, the integrity of the containers, coupled with the sorbtive capacity of most soils for waste containments, provides assurance that groundwater supplies will not be impacted. Thus the facility does not appear to have any ecological impact on the surface or groundwater environment."

AR-11.1 Such a statement can be made only after the individual soil and groundwater regimes of each potential site are assessed and found to be so.

15. P. 4-3, Section 4.1.1.3 - Dry Storage - The statement is made, in reference to the existing Idaho National Engineering Laboratory (INEL) dry storage facility, "Thus the facility does not appear to have any ecological impact on the surface or groundwater environment." This statement should be supported by environmental monitor data. AR-11.2

16. P. 4-5, Section 4.1.2.2.2 - Operational Impacts - The reference used to compare radiological impacts for nuclear and coal generation (Martin et al) compared a hypothetical 1000 MWe coal plant with two existing 462 MWe and 200 MWe nuclear plants. This seems to be a case of comparing apples and oranges because of the size difference of the plants. In addition, reference should be made to the variability of radioactivity between various coal fields. AR-3.2

17. P. 4-5, Section 4.1.2.2.2 - Operational Impacts - More discussion of the effects of CO_2 production should be given than saying it is "beyond the scope of this impact statement." The 1977 National Academy of Sciences report Energy and Climate can be used as a reference. AR-3.3

18. P. 4-7, Section 4.1.2.2.2 - Operational Impacts - The effects of burning of coal on crops, real estate, fish and animals should be discussed further and compared to nuclear.

19. P. 4-15, Table 4.4 - Radioactivity Present in Spent Fuel - It would be helpful if the external dose rate for typical spent fuel could also be given with time. It might be given for both shielded and unshielded conditions such as for a typical shipping cask. AR-5.3

20. P. 4-15, Section 4.2.2.1 - Composition of Spent Fuel - There should be a discussion of the reduction of potentially volatile nuclides such as cesium-134 and ruthenium-106 by extended storage at the reactor. Any effect on the transportation accident where fire might be involved should be addressed. AR-5.4

21. P. 4-22, Section 4.2.3.8 - Loss of Cooling - Additional information should be presented to emphasize that fuel failure will not occur for one year old fuel if cooling water were to be lost. The relationship between temperature, integrity of fuel cladding as a function of decay time for the air convection cooling mode should be given in an Appendix. AR-5.5

22. P. 4-27, 28, Section 4.3.2.1 - Employment - The statement "...however, this rise in (coal-fired plant) employment is relatively small," does not correspond with the previous statements in this section - i.e. "The electric power industry is one of the nation's largest employers---A 1000 MWe coal-fired plant requires a labor force of about 600 persons compared with 130 persons for an equivalent nuclear plant." A 4.6/1 ratio of employment for coal/nuclear does not seem "relatively small" if the "electric power industry is one of the nation's largest employers." Total employment comparisons should be given. AR-12

Volume II - Mining

23. P. A-5 - It is stated that the United States will, within a few years, be reliant on imports of uranium. There is not enough U. S. uranium to fuel the plants which are presently scheduled, let alone

AR-13 those which are to be planned. This is one reality of nuclear power which must be considered when comparing coal with nuclear energy, since reliance on imports could eventually place us in a vulnerable position similar to that of the Arab oil embargo.

24. P. C-13, Appendix C, Section 5.2.5 - Intermittent Control Systems - The statement should be made that EPA does not consider Intermittent Control Systems a viable alternative for controlling emissions.

25. P. C-16, Appendix C, Section 6.2 - Sulfur Emissions - The assumption

AR-3.4 that coal fired power plants which emit SO_2 below 1.2 lb/million BTU will not be required to install SO_2 scrubbers is likely incorrect. The proposed New Source Performance Standards will require some degree of scrubbing for emissions of SO_2 greater than 0.2 lb/million BTU.

26. P. E-32, Appendix - Table E-6 - Cask-Days Required for Spent Fuel Transshipment - There is apparently a minor typographical error.

AR-6.2 The 63 on/offsite transshipments in 1978 appears to be inconsistent with the balance of the table.

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EDMUND G. BROWN JR.
GOVERNOR

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

June 19, 1978

Attention: Director
Division of Fuel Cycle & Material Safety

Comments on NUREG-0404, Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel

I appreciate the opportunity to comment on the NRC's Generic EIS on the handling and storage of spent light water power reactor fuel. The lack of a comprehensive nuclear waste management system continues to be one of the main roadblocks to public acceptance of nuclear power. Providing adequate interim spent fuel storage is a critical element of that comprehensive system. The NRC, however, has taken a very narrow and simplified approach to the interim storage problem. The relationship between the

AS-1 accumulation of spent fuel and the need for interim storage is not a direct one. The amount of interim storage required cannot be projected without examing how interim storage fits into the larger waste management scheme. A complete understanding of the interim storage problem is impossible without including a discussion of the details of the DOE's spent fuel offer, ances in the required cooling period for spent fuel, the

AS-2 operational and design constraints of a geologic repository, the problems of transporting spent fuel, and potential conflicts with other radioactive waste activities.

As you are aware, current California law does not allow the siting of nuclear power plants in the State until the California Energy Commission makes a finding confirming the existence of an adequate waste management

AS-3 system. The spent fuel offer is the first step toward achieving this goal. It is therefore unfortunate that the NRC did not address the interim storage problem in relation to the DOE spent fuel offer.

The NRC staff was directed to "analyze alternatives for the handling and storage of spent ght water power reactor fuel with particular emphasis on developing long ge policy." The DOE spent fuel offer assumes shipment of spent fuel to interim away-from-reactor (AFR) storage facilities and

AS-4 ultimately retrievable storage in a geologic facility suitable for permanent waste disposal. Yet, the NRC disclaims the existence of a national

AS-4 policy on the final disposition of spent fuel.

The problems of interim storage and permanent disposal cannot be easily separated. The type, amount, and location of interim storage required over time are sensitive not only to the number of nuclear plants in
AS-1 operation, but also to the implementation of the spent fuel offer as well. For example, the DOE spent fuel offer extends to foreign countries for the purpose of meeting nonproliferation goals. The NRC EIS, however, does not include any projections of the amount of spent fuel from foreign countries delivered to the U.S..

The DOE spent fuel offer requires that fuel be cooled for a minimum of five years prior to disposal in a geologic repository, although there is a great deal of scientific uncertainty about the thermal loading characteristics of geologic formations selected for disposal. Since spent fuel
AS-2 has a high (and long-lived) heat content, assumptions about the allowable heat loads that the repository can tolerate, become very important in determining the loading rate, the age of the spent fuel, and therefore the amount of interim storage needed.

The NRC report NUREG-0116 Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle assumes that spent fuel would be retained for 10 years in water basins before packaging and final disposal in bedded salt. Sweden has already adopted a policy requiring a 10-year cooling period prior to reprocessing or storage. Given the uncer-
AS-5 tainty associated with long-term storage of wastes in geologic formations and the time needed for cooling spent fuel prior to disposal, it would appear that compact storage at the reactor and transshipment are both short-term measures and that the NRC EIS therefore understates both the timing and amount of interim AFR storage required to handle spent fuel.

The timing and amount of interim AFR storage also depends on the transportation requirements for the spent fuel and the eventual location and start-up date of the geologic repository. Transportation can be equally as limiting a factor as inadequate interim storage. The current commercial cask inventory can transport only about one-third of the spent fuel from reactors. Spent fuel from commercial reactors must compete with high-level defense wastes for available casks and licensed railcars to carry
AS-5 wastes.

The NRC EIS does not mention that there might be potential conflicts with other waste disposal activities, nor does it mention whether or not compact storage will allow a sufficient cask inventory to build up in time to meet the anticipated demand for either transshipment or movement to an AFR storage facility.

The DOE has recommended in its draft report DOE/ER-0004/D Report of Task Force for Review of Nuclear Waste Management that AFR storage and potential geologic repositories be located near each other to minimize the need for transporation. The DOE report also recommended that additional AFR be set
AS-3 aside once the geologic repository is in operation in case problems develop. The NRC EIS contains no discussion of the best location for AFR storage, or

AS-3 the possibility that contingency AFR storage may be required once a geologic repository is in operation.

The NRC EIS states that, assuming a geologic repository for high-level nuclear wastes and possible disposal of spent fuel is operational by 1985, the amount of spent fuel requiring AFR storage will not be great. A delay in the start-up date for a geologic repository, however, will increase the
AS-5 need for AFR storage. According to the DOE report, the 1985 start-up date for a geologic repository is unrealistic; it estimates that it will take at least until 1988 to put one in operation, and possibly l[illegible]er. DOE calculates that the AFR storage requirement will d[illegible]ble f[illegible]r [illegible]-year delay and triple for a 5-year delay.

In general, the NRC EIS offers no comparison of the relative economic, environmental, or safety features of the various interim storage alterna-
AS-7 tives, nor does it discuss which alternatives provide the greatest flexibility for future options and technical development. The NRC's comparison of the advantages of continued nuclear power generation versus coal-fired power generation is meaningless for this purpose. The termination of nuclear power generation because of a back-up of spent fuel becomes a real alternative only if the other alternatives discussed in the EIS are not pursued in a "timely fashion. The NRC EIS however, fails to identify when critical decisions need to be made and [illegible] taken for supplying
AS-5 interim storage.

The NRC EIS lacks a realistic perspective on the interim storage problem. The issue is not one of choosing nuclear over coal power generation or of increased at-reactor storage as opposed to AFR storage. The issue is whether or not a combination of compact storage and transshipment will provide enough time to allow sufficient AFR storage to be built. This question remains to be answered.

Sincerely,

Deni Greene

Deni Greene
Acting Director

DG/RG/jm

POOR ORIGINAL

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GOVERNOR OF
CALIFORNIA

Air Resources Board
California Coastal Commission
California Conservation Corps
Colorado River Board
Energy Resources Conservation and Development Commission
Regional Water Quality Control Boards
San Francisco Bay Conservation and Development Commission
Solid Waste Management Board
State Coastal Conservancy
State Lands Commission
State Reclamation Board
State Water Resources Control Board

THE RESOURCES AGENCY OF CALIFORNIA
SACRAMENTO, CALIFORNIA

1978 JUN 19

RECEIVED JUN 26 1978 U. S. Nuclear Regulatory Commission Mail Section

Mr. Richard Starostecki
Office of Nuclear Material
Safety and Safeguards
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Starostecki:

The State of California has reviewed your "Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel", submitted to the Office of Planning and Research in the Governor's Office.

This review fulfills the requirements of Part II of U. S. Office of Management and Budget Circular A-95 and the National Environmental Policy Act of 1969. It has been coordinated with the Departments of Conservation, Fish and Game, Parks and Recreation, Water Resources, Food and Agriculture, Health, and Transportation; the Air Resources, Solid Waste Management, and State Water Resources Control Boards; and the Coastal, Energy, and Public Utilities Commissions.

The State has received comments from the Energy Resources Conservation and Development Commission, the Department of Parks and Recreation, and the Department of Conservation. These comments are attached and constitute the State's official response regarding this draft EIS.

Thank you for the opportunity to review this document.

Sincerely,

L. FRANK GOODSON
Assistant Secretary for Resources

Attachments

cc: Director of Management Services
Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814
(SCH No. 78041783)

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POOR ORIGINAL

State of California

The Resources Agency

Memorandum

To : L. Frank Goodson
Projects Coordinator
The Resources Agency

Richard Starostecki
Nuclear Regulatory Commission
Washington, D. C. 20555

Date: May 10, 1978

From : **Department of Conservation**
Division of Mines and Geology
1416 - 9th Street, Sacramento 95814

Subject: SCH78041783 Draft Generic Environmental Impact statement--Handling and Storage of Spent Light Water Power Reactor Fuel

AT-1 The Division of Miner and Geology has reviewed the subject document and finds that it is not ce specific in nature and covers mainly the general mechanical handling facilities, including racks and containers, for transport and storage of spent fuel. It does not present any details of geologic/seismologic hazards or considerations for their mitigation, but rather states that facilities are designed to seismic Category I or II, as appropriate, and refers the reader to NRC Regulatory Guides and other documents, listed in Appendix Table D. 1 (P.D.-4, D-5), for specifics. Division seismologist Lalliana Mualchin has examined both volumes and finds no consideration of seismology presented.

Because this document lacks necessary information and refers only to separate, unavailable documents said to contain such information, the Division finds the discussion of geologic and seismological hazards inadequate for an Environmental Impact statement.

C. Forrest Bacon
Assistant District Geologist

APPROVE:

Thomas E. Gay, Jr., Chief Deputy State Geologist
for James F. Davis, State Geologist

CFB:JFD:TEG:vlf

APPROVED:

DATE:

964015

State of California | The Resources Agency of California

Memorandum

Date : MAY 1[illegible]

To : Honorable Huey D. Johnson
Secretary for R[illegible]ources
Resources Agency

Attention Mr. L. Frank Goodson

From : Department of Parks and Recreation

Subject: Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel, SCH78041783

The Office of Historic Preservation has reviewed the Draft GEIS submitted for the undertaking referenced above.

AT-2

In compliance with 36 CFR [illegible]00 and Section 106 of the National Historic Preservation Act of 1966, properties possessing historical, archeological, architectural, or other cultural values within the project's area of potential environmental impact (including the areas used for waste disposal), must be identified for possible inclusion in the National Register of Historic Places. Structures scheduled for demolition, sale, or alteration must be assessed for their architectural, historical or engineering significance.

We look forward to receiving copies of the Cultural Resource Identification and Assessment Reports compiled by qualified professionals of appropriate disciplines.

If we can be of assistance, please feel free to contact Nicholas Del Cioppo at (916) 322-8703.

Knox Mellon

Dr. Knox Mellon
State Historic Preservation Officer
Office of Historic Preservation

James P. Tryner

James P. Tryner, Chief
Resource Preservation and Interpretation Division

P-7215A

State of California | The Resources Agency of California

Memorandum

To : Frank Goodson
Project Coordinator
Resources Agency

Richard Starostecki
Nuclear Regulatory Commission
Washington, D.C. 20555

Date : May 12, 1978

From : Energy Resources Conservation and Development Commission - Richard L. Maullin
1111 Howe Avenue
Sacramento, 95825

Subject: DRAFT GENERIC EIS ON HANDLING AND STORAGE OF SPENT LIGHT WATER POWER REACTOR FUEL (NRC-NUREG-0404)

Introduction: The Nuclear Regulatory Commission's Office of Nuclear Material Safety and Safeguards examines in this report the possible shortage of storage space for spent nuclear fuel and alternative solutions to the problem. The three alternatives given were increased storage, transshipment and termination of nuclear generation. These alternative storage scenarios are interim solutions. Also presented is a cost-benefit analysis of the alternative solutions. The analysis essentially discusses three areas of concern: 1) environmental impacts, 2) safeguards, and 3) economics.

After evaluation of the alternative solutions with the cost-benefit analysis, the report makes the following conclusions:

1. The lack of sufficient spent fuel storage capacity at nuclear power plants has been alleviated by ongoing and planned modifications of at-reactor spent fuel storage pools.
2. Licensing reviews of these applications have shown that the modifications are technically and economically feasible and justified.
3. The timing and magnitude of the away from reactor spent fuel storage requirements are as follows:

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Year	Metric Tons of Heavy Metal (MTHM)
1980	190
1985	1,900
1990	5,800
1995	17,000
2000	41,000

4. The storage of light water reactor spent fuels in water pools has an insignificant impact on the environment, whether at reactor or away from reactor sites.

5. Although relatively small and manageable, assuming the power reactor industry continues to increase at-reactor spent fuel storage capacity, there is a continuing need for away-from-reactor spent fuel storage through the mid-1980's.

6. There is a recognized need for a more definitive regulatory basis for the licensing of future "storage only" facilities.

7. Curtailment of the generation of spent fuel by ceasing the operation of existing nuclear power plants when their spent fuel pools become filled is found to be undesirable, and the prohibition of construction of new nuclear plants is not necessary.

8. No modification of 10 CFR 51.20(e) (the summary of environmental considerations for the uranium fuel cycle) appears necessary for spent fuel storage considerations.

General Comments

This draft EIS obscures the viable alternative solutions to the spent nuclear fuel problem with poor organization, flaws in methodology and insufficient analysis of key environmental and safety issues. The following comments should be considered and responded to in the final generic EIS.

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May 12, 1978
Page 3

A. ALTERNATIVES

1. Choice of Alternative Scenarios. The scenarios chosen for evaluation do not reflect the range of realistically available options for managing spent fuel. The three alternatives presented are increased storage, transshipment, and termination. The termination alternative is inappropriate for this statement. The transshipment alternative does present a bounding case for spent fuel management methods; but no environmental, health, or safety impact analysis is performed for this case. The increased storage alternative as described obscures the choices that must be made concerning storage technologies: dispersed vs. centralized, wet storage vs. dry, and so on. Thus, the alternatives chosen do not clarify the issues in a useful way. We have commented generally on each of the alternatives, followed by an outline of a more appropriate choice of alternatives to be analyzed.

2. Comments on Alternatives as Presented.

a. It is clear that the most common choice for utilities in managing spent fuel has been the expansion of storage capacity at the reactor site. Alternative 1 as presented includes this among the options it examines, but no comparative environmental analysis is made of the various storage technologies assumed under this alternative. At-reactor compact storage, away-from-reactor storage pools, current government facilities, and a design-stage SURFF technology are all treated together. Detailed analysis is confined to current reactor site and AFR technologies; 14 pages are devoted to description of pool storage health and safety effects but no space is given to dry storage. Environmental impacts of dry vs. wet storage are dismissed with a one paragraph description of the INEL facility which concludes that "...the facility does not appear to have any ecological impact on the surface or groundwater environment" (p. 4-3).

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b. Although transshipment is identified as an alternative for analysis, "environmental impacts and financial factors of this alternative were not examined" (p. 3-31). The "safety analysis" (Section 3.2.1.3) consists of a two-sentence dismissal of any safety problems in spite of the greatly increased transportation and handling requirements associated with this alternative. The reason given is that transshipment is "only a means for postponing the spent fuel storage problem." This is not convincing since all spent fuel storage technologies short of final disposal are interim solutions. Therefore, transshipment should not be ignored. Instead the analysis should focus on two questions: (1) how long will transshipment allow storage expansion to be postponed? (2) what are the relative impacts of transshipment vs. increased on-site storage?

c. The "termination case" is seriously flawed in concept and the purported choice -- coal vs. nuclear -- is not supported. An analysis of the large question of nuclear vs. other electricity-generating technologies appears to be seriously out of place in this impact statement.

Replacement of nuclear plants with coal plants is not a spent fuel management alternative; it is an electricity supply alternative.

The specific choice of coal as the only available alternative is also deficient. Other alternatives do exist -- stringent conservation, oil, replacement of electricity at the point of use, or even new nuclear plants. The latter option points out the flaw in methodology: if it is assumed that utilities could choose to build all-new generating capacity instead of new pool storage, there is no obvious reason not to build a new nuclear plant with a larger pool. A more credible alternative would be the construction of new storage facilities at the existing reactor, similar to Stone and Webster's design which has been submitted to NRC as a topical report (SWECO-7601).

The EIS should also discuss conservation techniques (such as Building Standards) and other viable electric generating technologies that could lessen the storage problem. These conservation techniques could reduce the need for

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additional "new" capacity, as existing nuclear baseload capacity would subsequently not be needed to the degree discussed in the DEIS.

3. Recommended Choice of Alternatives. A more useful selection of scenarios for evaluation would focus on three key questions: dispersed vs. centralized storage; maximum vs. minimum transshipment of spent fuel; choice of technology for storage. The alternatives proposed below would allow comparison of environmental impacts for a broad range of answers to these questions.

Alternative 1 -- Centralized Storage, Minimized On-Site Storage Expansion. This scenario assumes that centralized AFR storage facilities (perhaps government-operated) are made available by a specified target year, e.g. 1985. Pending AFR availability, spent fuel is transshipped between existing pools to the extent necessary to minimize the need for expanded reactor-site storage capacity.

Alternative 2 -- Centralized Storage, Minimized Transshipment. This alternative is similar to alternative 1 except that reactor-site storage capacity is expanded to the extent necessary to minimize or eliminate the need for shipment of spent fuel between reactors.

Both Alternative 1 and Alternative 2 should include comparative evaluations of different types of AFR storage, specifically of pool storage vs. the various proposed dry-storage techniques.

Alternative 3 -- Dispersed Storage, Minimized Transshipment. This scenario envisions maximum expansion of reactor-site storage pools. Comparative analyses would be made for different methods of on-site expansion: re-racking in existing pools, expansion of existing pools, construction of new pools on-site. Transportation of spent fuel would be limited, and would only be used to maintain full core reserve or reload capability while storage expansion takes place.

Alternative 4 -- Dispersed Storage, Minimized Expansion of Existing On-Site Storage Capacity. This alternative is similar to the transshipment case presented in the draft statement, though more realistic assumptions should be made for storage capacities at new reactors. Environmental and other impacts of the increase in transportation should be evaluated; loss of full core reserve and reload capability over time should be estimated.

B. SAFEGUARDS CONSIDERATIONS

The "Safeguards Considerations" chapter (Chapter 5.0) fails to provide any analysis of the safeguards threat to on- or off-site spent fuel storage facilities. All that is presented is a brief summary of certain provisions of 10 CFR Part 73. There is no comparative analysis of the relative vulnerability of at-reactor or AFR storage, no discussion of environmental consequences of sabotage attempts, and no economic analysis of the impact of physical protection measures on storage costs.

In fact, there is little if any attempt to give any analysis in terms of environmental impact with respect to safeguards considerations. Although many safeguards considerations are in terms of non-quantifiable, i.e., civil liberties and anticipated or perceived threats, addressing these problem areas is still warranted given the potential magnitude of the hazards compared to alternatives such as coal and solar.

The Safeguards Chapter, only three pages long, clearly does not fulfill the role of an environmental impact analysis. It should therefore be expanded to include a discussion of the above issues.

C. ANALYSIS OF ECONOMICS NEEDED

1. Implementation costs of viable conservation techniques sufficient to reduce rate of energy consumption equal to the energy generated by the waste fuel to be stored in facilities over and above existing capacity should be described.

2. Estimate what the cost to the utilities would be to store spent fuel under each alternative (per unit of waste or mills/Kwh). This data is essential in determining the impacts on rate payers,

an area the DEIS failed to analyze.

D. SCOPE AND INTENT OF THE STATEMENT

Section 1 of the summary states that the staff was directed to examine alternatives for spent fuel management "...with particular emphasis on developing long range policy." This purpose appears to have been lost in the draft statement. By casting the issue as "spent fuel management vs. nuclear shutdown," long range policy choices among storage alternatives are obscured.

The draft statement also appears to be directed at proving that AFR storage will be needed. From the figures presented in Table 3.1 and in the "Transshipment" section, it appears that compact storage at reactors combined with transshipment could reduce or eliminate the need for large storage-only facilities. This is not meant to suggest that such a policy is the preferred one; however, to illustrate accurately the bounding cases for spent fuel management some such alternative should be analyzed. Instead, every scenario chosen requires that large amounts of AFR capacity be made available in the mid-1980's and beyond.

SPECIFIC COMMENTS

Page	Comments
ES-1	Although extension of the time period to 2000 is reasonable, it leads directly to the staff's dismissal of the transshipment option as "...only a means for postponing the spent fuel storage problem..." (p. 3-34). This is not consistent with the recognition of spent fuel storage as "...an interim action, not a final solution."
ES-3	As the projected generation of spent fuel is highly influenced by the assumption that 414 GWE of nuclear power will be

Page	Comments
	constructed by the year 2000, the EIS should update and justify the estimates in Table ES-1. For example, does the projection take into account the present status of the proposed Sundesert and Stanislaus nuclear plants in California.
ES-4	The statement that maintenance of a full core reserve is not a safety matter should be supported. Has a detailed analysis been performed to verify this position?
	That "many" power plant operators find maintenance of a full core reserve desirable is understating the case. Has any reactor owner indicated that he is willing to forego FCR?
	It should be made clear that Table ES-2 assumes no transshipment of fuel.
ES-5	The conclusion that expansion of at-reactor storage capacity "...can be taken without significant effect on health and safety... appears to prejudge the outcome of the NRC's consideration of pending licensing proceedings on this subject.
	Although the Barnwell plant storage capacity is now limited to 350 metric tons (not 400 as stated), recent testimony before Congress by AGNS officials indicated that this could be extended to 2000-3000 metric tons if necessary.
	Given the termination of the Exxon licensing proceeding, it is misleading to present the storage pool at the proposed Exxon reprocessing plant as a potential storage facility.

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Page	Comments
ES-6	Since the NFS or GE Morris facilities were not designed as independent spent fuel storage installations, they should not be used as examples of the successful operation of ISFSI's. Handling techniques, surrounding structures, personnel training and availability may all be different for facilities designed solely for spent fuel storage.
	If AFR storage becomes available in the mid- to late 1980's, as projected by DOE, then the fact that "...transshipment provides some relief for about the first decade" is significant. By rejecting transshipment because it is "only a short-term solution," this summary of the transshipment case conflicts with the original statement that spent fuel storage is an interim solution.
ES-7	Physical security measures are already in place at a reactor site, but a new security system would be needed at an AFR storage facility. Therefore, construction of independent facilities would have a greater impact on the need for guards, equipment, etc., than would on-site expansion.
	Reduction of the comparative analysis of spent fuel management options to a coal vs. nuclear comparison follows only because of the alternatives that have been chosen for analysis in this statement. As pointed out previously, the statement should be rewritten to provide guidance in choosing among the management alternatives.
ES-8	Table ES-3 is misleading, since the figures given for excess mortality due to nuclear generation are given with more precision than is warranted. A credible range of figures should be presented as is done for coal.
ES-9	The paragraph beginning "A replacement of nuclear generating capacity..." is logically flawed. It is true that coal plants can also generate electricity, but this does not lead to the conclusion that "...the only real option...is to continue generating electricity." Furthermore, this conclusion is beyond the proper scope of this document.

Page	Comments
	The statement that the incremental environmental impact of increased transportation is insignificant is not supported by analysis in the summary or in the text of the report.
ES-10	The sentence beginning "Away-from-reactor spent fuel storage..." does not seem to have any point. What distinction could be made between AFR storage facilities and "storage only" type facilities?
	In the introduction to the findings the statement is made that on-site and AFR storage have essentially equal environmental impacts, but that "[t]his conclusion is based on existing water pool storage technology." Dry storage is expected to have equivalent low impact "[b]ecause of the physical characteristics of aged spent fuel...." This qualification is not made clear in the full document, where judgements of dry storage environmental impacts appear to be based on an uncritical acceptance of the designers' goals and not on the age of the spent fuel.
ES-11	The meaning of the statement "the situation is manageable for some time beyond [the mid-1980's]..." is unclear. At what point would the situation become unmanageable? How long is "some time"? When must planning for AFR storage begin in order to be "timely"?
ES-12	The finding that "Even under these circumstances, <u>only</u> six storage pools of the size of the projected Exxon facility (7000 MT) would be required by the year 2000" (emphasis added) seems to downplay the significance of such a shortage in storage capacity. In light of the suspension of hearings on the GE Morris expansion, the termination of the Exxon license proceeding, and the uncertainties surrounding the government spent fuel policy, the possible 41,000 MT shortfall by 2000 could become very serious.
	Finding number 4 fails to mention the possible effects of long-term corrosion on zircaloy-clad fuel. A recent study for DOE, "Behavior of Spent Nuclear Fuel in Water Pool Storage" (BNWL-2256) recommended that detailed examinations of fuel bundles

Page	Comments
	stored for long periods be conducted, especially if storage under water is expected to last longer than 20 years. This report identified several factors needing further study, including: behavior of defective fuel in pool storage, effects of changes in pool temperature and water chemistry on fuel condition, hydriding of zircaloy due to galvanic coupling, fission product attack on the inner wall of the cladding, and the incidence and consequences of corrosion due to residual stress, crud layer build-up, and crevice corrosion.
ES-13	The finding that dry storage techniques will be feasible and environmentally acceptable is not supported by detailed analysis or by demonstration of any of these techniques.
	Characterizing GE Morris and the NFS plant as "storage only" facilities is misleading since they were not designed for this purpose. This emphasizes the urgent need for release of 10 CFR 72 and supporting regulatory guides.
	Finding number 7, based on the "termination alternative," includes the statement that "...the prohibition of construction of new nuclear plants is not necessary." This does not follow from the termination case analysis, which is based on the replacement of <u>existing</u> plants with coal-fired plants. The phrase should be deleted.
	Finding number 8 should acknowledge that the adequacy of the S-3 table is currently being questioned and that changes in 10 CFR 51 may be required.

Comments
NUREG-0404, Chapters 1 and 2

Page	Comments
1-2 to 1-3	Because of the brevity of the discussion of spent fuel permanent disposal in GESMO, an analysis of such an option would be useful.
	Has any reactor operator proposed to operate for any length of time without FCR? Is the "no-FCR" case a realistic one?
	The figure of 63,000 MTHM AR storage seem incompatible with the projected requirements for 41,000 MT of AFR storage given in Table 1.1. That this is due to lack of transshipment should be stated clearly in the table.
1-3	The alternatives presented do not really address the issues. See general comments on choice of alternatives.
	Table 1.1 is poorly defined. It should say more clearly why the additional AFR capacity is required and should present the potential impact of transshipment. The case requiring additional capacity in 1976 should be amplified -- what actually happened? It should also be made clear whether or not the additional AFR storage needs are in addition to current capacity, and if so what storage is considered to be currently available.
2-4	The estimate of 22.4 MT/GWe for spent fuel discharged per year is lower than most other published estimates and conflicts with the 30 MT/GWe figure given on page 2-3. The recent waste management task force report used an estimate of 25.4 MT/GWe. Since a low estimate is a non-conservative assumption, this number should be more adequately justified.
2-5	The executive summary states that an inventory of 41,000 MT of spent fuel might require storage in the year 2000 -- "only" six times the capacity of the projected Exxon facility. On page 2-5 the statement is made that increasing the projected nuclear capacity "does not alter the conclusions of this study."

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Page	Comments
	Since the reference case would require approximately forty times the current AFR capability, and the GESMO "Low Growth" case would increase this by about another 40%, the question becomes "how large a storage requirement would be regarded as significant"?
2-6	The assumption that reactors coming on line from 1986-2000 will provide only 1.5 cores of storage capacity is clearly unwarranted. Most operators plan to build capacity sufficient for ten years or more. Even for existing reactors, the NRC staff estimates that compact storage can provide approximately 2.5 x 1.5 cores = 3.75 cores' worth of capacity. It is unclear, then, why new reactors would be built with so limited a capacity.
	It is recognized that this is intended as a conservative assumption; however, it drastically inflates the requirement for AFR storage. If it is assumed instead that post-1985 reactors will provide sufficient storage for ten years' discharge (still a conservative assumption), the year 2000 AFR requirement reduces from 41,000 MT to less than 11,000 MT.

Comments
NUREG-0404, Chapter 3

Page	Comments
3-3	A useful addition to Table 3.1 would be a column listing available pool capacity *with* compact storage. If the estimated 2.5 expansion factor is applied to the non-compact capacity figures presented, it appears that storage capacity exceeds discharge plus full core reserve in every year from 1976 to 2000. This seems to imply that allowing transshipment between reactor pools could limit the requirement for AFR storage to zero. (See comment referring to pp. 3-27 to 3-34.)
3-7 to 3-13	To set an upper limit on the potential for reactor-site storage, the highest possible expansion capability should be assessed. For example, Table 3.4 indicates that several reactors have exceeded the 2.5 expansion factor estimated for Alternative 1. If this is commonly achievable and if reactors are built with greater initial storage capacities, the requirement for AFR storage can be drastically reduced.
3-13	The statement, "Presently, there are several fuel storage pools functioning as ISFSI's, though their original purpose may have been different" is misleading. There are *two* facilities currently serving as ISFSI's -- GE Morris and NFS -- and *neither* was intended to serve as a storage-only facility.
3-14 to 3-24	The discussion of dry storage facilities is misleading in that it presents a large amount of detail on technologies which are today only in the conceptual design stage, but fails to justify the conclusion that environmental impacts from such facilities will be equivalent to or less than those from pool storage facilities.
3-27 to 3-34	The description of the transshipment alternative is confusingly presented, making it difficult to judge the validity of the assumptions, the analysis, or the conclusions.
	The assumptions appear to involve two major flaws:

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Page	Comments
	1. Because it is assumed that the capacity of spent fuel pools would be the same as they were in January 1976 (over two years ago), no allowance is made for increased storage. Even those reactors which have already increased storage capacity are disregarded. As pointed out in the comment referring to p. 3-3, applying the 2.5 expansion factor to the storage capacity given in Table 3.1 implies that storage capacity can exceed requirements in each year from 1976 to 2000. Even with no transfers between PWRs and BWRs, this combination of compact storage and transshipment would lower the requirement for AFR storage.
	2. No allowance is made for storage capacity at any reactors coming on line after 1986. If the GESMO "super low" growth projection is used (as it is elsewhere in the statement), spent fuel pools for several reactors other than those listed in Table 3.5 will become available for transshipment.
3-34	The conclusion that "...it seems unlikely that new reactors would be put into service..." if storage pools at old reactors fill up does not follow. The interim storage problem could be solved for new reactors by building large capacity pools from the outset. Thus, given the scenario presented here, replacement of old nuclear capacity with new nuclear capacity (with larger storage capacity) would be a feasible option. This points out the flaw in the reasoning behind the choice of this alternative -- in essence, an entire nuclear plant would be built for the sake of its associated storage pool. See general comments on choice of alternatives and on alternatives as presented.
3-36	The references cited do not support the conclusion that "[c]onservation is not expected to materially affect the projected need for electricity." Reference 14 projects that fuel requirements for central station electricity generation could be cut to less than half the "historical growth" scenario by increased conservation. This directly contradicts the NRC staff's interpretation

Page	Comments
	of that study. (A Time to Choose: America's Energy Future, Ford Foundation Energy Policy Project, pp. 28-29, 76.)

CHAPTER 4: ENVIRONMENTAL IMPACTS

Environmental effects of having to de-commission and de-contaminate the nuclear facilities after termination should be discussed.

- o The ecological section is incomplete in that it fails to adequately discuss the environmental impacts of: dry vs. wet storage, dispersed vs. centralized storage, and maximum vs. minimum transshipment of spent fuel. In addition to assessing these issues the document should discuss the following specific impacts.

  4.1.1.1 Compact storage increases the extent of potential environmental impacts by increasing the amount of radioactive material at the storage facility. Specifically, the report should discuss the change in magnitude of impacts from additional waste heat and accidental or abnormal events.

  4.1.1.2 Wet Storage Facilities. Discuss the ecological and health impacts from accidental loss of cooling water (Section 4.2.3.8).

  4.1.1.3 Dry Storage. Identify, quantify and discuss the impacts from "above normal temperatures in soils immediately surrounding the storage area."

- o Explain the area and impacts that may become sterile and the probability of it occurring.

- o Since a potential for leaching does exist, the EIS should discuss the probable impacts on the environment. If leaching of radioactive materials from a dry storage facility does occur scenarios should be constructed that describe the various degrees of impacts from leaching, including surface and ground water contamination. References that present more in-depth information on potential ecological impacts should also be included.

Richard Starostecki
May 12, 1978
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Section 4.2.3.2 Low Probability Missile Accident

It is assumed that the missile enters the pool at an optimum angle of 45 degrees, a 45-foot row of fuel is attacked, resulting in a conservative release of radionuclides.

However, there may be more KR^{85} for dispersal if the "worst case" is used. What are the effects on the fuel rods; are they knocked over? Is their integrity diminished? Are the racks sufficiently rigid to withstand such an impact? (Although the racks may be designed to withstand a fuel rod drop, has it been designed for a 144 mile per hour missile?)

Secondly, because of the initiating event (tornado), ambient air or meteorological conditions will be far from normal, which might agitate the "ORIGEN Code" calculations." Under tornado conditions and with a 13½" hole in the side of the fuel pool, a situation may exist (and should be discussed) where radionuclides are readily dispersable into the atmosphere and release of the cooling and moderating medium may leave faster than the auxiliary pumps can handle.

RICHARD L. MAULLIN
Chairman

RLM:JT:rc

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 22 1978

OFFICE OF THE ADMINISTRATOR

RECEIVED JUN 15 1978

Mr. Richard W. Starostecki, Chief
Fuel Reprocessing & Recycle Branch
Division of Fuel Cycle and Material Safety
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Starostecki:

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Reactor Fuel (NUREG-0404) issued on March 17, 1978 by the Nuclear Regulatory Commission. Our detailed comments are enclosed.

AU-1 EPA believes the draft EIS does not consider all of the alternatives that could contribute to the phasing out of nuclear power. The basic assumption is made that coal-fired plants are the only replacement for nuclear plants. We believe that conservation measures and other alternative energy sources (such as solar), with government initiative and support, could be competitive and are far more environmentally acceptable. The potential impact of these energy technologies on reducing the need for spent fuel storage capacity should be analyzed in the EIS.

AU-2 EPA realizes the scope of the draft EIS is limited to some extent by both the President's policy of non-proliferation and the recent recommendation of the Deutch Task Force to the Department of Energy on long-term disposal of reactor spent fuel. However, since the Department of Energy may use NRC's EIS on spent fuel for their generic EIS's on spent fuel disposition, we believe every effort should be expended to insure that this generic EIS presents a sufficient analysis of all disposal alternatives, including the environmental impacts of those alternatives. AU-3 Furthermore, NRC's final EIS should discuss the relationship between the spent fuel storage options discussed in the draft EIS and the Department of Energy's options for ultimate disposal of spent fuel.

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The EIS considers two options to handling and storage of spent fuel, increasing "at-reactor" storage (AR) and constructing new "away-from-reactor" storage (AFR) facilities. We note that NRC has already started to implement the first option, that is, increasing AR storage. We object to this approach in view of both the current guidelines and the proposed regulations of the Council on Environmental Quality implementing the National Environmental Policy Act.

We understand the recommended finding to build AFR storage for the interim period is still under investigation. We assume an environmental impact statement on this alternative would be completed prior to issuance of any license for these facilities.

As a result of our review, and in accordance with EPA procedures, we have rated the proposed action as ER (Environmental Reservations) and the draft generic EIS as Category 2 (Insufficient Information). If you have any questions concerning our comments, please let us know.

Sincerely yours,

Peter L. Cook for

William D. Dickerson
Acting Director
Office of Federal Activities (A-104)

Enclosure

9604026

Detailed Comments on the Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel

The draft EIS contains an exhaustive analysis of the
spent nuclear fuel situation as it exists for the near-term
AU-3 and up to the year 2000. However, there is no discussion of
the relationship of current spent fuel storage facilities
to permanent disposal site(s). In addition, the analysis
on environmental impacts and consequences of alternative
actions does not go beyond the year 2000. Issues such as
AU-4 commercial lifetime and decommissioning of away-from-reactor
(AFR) storage facilities should be discussed in the final EIS.

In several places in the draft statement, NRC states that
a permanent repository for spent fuel will be available by
1985. The recent Deutch Task Force report, however, indicates
AU-3 that it would be 1988 or possibly 1993 before such facilities
are available. Since some of the analysis contained in NUREG-0404 is based upon the 1985 date, revisions may be necessary,
specifically in the planning of AFR storage requirements.
Other considerations in the regional planning of AFR storage
AU-5.1 requirements, such as community bans on the transport of spent
fuel, have not been included in this EIS. Also, the EIS does
not appear to have considered the additional storage capacity
AU-6 needed in the event the U.S. accommodates foreign spent fuel.

As noted in our cover letter, NRC has already started
to implement one of the options to handling and storage of
spent fuel by granting amendments to increase storage pools at
AU-7.1 about 25 nuclear power plant facilities. The reasons for the
delay in meeting NEPA requirements for these actions should be
addressed, at the very least, to indicate the NRC's intent to
fulfill the requirements of NEPA.

The draft EIS does not discuss whether spent fuel pool
equipment for cooling and cleanup will be adequate to handle
increased storage at the existing nuclear facilities. Possible
AU-7.2 design changes in the facilities must have been considered by
NRC in the granting of amendments. These possible modifications or any others NRC is requiring should be summarized
reactor-by-reactor in the final generic statement.

AU-8
AU-9.1
AU-9.2
AU-9.1
AU-5.2
AU-10
AU-11

Alternatives

EPA disagrees with the basic assumptions that coal-fired plants are the only replacement for nuclear power plants and that the projected (FEA) national energy need for electricity will not change due to conservation measures. A recent CEQ report* on the prospects of solar energy states that it is possible for solar technology to supp[illegible] a quarter of all U.S. energy by the year 2000. This change is based on strong government initiative in support of both conservation and solar development. There are significant environmental benefits which may be achieved with the adoption of any of a range of solar technologies (photovoltaics, solar heating and cooling, passive solar design, etc.) and other non-solar energy technologies. While such alternatives may not be generally anticipated by the electric utility industry, their impact on the continued need for large central electric generating stations should be reevaluated (by NRC) for inclusion in the final EIS along with the conventional economic factors now influencing electricity demand.

Potential Accidents

We believe a reassessment of potential accidents is needed specific to fuel handling and heavy drop types of accidents at reactor spent fuel storage pools (AR) and AFR storage. AFR storage of spent fuel will increase the potential for accidents due to additional fuel handling and transportation. A more detailed analysis is needed on the kinds and risks of accidents during fuel handling, cask handling and transportation rather than relying on other references. We recommend that a thorough discussion on these safety issues be included in the final EIS.

On page 4-20, the draft EIS indicates that fires and explosions at AFR storage facilities are not considered credible accidents. Therefore, NRC does not analyze the impacts of such accidents. However, the fires that occurred at the TVA Browns Ferry Nuclear Plants in 1975 indicate that this kind of accident can occur. The draft EIS should discuss the possibility of fires or explosions and the effects of such accidents if they were to occur.

* Solar Energy: Progress and Promise, April 1978.

We feel the section on transportation accidents is inadequate and needs further clarification. We understand NRC has undertaken a program to resolve some of these safety issues concerning expanding spent fuel storage and accident risks (Resolution of Generic Issues Related to Nuclear Plants -- NUREG-0410). With this in view, we offer the following comments.

On page 3-34 of the draft EIS, it is stated, "Because transshipment, as a 'stand-alone' alternative represents only a means for postponing the spent fuel storage problem, environmental impacts and financial factors of this alternative were not examined." Even though transshipment is expected to be employed to a small extent, the impact should not be totally ignored because this alternative is a short-term solution to the immediate problem.

In our earlier reviews of the environmental impacts of transportation of radioactive material, EPA agreed with NRC that many aspects of this program could best be treated on a generic basis. A table summarizing the environmental impacts resulting from transport of radioactive material has been added to NRC's regulations (10 CFR Part 51) for assessing individual reactors. A summary table would seem to be appropriate for this final EIS.

Also in the transportation section, it is not clear why NRC has used the "super low" projections from GESMO as opposed to any other projections.

Decommissioning

We believe an orderly decommissioning procedure should be developed by the NRC. A commercial light-w[illegible] nuclear power plant eventually becomes a form of radioactive waste. This waste possesses characteristics quite different from those generated during operation and represents a considerable volume of the radioactive inventory. Present regulations do not require consideration of decommissioning until near the end of a reactor's life. Considering the size, complexity, and number of commercial power reactors that are or will be licensed, EPA believes it would be prudent to begin planning for decommissioning as early in the design stage as possible. EPA has been advocating that an evaluation of social impacts and resource commitments on present and future generations be considered in EIS's. This is particularly important as the populations presently receiving the benefits of nuclear power are not now assuming the costs of plant retirement.

The design criteri: for spent fuel pools should also include provisions fo. decontamination and decommissioning.
AU-12 Past experience, such as at Turkey Point Units 3 and 4, indicates contamination of the walls and floor as well as the outside environment of the spent fuel pool is possible without precautionary measures.

Safeguards

We recommend that serious consideration be given to requiring a hardening of enlarged AR spent pools, as well as AFR storage facilities, as a precaution to possible "subnational" threats involving aircraft. We believe this structural hardening may be needed to protect the health and safety of citizens.

AU-13.1 In this case, the costs of spent fuel hardening should be included in the final EIS and compared to the existing costs of safeguard requirements. These costs may significantly affect the major conclusions of the EIS. We note that certain European countries, in particular West Germany, have given consideration to this proposal.

Population Dose Commitments

We are encouraged that the NRC has adopted the method of calculating annual population dose commitments to the U.S. population (a partial evaluation of the total potential environmental dose commitments (EDC)). (These include H-3, Kr-85, C-14, iodines and "particulates.") EPA has urged this method be adopted for several years and we view this step as progress towards evaluating the total potential EDC. However, NRC should recognize that several of these radionuclides (particularly C-14 and Kr-85) will contribute
AU-14.1 to long-term population dose impacts on a worldwide basis, rather than just in the U.S. To the extent that the draft statement:

- has limited the EDC to the annual discharge of these radionuclides,
- assumed a population of constant size, and
- has assessed the doses only 50 years following each release, it does not adequately represent the total environmental impact.

Assessment of the total impact would:

- incorporate the projected releases over the lifetime of the facility (rather than just the annual release),
- extend the assessment to several half-lives or 100 years (beyond the period of release), AU-14.1
- consider, at least qualitatively or generically, the worldwide impacts.

We suggest that future assessments discuss these influences on the total environmental impact of the proposed action or activity.

Fuel Cycle and Long-Term Dose Assessment

The draft EIS presents tables (ES-3 and 4-2) showing excess mortality values due to the nuclear fuel cycle. These values were initially generated for the Reactor Safety Study and have subsequently been used in other NRC analyses. The tables themselves were developed primarily using data from Table S-3 of the proposed 10 CFR 51 and the methodology from the Final Generic Environmental Impact Statement on the Use of Recycle Plutonium in Mixed Oxide Fuel in Light Water Cooled Reactors (GESMO), NUREG-0002. Neither of these rulemaking activities has been completed and as of this date resolution of several
AU-15 significant issues in these actions is still pending. EPA has submitted information for the Table S-3 rulemaking and commented extensively on the GESMO statement. Our previous views and comments apply to this EIS as well. EPA's assessment of source terms and environmental dose commitment lead to higher estimates of health effects than reflected in the tables in this statement.

As stated previously, EPA believes that a total environmental impact should be calculated using the environmental dose commitment concept (the sum of all doses to individuals over the entire time period that the radionuclide is available for interaction with humans). Since neither the Table S-3 or GESMO proceedings have resolved these significant issues, EPA cannot agree with the tables presented in this EIS. However, we will continue to work with the NRC to resolve this issue on a generic basis.

Other detailed comments (by page)

AU-14.2 ES-5 Paragraph 3.1 Since AR storage of spent fuel is a low hazard potential compared to the working reactor fuel, it might be useful to present a graph illustrating these radiological differences.

AU-16 ES-7 3.5 From the discussions on this page and others (6.2&6.8), nuclear power production is assumed to terminate abruptly. These discussions (including economic) should be adjusted to reflect a phasing out of nuclear power.

AU-17 ES-8 and 4-3 The discussion comparing nuclear power and coal-fired units neglects the production of low-level radioactive waste by nuclear power plants. The report discusses increased mortality effects from coal and nuclear generation but does not discuss morbidity effects. The radiological effects from natural radioactivity in coal are not considered also.

AU-5.3 ES-9 Paragraph 5.0 The last sentence, "However, the environmental impact increment from this spent fuel transportation is insignificant," does not agree with the statement on p. 4-13 Paragraph 4.2.1.3. Also, see our previous comments on accidents.

AU-18 ES-13 Paragraph 7, 7-3 Paragraph 7.2.2, and 8-3 Paragraph 7 EPA believes it is premature for NRC to state that the impacts of coal-fired facilities are much greater than for nuclear power plants, since all the effects of both industries have not been presented in this EIS. (See other comments on coal-fired plants).

AU-5.2 ES-13 Paragraph 8 EPA does not agree with this finding as discussed in previous sections. The final EIS should compare the fuel cycle considerations in 10 CFR 51.20(e) to a summary of environmental impacts ensuing from different storage modes, and show by comparison whether the additional impacts of spent fuel storage and transportation are negligible.

AU-9.3 3-15 The statement on modes of heat transfer needs to be corrected. "Radiant heat is removed from the assembly by natural convection."

AU-14.3 4-15 The EIS should contain observed quantitative values of krypton-85 releases from spent fuel storage pools to support its contentions that they are small. Detection of environmental levels of Kr-85 is several orders of magnitude more sensitive than the information presented in the EIS.

AU-14.4 The radioisotope tritium, a relatively long-lived (12.3 years) and biologically available isotope, produced as a tertiary fission product (and a contaminant) appears to have been ignored in the consideration of environmental impacts.

AU-13.2 5-1 It is not clear why the first paragraph of Section 5.2 is important. The LWR spent fuel discussed in the EIS should not contain any highly enriched uranium or separated uranium-233 or plutonium.

AU-19 6-8 Paragraph 6.2 The capital and operating and maintenance costs for AR and AFR facilities do not consider the effect of schedule slippage. The source of information used to arrive at the higher cost of coal operation & maintenance costs with a scrubber is not cited.

AU-20 7-1 Paragraph 7.1.1.1 A discussion on the potential irreversible use of land following decommissioning of nuclear fuel cycle activities would be appropriate in the final EIS.

AU-21 Appendix C-11 Section 5.0 This section does not reflect the new Clean Air Act Amendments of 1977 which require a percent reduction in emissions of criteria pollutants, as well as the previously used emission limit of 1.2 pounds of SO_x per 10^6 Btu of coal heat content.

AU-22 Appendix D Page D-2 The computer codes and methods used to calculate the "criticality" of nuclear reactive systems should be identified and referenced. It also would be helpful if, in the general discussion (VOL. I), these computational techniques were briefly identified and referenced to the Appendix.

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26 May, 1978

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U. S. Nuclear Regulatory Commission

Director
Division of Fuel Cycle and Material Safety
Office of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

I am enclosing two items relating to the storage of spent light-water reactor fuel: (A) A Bibliography entitled: "Storage Facilities for Spent Fuel from Light Water Reactors", and (B) a paper summary entitled: "Thermal Behavior of Spent Fuel Storage Pools".

It is my intention that the two items above be considered as commentary to the Draft GEIS on Handling and Storage of Spent Light Water Power Reactor Fuel, U.S. NRC Report NUREG-0404.

Respectfully submitted,

Thomas E. Eaton

Thomas E. Eaton, ScD, PE
Assistant Professor

TEE/dis

Enclosures

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Summary

THERMAL BEHAVIOR OF SPENT FUEL STORAGE POOLS

by

Thomas E. Eaton

University of Kentucky

This work was performed to determine the thermal behavior of spent nuclear fuel storage pools. Of particular interest was the estimation of the time-dependent, pool thermal loading and water temperature.

An empirical equation[1] was used to calculate the decay heat release from irradiated nuclear fuel. The maximum thermal loading on a spent fuel storage pool is determined principally by the time the fuel is allowed to cool before storing in the pool, see Figure 1.

Concerning routine, periodic fuel discharges, the spent fuel pool decay heat power will increase by a constant increment at the end of each reactor operating cycle. The increase in maximum heat loading is equal to the decay heat generation of the first batch, see Figure 2. Decay heat from the first batch of fuel stored decreases exponentially with time; thus, the maximum decay power (occurring at the time of fuel charging) approaches an asymptote and is nominally less than 0.20% of reactor power. For a typical 3300 MWth reactor, the maximum decay heat from spent fuel in storage would be le. than 6.0 MWth (with 100 hours of cooling).

The most significant thermal load on a spent fuel storag. pool would come from a full core discharge (FCD), e.g., for reactor repairs or decommissioning. Because a FCD involves typically three times more fuel, over 1000 hours of cooling would not decrease the FCD power below that of a refueling batch after 100 hours. A FCD at 100 hours after shutdown would increase the pool power by 0.5% of reactor power.

Transient, spent fuel pool temperatures were estimated using a simplified calculational model. The pool water was assumed well-mixed and o. uniform temperature. Evaporation and heat transfer from the pool surface was neglected. Only the thermal capacitance of water was considered.

A spent fuel pool contains a large water inventory, typically 1100 m^3 (40,000 ft^3), but . ay produce a 3-6 °C/hour (5-10 °F/hr) adiabatic heat-up rate. The pool's thermal capacitance is around 0.8 °C/MWth-hr (1.5 °F/MWth-hr). The maximum water temperature is determined principally by the heat removal system, the pool volume, and the pool thermal loading; it occurs about one day after fuel charging, see Figure 3.

If all active pool cooling failed, the pool temperature would rise until the pool water evaporated or boiled at a rate less than 10 cm/hr (4 in/hr). Pool water temperatures greater than 49 °C (120 °F) would be undesirable because of damp air conditions and personnel hazards.

During routine spent fuel storage, the maximum pool thermal loading is limited to less than 0.20% of the reactor thermal power. The greatest thermal loading on a fuel storage pool is due to a FCD. The pool thermal loading is strongly influenced by the time since reactor shutdown. The pool water temperature varies from 28-3 °C (50-5 °F) above the cooling water temperature and is maximum about one day after spent fuel loading.

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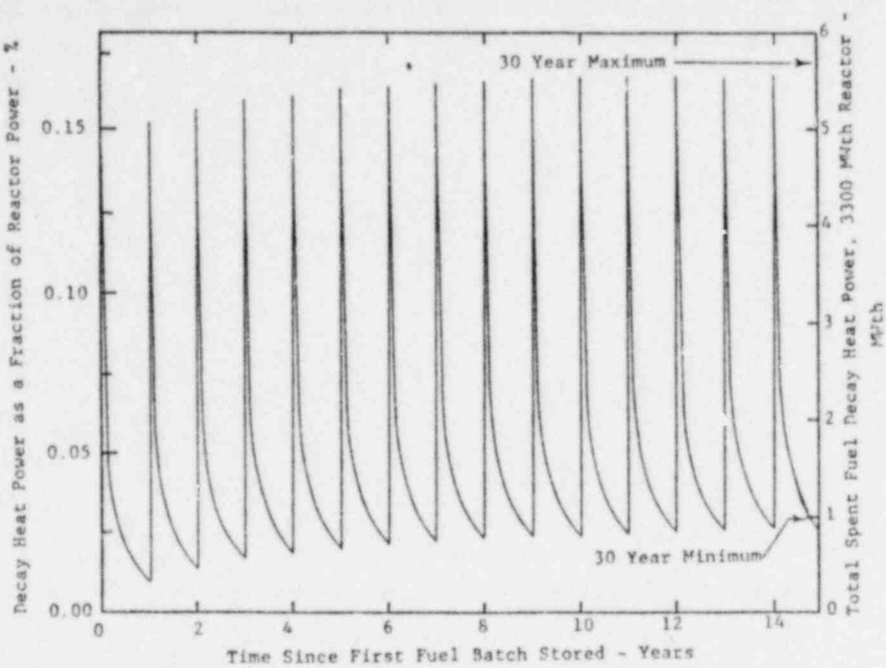
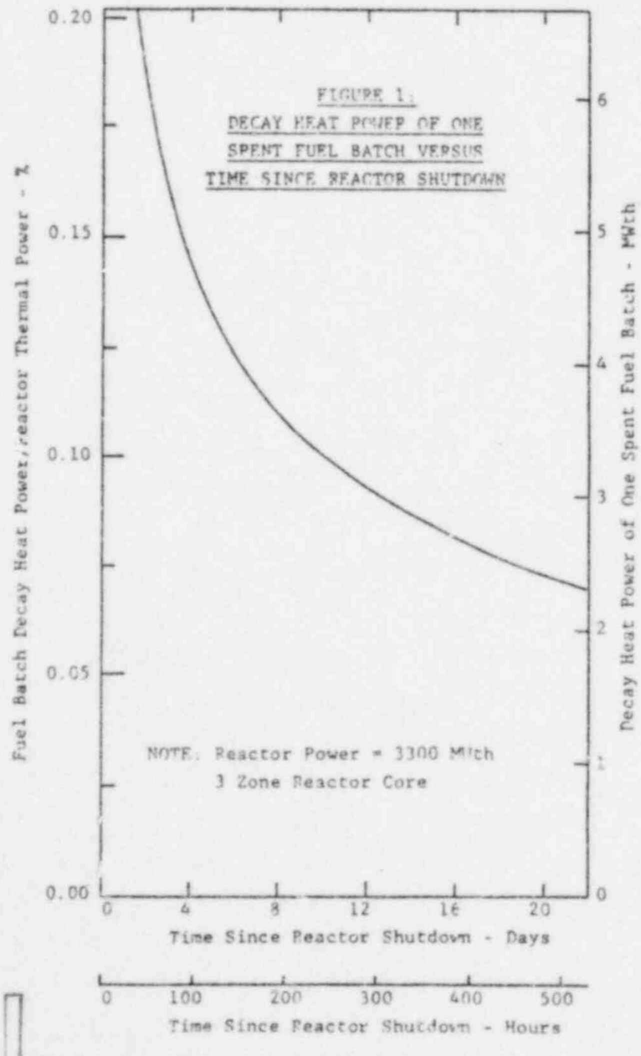


FIGURE 2: TOTAL SPENT FUEL POOL DECAY HEAT POWER WITH 1/3 OF REACTOR CORE REFUELED ANNUALLY



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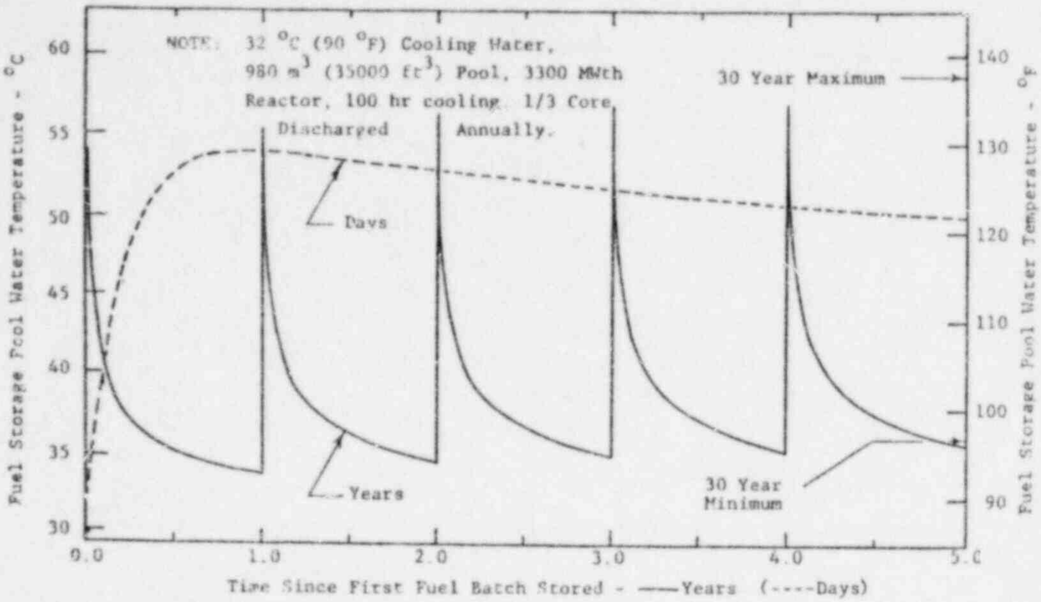

FIGURE 3: TRANSIENT WATER TEMPERATURE OF A TYPICAL SPENT FUEL POOL

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STORAGE FACILITIES FOR SPENT FUEL

FROM LIGHT WATER REACTORS

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WYOMING
EXECUTIVE DEPARTMENT
CHEYENNE

ED HERSCHLER
GOVERNOR

June 12, 1978

Mr. Richard W. Starostecki, Chief
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material Safety
U.S. Nuclear Regulatory Commission
Washington D.C. 20555

Re: Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel

Dear Mr. Starostecki,

In compliance with the National Environmental Protection Act, 1969, Office of Management and Budget Circular A-95 (revised), and the Wyoming State Review Procedures, the State of Wyoming has completed it's review of the above mentioned Environmental Statement. (See attached comments).

Thank you for providing an opportunity to review the statement. Please notify this office of the progress of this effort.

Yours sincerely,

Ed Herschler

EH:tro

3607037

THE STATE OF WYOMING
EXECUTIVE DEPARTMENT

ED HERSCHLER
GOVERNOR

Office of Industrial Siting Administration

SUITE 500 BOYD BUILDING CHEYENNE, WYOMING 82002 TELEPHONE: 307-777-7368

May 15, 1978

Director, Division of Fuel Cycle
and Material Safety
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

AV-1 We have reviewed the "Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fueld" (NUREG-0404). Because of the lack of spent fuel reprocessing facilities, and the undesirability of terminating operation of nuclear power plants, it becomes intuitively obvious that additional spent fuel storage will be required. We concur with the conclusion of the DES that away from reactor storage is a viable interim solution. However, we do take exception to presenting future storage requirements based solely on the GESMO "super low" growth scenario. Although this scenario may appear to be the most reasonable at this time, any projection of future development is fraught with uncertainty. We believe that NRC should estimate required storage capacity based upon a growth scenario which features a level of reactor development which NRC considers realistic if the U.S. were to turn to the light water reactor for an increasing share of its electrical needs.

Thank you for the opportunity to comment on this draft statement.

Sincerely,

Blaine E. Dinger
Blaine E. Dinger, Director

lp

Washington, D.C
June 20, 1978

Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Director, Division of Fuel
Cycle and Material Safety

Dear Sir:

NRC News Release No. 78-58 requested public comment of a "Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Reactor Fuel" (NUREG 0404). The following specific comments are offered.

This GEIS finds in section 8.2 that modification to at-reactor storage is alleviating the lack of sufficient spent fuel storage capacity to a large degree. Applications for modification to 44 reactor pools have been received by NRC as of Nov. 1977 with 20 of these approved to date. The statement supports the finding of the individual licensing reviews that, increasing the capacity of individual spent fuel storage pools is environmentally acceptable. The statement concludes that away from-reactor (AFR) storage pools will be needed in the early 1980's and that they are also environmentally acceptable.

Section 4 of the text treats "Environmental Impacts". In section 4.2.3.2 " Low Probability Missile Accident", the environmental impact of an assumed accident at a storage facility is evaluated. It is assumed that as a result of a tornado, a 35 foot long utility pole, traveling at 144 mph penetrates the pool and impacts a 45 foot row of fuel assemblies. It is concluded that the only releases to the site boundaries would be a small amount of 85_{Kr} or 129_{I} which are stated to be obviously quite small and a fraction of the a[illegible]e annual natural background dose of greater than 0.1 rem.

This evaluation appears to be unacceptably superficial as the following questions support. If [illegible] pool containing tightly packed fuel elements is impacted by such a missile, would not the carnage in the pool be very substantial? If one visualizes bent and mangled fuel racks and fuel receptor tubes, broken and bent fuel elements, dispersed fragments of fuel pellets, and suspended or settled powdered fuel particles within the pool in the aftermath
AX-1 of such and occurrence, how is it to be cleaned up? How would the tangled metal be separated? Could the reactor continue to operate? How would the debris be packaged for future isolation? Where would the debris be disposed of? How would it be transported? Are casks available? What would be the exposure to plant personnel and the public restoring order in the pool? How long would it take for clean-up? Do the utilities have an emergency plan and equipment available in case of such an event? How would the fuel particles in the pool be removed?

Can such an accident also result from a plane crashing into a pool as hypothesised by the Europeans (German) or from mortar or
AX-1 missile? Does this suggest that pool designs should be hardened as they are in some other countries?

Is it truly acceptable for compacted reactor pools [illegible] up to
AX-2 10 years supply of spent fuel to be scattered over the country in proximity to populated areas? What would be the public reaction in the event of such an incident?

Are the Nuclean Regulatory Commission and the Federal Government glossing over the envioronmental impacts of extended fuel storage
AX-3 in order to avoid the real impact of their failure to come to grips with a viable fuel cycle alternative?

Is the continued licensing of compacted, expanded reactor pools in the public interest?

Sincerely,

[illegible signature]

cc: Commissioners
A. Roisman

DUKE POWER COMPANY
STEAM PRODUCTION DEPT.
GENERAL OFFICES
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P. O. BOX 2178
TELEPHONE: AREA 704
373-4011

June 27, 1978

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Director, Division of Fuel Cycle and Material Safety

Reference: Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0404)
File No. GS-514.85

Dear Sir:

Duke Power Company is a member of the Utility Waste Management Group (UWMG) which is a group of 21 investor-owned and public-owned utilities formed in 1976 to monitor and assess Federal programs which deal with nuclear waste. Duke Power subscribes to and endorses those comments submitted by Alan Hanson's UWMG Spent Fuel Task Force.

In addition to endorsing the UWMG comments, we wish to suggest an additional storage option and several specific corrections with regard to the Duke nuclear units. These suggestions follow:

Addition:

AY-1 No mention is made in NUREG-0404 of the pin storage technique for increasing storage capacity. This technique involves disassembly of the fuel elements; in effect, eliminating the spacing between fuel pins. It is then possible to store more fuel pins in one spent fuel pool storage space than were originally contained in one fuel element. This procedure could increase the storage capacity of existing racks and pools by as much as 75%. This technique has been tested and should be considered briefly in the final GEIS for completeness.

Corrections:

AY-2 Page 3-9: Table 3.4 the data for Oconee 3 should be corrected. Modification of the Oconee 3 pool is complete with a storage capacity of 465 assemblies.

AY-2 Appendix E: (1) In Table E.1 the spent fuel storage capacities for Duke reactors should be:

Catawba 1	1414
Catawba 2	1414
McGuire 1	500
McGuire 2	500
Oconee 1	306
Oconee 2	CP
Oconee 3	465

(2) In Table E.2 the discharge data for Duke reactors are very low by historical standards. This is most likely due to the assumption of a very low capacity factor. Duke expects the McGuire 1 and 2 units and Catawba 1 and 2 units to discharge 64 assemblies every year. Duke is currently discharging approximately 56 assemblies every year from each of its three Oconee units.

(3) The calculated storage situations in Tables E.3, E.4, and E.5 should be corrected to reflect those changes in storage capacity outlined above in (1).

(4) Table E.9

1979 Oconee to McGuire	147
1980 Oconee to McGuire	122
1981 Oconee to McGuire	179
1982 Oconee to Catawba	120
1982 McGuire to Catawba	57
[illegible]3 Oconee to Catawba	171
[illegible] McGuire to Catawba	64

We appreciate the opportunity to comment on NUREG-0404. It is our hope that these comments will aid the NRC in its endeavor to issue the proposed regulations on spent fuel storage.

Sincerely,

R W Bostian

R. W. Bostian, Manager
System Results and Fuel Management

SJH/lk

Department of Energy
LABOR & INDUSTRIES BUILDING, ROOM 111, SALEM, OREGON 97310 PHONE 378-4131

June 14, 1978

Richard W. Starostecki
Division of Fuel Cycle and
Material Safety
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Starostecki:

The federal Nuclear Regulatory Commission has published for comment a Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel, NUREG-0404. The purpose of this letter is to provide comments of the Oregon Energy Facility Siting Council and the Department of Energy.

Detailed comments are enclosed as an attachment. However, the following major comments are emphasized:

1. By its decision to terminate hearings leading to the licensing of the AGNS reprocessing plant NRC has changed a 20 year policy. If reprocessing will not be utilized in the foreseeable future, NRC should define the parameters of the alternative program, i.e., interim spent fuel storage. Definition is needed to permit timely planning for storage facilities by the federal DOE and the nuclear industry.

AZ-1.1 Oregon believes that NRC should identify a) the limits in terms of amount and duration of spent fuel storage at reactor sites and b) a realistic date, that provides for unexpected delays, by which the rate of spent fuel generation will equal the rate of disposal. This information is needed to determine the amount and type of interim storage to be provided. It then remains for the federal DOE to announce whether it or the nuclear industry will provide the needed facilities.

AZ-2.1 2. NUREG-0404 indicates that shutdown of nuclear generating capacity is unavoidable given the projected rates of fuel generation and facility lead times. NRC should take the steps to inform the federal DOE of this situation so that it may be factored into its planning.

AZ-2.2 NRC has also concluded in NUREG-0404 that additional siting rules should be adopted to license away-from-reactor storage facilities.

Richard W. Starostecki
June 14, 1978
Page two

AZ-2.2 NRC should take the steps necessary to ensure that this finding does not increase the likelihood of curtailment of reactor operation.

AZ-1.1 3. NRC's generic evaluation of spent fuel storage should identify under what conditions, if any, a site specific environmental impact statement is needed.

AZ-3 4. NUREG-0404 has not been written in compliance with the NRC Policy Statement issued on September 16, 1974 and published in 40 FR 42801 in that the following alternatives have not been considered:

a) storage at the Barnwell South Carolina facility,
b) restricted plant operation at reduced capacities, and
c) alternative sources of energy other than coal, such as conservation or curtailment.

AZ-4

AZ-2.3 Furthermore at reactor and away from reactor storage have not been considered separately.

AZ-5 Use of coal as a replacement power source is unrealistic since it would not be made available by the mid-1980's if nuclear plants had to be shutdown for lack of storage space. Also, nuclear plants would remain shutdown only until off-site facilities are available which the federal government indicates will be available by the 1980's.

This comment is deserving of special attention by NRC since any litigation on the adequacy of the GEIS will only exacerbate the already difficult resolution of the spent fuel storage problem.

Very truly yours,

Fred D. Miller

Fred D. Miller, Director
Department of Energy

Dawn Dressler

Dawn Dressler, Chair,
Energy Facility Siting Council

FDM/DWG:jkm

Enclosures

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OREGON DEPARTMENT OF ENERGY AND ENERGY FACILITY SITING COUNCIL

COMMENTS ON NUREG-0404

1. POLICY

AZ-2.4 A. One of the purposes of NUREG-0404 is to analyze alternatives for handling and storage of spent fuel with an emphasis on developing long range policies (page S-1) and for decision making (page 1-2). Oregon does not believe that this goal has been accomplished.

AZ-2.5 The federal Department of Energy has announced it will provide Away-from-Reactor (AFR) storage of spent fuel by 1983 (see Deutch Report). NRC states that it believes the DOE schedule can be met (NUREG-0404, page ES-11). Nevertheless, NUREG-0404 projects spent fuel storage and its impacts through the year 2000 for planning purposes. By asserting its belief that the DOE schedule is valid while performing its analysis through the year 2000 NRC has not provided any policy guidance to reactor owners.

AZ-2.6 Further, NUREG-0404 does not define an upper limit to on-site storage of spent fuel. Oregon believes an upper limit should be established in order to more clearly define when AFR facilities are required. At present, reactor operators may be planning for insufficient on-site storage of spent fuel.

AZ-2.7 Reactor plants were proposed by utilities and approved by NRC with the intent that spent fuel would be stored on-site for several months before shipment to a reprocessing plant (page 1-1). The nuclear industry has provided a reprocessing plant; however, the NRC has terminated the proceeding that was required in order to obtain the necessary federal license (page 1-1). Since it was the NRC that created the current need for increased storage for greater periods of time, it is reasonable for the NRC to provide guidance for reactor operator planning.

Oregon believes that by specifying the expected duration of spent fuel storage (at reactor or at AFR facilities) and the maximum acceptable amount of on-site storage of spent fuel the necessary guidance will be provided to facilitate long range plannir

AZ-2.8 B. To be a useful planning document NUREG-0404 must be rea stic and reliable. As discussed above, utility planning for on site storage depends in part on NRC's conclusions. Additionally, DOE planning for AFR storage and industry planning to supply the needed spent fuel shipping casks depends on NRC's conclusions (page ES-1 and 3-26, respectively). Oregon believes that the NRC has not provided realistic or reliable guidance as follows:

1. NRC states that it believes that "the national objective of an operational geologic repository for . . . spent fuel by 1985" (ES-12) is realistic (ES-11 and 1-2). First, the "national objective" was to have a geologic repository <u>constructed</u> by 1985. Several more years would be required to bring it up to operational status; even then only limited amounts of spent fuel may be deposited for demonstration and testing purposes. Second, the DOE has concluded that the 1985 date has slipped three years within the first two years of the national program (see Deutch Report).

AZ-2.9 2. NRC states that "increasing interest in independent spent fuel storage installation is being shown by the nuclear power industry" (ES-6). Plans for interim storage by EXXON have been terminated by NRC's decision on reprocessing (page 1-1). Expansion by General Electric at Morris, Illinois has been terminated by DOE's announcement to take title to spent fuel. Additionally, industry has not responded favorably to DOE's inquiry regarding interest in providing AFR storage. The one expression of industry interest referenced by NRC (page ES-6) is simply an architect-engineer with a design to sell. No one has shown interest in using the design.

AZ-2.10 C. If NUREG-0404 is to be believed it seems unavoidable that NRC's decision to defer reprocessing will result in the shutdown of reactor capacity of an undetermined amount. Table ES-2 shows that by 1980 on-site storage will be insufficient and by 1985 the situation will be even more severe absent any AFR storage. Figure 6-7 shows that AFR facilities could not be operational until 1983 even if design work and license application began this year. Even in 1983 it is not clear that the receiving capability of the facility will be sufficient for annual spent fuel generation rates.

Controversy over who should provide AFR capability indicates that the start of these facilities will be delayed for an indefinite period. The Office of Management and Budget believes that industry should provide AFR facilities (Nucleonics Week, April 13, 1978) but industry has been left holding unused facilities due to changes in federal policy and has backed off on AFR facilities because of potential competition from DOE.

AZ-2.11 NRC assumes a full core reserve will be maintained by utilities. This is reasonable to insure power production reliability and in Oregon's view for prudent safety planning. Maintenance of a full core reserve results in an earlier need for AFR facilities. Since NRC relies on the federal DOE policy announcement of April 18, 1977 it should demonstrate that DOE has taken this factor into account in its planning for AFR facilities.

AZ-2.12 D. NUREG-0404 should note that the nuclear industry could meet its AFR facility requirements through at least 1985, and maintain a full core reserve by extension of storage at AGNS. Table ES-2 shows that under the stated conditions 1900 MTU AFR capacity will be needed through 1985. The AGNS plant is designed for 400 MTU

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which could be increased by 2.5 times by use of close packed storage (ES-4). Further storage could be achieved at AGNS by use of poison storage rods and use of the high level waste storage pool. G. E. Morris was increased from 100 to 750 MTU by use of some of these methods (ES-6).

AZ-2.12

NRC should discuss the cost of this alternative compared to construction of separate AFR facilities.

E. An obvious alternative to increased storage of spent fuel is reprocessing. NRC has not evaluated this alternative.

AZ-2.13

By NRC's analysis, reactor shutdown is unavoidable (see above) and the lost generating capacity will be replaced by coal fired units that, according to NRC, have more severe impacts than nuclear plants (Table ES-3). These conclusions would indicate that reprocessing, which would obviate the need for increased on-site storage and reactor shutdown, would be the preferable option since impacts shown in Table ES-3 would not change if reprocessing was assumed (see NUREG-0116 and -0216).

AZ-2.14

F. NRC should conclude whether or not a site specific environmental impact statement is warranted based on the results of NUREG-0404. In any case, an environmental impact appraisal would be important for each separate license amendment either to demonstrate that the site specific case falls within the scope of the generic statement or to ascertain whether a site specific EIS is needed.

3. <u>TECHNICAL COMMENTS</u>

A. General

AZ-6.1

1. To Oregon, three factors are most pertinent to increased on-site storage of spent fuel. First, corrosion impact is the only parameter that is time dependent and is therefore directly related to storage in water cooled basins for increased periods of time. BNWL-2256, by A. B. Johnson, is a compilation of experience to date with storage of reactor fuel in an aqueous environment. NUREG-0404 should clearly show that corrosion impacts on stored fuel are expected to be minimal because:

   a. fuel is exposed to a much more severe environment in the reactor,

   b. fuel with materials and burnups similar to today's commercial fuel (i.e., Zircalloy-clad and 35,000 MWD/MTU), has been successfully stored for 14 years and destructively examined without identifying any apparent adverse effects. Since corrosion is time dependent any unexpected results would occur first in the small amount of oldest fuel and would permit corrective actions (such as use of storage canisters) on more recently discharged fuel, and

   c. If unexpected corrosion did cause deterioration of fuel cladding the gaseous activity available for release would be minimal due to radioactive decay.

   The second factor important to increased storage is that only the most recently discharged fuel is susceptible to melting. Residual heat in older fuel has decayed sufficiently that natural circulation of air will provide adequate cooling. Additionally, loss of primary and back-up cooling systems or failure of the pool liner and concrete structure would be required to cause loss of cooling and subsequent melting of the freshest fuel.

   The third factor is the relatively rapid decay of gaseous fission products. Fuel older than several years will make a negligible contribution to any accident consequence that would result in release of gap activity caused by projectile strikes, dropping of heavy objects, or corrosion. This behavior can be quantified by use of the ORIGEN Code and what has been called the "Relative Hazard Index". Reference A has used this technique to compare the "hazard" presented by the total activity in the fuel (inert and gaseous). A similar approach for the gap activity would be pertinent for a comparison of accident consequences, for various quantities of stored fuel, that result in a release of gap activity.

   Oregon believes that NUREG-0404 should develop these three concepts. Substantiation of these factors should illustrate that increased storage of spent fuel does not create an additional risk to the public health and safety. In general, NUREG-0404 fails to distinguish between impacts resulting from on-site storage of four-thirds cores and larger amounts.

AZ-7

2. NUREG-0404's use of coal units as replacement for nuclear capability appears to be unnecessarily narrow, other choices exist. It would seem sufficient to compare the environmental impacts from increased storage to the cost of idle generating capacity in order to assess the cost benefit of increased storage of spent fuel.

AZ-6

3. NUREG-0404 should treat at reactor and AFR facilities as separate options. The reader ought to be able to ascertain any advantage of one type of storage over the other. Currently the SEIS does not treat at reactor and AFR storage consistently. For example, in Section 3.1 they are discussed as one option while pages 4-22 and 4-26 discuss only AFR even though the discussion is applicable to both on-site and AFR storage.

B. Specific Comments

AZ-9

1. NUREG-0404 concludes that increased storage of spent fuel does not require modification of Table S-3 (10CFR 51.20) (e) (ES-13).

AZ-9 However, the document does not identify what impacts from spent fuel were assumed in Table S-3 and it is not shown how these values might change as the result of increased amounts of stored spent fuel or an increase in the duration of spent fuel storage.

AZ-6.2 2. NUREG-0404 apparently makes the implicit assumption that spent fuel discharge from reactors in the 1960's may be stored in aqueous environments until the year 2000. Since the only time dependent variable is corrosion, GEIS should provide the basis for its assumption that corrosion over a 30-40 year period is acceptable.

AZ-1.2 3. NUREG-0404 does not adequately support its finding (ES-13) that additional rules are required in order to license AFR facilities. Because fuel at reactor sites will be fresher, storage of fuel at AFR facilities will be less rigorous (DOE has announced it will accept only fuel that has decayed at least five years, except in special circumstances). Since the service will not be as severe and because successful operation of AFR facilities at NFS and Morris, Illinois it would appear that existing standards are appropriate. It is important for NUREG-0404 to justify its conclusion because any rule-making required by NRC to license AFR facilities will cause further delays in any effort by the federal government to resolve the pending storage shortage of interim storage capacity.

AZ-10.1 4. NUREG-0404 should explain why spent fuel pools at reactor plants were designed so conservatively that 2.5 times the amount of fuel can be safely stored in the same space (ES-4). What construction, operational or regulatory constraints resulted in the original conservative design of the spent fuel pool?

AZ-1.3 5. NUREG-0404 erroneously states on page ES-12 that maintenance of activity concentration in pool water requires continuous purification system operation. Neither continuous system operation or pool activity concentration are license requirements. Further, continuous system operation is not required to maintain pool activity levels since release of activity from stored fuel primarily results from crud spalling during fuel transfers. Between fuel transfers little activity release is normally expected.

AZ-11.1 6. NUREG-0404 page ES-12 erroneously infers a Kr-85 release from defective fuel is a result of increase of on-site storage of spent fuel. Table 4-3 makes this same error. Values shown in Table 4-3 are the radiological doses from spent fuel and will occur regardless of whether the fuel is stored at the reactor, an AFR facility, or if it has been sent to a reprocessing plant as originally intended. The GEIS should not imply that these impacts result from increased storage and that they are in addition to those impacts already considered.

AZ-11.2 7. NUREG-0404 several places relies on the fact that impacts due to increased storage are minimal because the additional fuel is aged (e.g., ES-5 and 7). Use of the curves developed in Ref. A and as proposed in Oregon Comment 2A (1) would provide an improved basis for these statements.

AZ-12 8. Table ES-3 concludes that waste management of the coal cycle causes approximatley zero impacts on mortality. Given the concentration of heavy metals and radioactivity in coal ash, this conclusion does not appear accurate.

AZ-10.2 9. On page 3-5 NUREG-0404 discusses the use of a 2.5 compaction factor to increase on-site storage. NRC should explain why this factor was assumed rather than some larger factor. A larger factor could be obtained by use of poison storage racks or by double tiering. If NRC is relying on previous utility applications NRC should discuss how the conclusions of NUREG-0404 would change if these other options were selected by the utilities.

AZ-13.1 10. In a letter from Edson Case to Victor Gilinsky dated August 4, 1977 it was stated that existing reactors could increase their fuel cycle to 18 months and maintain a 65 percent capacity factor. This option would purportedly reduce the amount of spent fuel generated while maintaining normal operations. This is inconsistent with the discussion on page 3-35. NRC should resolve this apparent discrepancy.

AZ-14 11. NRC's analysis does not identify the precise amount of generating capacity that will be lost due to storage shortages. Table 3-3 provides the information of interest but not for the most realistic case.

AZ-15 12. Page 3-8 states that stored fuel must remain sub-critical even in accident conditions. A projectile is considered to be a credible accident and could cause criticality in the pool by disarrangement of stored fuel. Use of 2000 ppm Boron would preclude criticality yet this is not a license requirement. NRC should explain this apparent discrepancy.

13. The discussion of corrosion on page 3-14 is not adequate given its importance to long term storage of spent fuel.

AZ-16 14. Page 4-1 should quantify the additional heat discharge from the plant as the result of increased storage. At the Trojan Nuclear Plant the increase is approximately 0.3 percent additional discharge to the Columbia River and is small enough that no modification to the NPDES will be needed.

AZ-17 15. The information on page 4-7 does not permit a comparision of rail traffic for coal and spent fuel shipments.

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AZ-11.3 16. Page ES-12 states no liquid activity will be released from spent fuel pools. Page 4-13 states AFR facilities will result in less discharge to aquatic environments. This apparent discrepancy should be explained.

AZ-1.4 17. Figure 6-1 does not accurately reflect the experience at the Trojan Nuclear Plant where the license amendment process has already taken 30 months and no decision has been reached at this time.

AZ-13.2 18. Page 3-36 should note that the coast down option may be accomplished but at the expense of subsequent fuel cycles since some of the fuel for those future cycles will be consumed during coast down.

Reference A "Relative Spent Fuel Storage Hazard" by Strahl, et. al., NUC Corporation, November 30, 1977.

BOSTON EDISON COMPANY
800 BOYLSTON STREET
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J. EDWARD HOWARD
VICE PRESIDENT
NUCLEAR

July 14, 1978

Director, Division of Fuel Cycle
and Material Safety
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Reference: Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0404)

Dear Sir:

Boston Edison Company is a member of the Utility Waste Management Group (UWMG) which is a group of 21 investor-owned and publicly-owned utilities formed in 1976 to monitor and assess Federal programs which deal with nuclear waste. By letter of June 7, 1978, the UWMG has submitted separate comments on the Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor fuel. By this letter, Boston Edison Company subscribes to and endorses those comments filed by the UWMG.

Although comments on the draft report were requested by June 8, 1978, we wish to take this opportunity to identify several minor corrections with regard to Pilgrim Unit 1 which may still be useful to you. These are:

Page 3-9	In Table 3.4, the pool size for Pilgrim 1 is 880 not 900 and the planned increase is 1440 not 1600. These figures result in a percentage increase of 164% not 180% and a compact storage factor of 2.64 not 2.80.
ASA-1	
Page 3-10	The last line of the description of Boston Edison's compact storage should read "the change will increase the capacity from 880 assemblies or approximately 1.5 cores to 2,320 assemblies or 4 cores."

BOSTON EDISON COMPANY

Appendix E (1) In Table E.1, the spent fuel storage capacity for Pilgrim 1 as of June 1, 1978 was 860.

(2) The discharge data in Table E.2 for Pilgrim 1 should read 132 for 1976 and 428 for 1977. Estimates of future discharges are highly dependent on the assumed capacity factor. The factor used to generate the numbers in the Table should be identified. Based on an overall capacity factor of 80%, the future discharge schedule for Pilgrim 1 is estimated to be:

AAA-1

1978	0
1979	0
1980	136
1981	132
1982	116
1983	112
1984	116
1985	120
1986	112

Appendix F (1) On pages F-9, F-13, F-17 and F-21, the number of assemblies in storage on 12/75 for Pilgrim 1 was 20 instead of 204 and the actual discharges in 1976 and 1977 were 132 and 428 assemblies respectively. Note that no assemblies are planned for discharge in 1978.

(2) Subsequent tables in Appendix F may be affected by the changes specified in (1).

None of these suggested corrections will materially affect the findings in NUREG-0404, but they will help to assure accuracy.

We appreciate the opportunity to comment on NUREG-0404. It is our hope that the NRC will now move expeditiously to issue proposed regulation on spent fuel storage so that the regulatory framework for continued storage can be assured.

Very truly yours,

cc: J. A. Seery
G. C. Andognini
D. G. Stoodley

POOR ORIGINAL

7904045

Österreichische Studiengesellschaft für Atomenergie Ges.m.b.H.

Lenaugasse 10 · A-1082 WIEN · Austria

Lenaugasse 10 · A-1082 WIEN · Austria

Mr. Richard W. Starostecki
Chief Fuel Reprocessing and Recycle Branch,
Division of Fuel Cycle and Material Safety
US Nuclear Regulatory Commission

Washington, D.C. 20555
USA

DOCKETED USNRC
NOV 0 3 1978
NMSS MAIL SECTION DOCKET

Institut für Metallurgie
Forschungszentrum Seibersdorf
Telefon: (02254) 201, 781 *
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CA-Bankverein: 29-34 345/02
Erste österr. Spar-Casse: 100-94709
Österr. Länderbank: 106-100-432

Ihr Zeichen	Ihre Nachricht vom	Unser Zeichen	Sachbearbeiter	Telefon (Durchwahl)	Datum
		ME/HKon/sh	H.R.Konvicka	* 236C	1978 05 02

Betreff:

Dear Mr. Starostecki

I really appreciate the opportunity to review and comment the Draft Generic Environmental Impact Statement of Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0404).

As far as I can judge from a general point of view, all the possible aspects in Handling and Storage of Spent Fuel are discussed in the GEIS. Since at the moment my special task is in the corrosion behaviour of spent fuel elements during water pool storage, I was especially interested in the parts of the GEIS related to this problem area and identified two statements I want to comment on:

ad 3.1.3.3 Design Criteria (p 3-14, Vol 1):
As far as I know from discussions with A.B. Johnson jr., BNWL, and other experienced people in this field, the longest todays experience in storage does not exceed 18 years for a Shippingport-fuel bundle (burn-up about 6000 MWd/t U), for power reactor fuel with high burn-up even not more than about 10 years. Therefore from a safety point of view, I think one cannot extrapolate these data to long periods
AAB-1 without an additional research or at least surveillance program, but I would agree with an extrapolation as far as interim storage is concerned. Investigations regarding the Corrosion of Fuel Assemblies During Long-term Storage (COFAST) are planned as an international program within the IEA-Working Party on Nuclear Safety (Chairman Dr. W.V. Johnston, USNRC). For your information I include a copy of the minutes of the first specialist meeting with participants of Italy, Sweden, USA (A.B. Johnson jr., BNWL) and Austria.

ad 4.2.2.10 Release Mechanisms (p 4-18, Vol 1):
From my point of view I agree that the pool water represents a low temperature,
AAB-2 low pressure environment, but one should mention the possibility of high residual stresses in the cladding which could result in a driving force unequal to zero for the release of fission products during long storage times.

Blatt 2 zum Brief an Mr. Starostecki

Hopefully my comments are of some interest for you.
Looking forward to a copy of the final GEIS

Sincerely yours

Heinz Konvicka

(Heinz Konvicka)

Encl.

POOR ORIGINAL

STATE OF ALABAMA

ALABAMA DEVELOPMENT OFFICE

GEORGE C. WALLACE
GOVERNOR

R. C. "RED" BAMBERG
DIRECTOR

W. M. "BILL" RUSHTON
ASSISTANT DIRECTOR

July 5, 1978

TO: Richard W. Starostecki, Chief
Fuel Reprocessing & Recycle Branch
Division of Fuel Cycle & Material Safety
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

FROM: Michael R. Amos, Administrator
State Clearinghouse
State Planning Division

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT

Applicant: U. S. Nuclear Regulatory Commission

Project: Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0404) for the U. S. Nuclear Regulatory Commission

State Clearinghouse Control Number: ADO-013-78

The Draft Environmental Impact Statement for the above project has been reviewed by the appropriate State agencies in accordance with Office of Management and Budget Circular A-95, Revised.

The Environmental Impact Statement on this project appears to be in order. No comments are offered.

Please contact us if we may be of further assistance. Correspondence regarding this proposal should refer to the assigned Clearinghouse Number.

A-95/06
Agencies contacted for comment:
- Conservation and Natural Resources - Reynolds
- Geological Survey of Alabama
- Public Water Supplies
- Environmental Health Administration
- ADO - Sternenberg

3734 ATLANTA HIGHWAY • MONTGOMERY, ALABAMA
MAILING ADDRESS: STATE CAPITOL • MONTGOMERY, ALABAMA • 36130
(205) 832-6815

9604046

COMMONWEALTH OF PENNSYLVANIA
GOVERNOR'S OFFICE
OFFICE OF THE BUDGET
HARRISBURG, PA. 17120
P.O. Box 1323

July 28, 1978

DOCKETED
USNRC

Richard W. Starostecki, Chief
Fuel Reprocessing and Recycle Branch
Division of Fuel Cycle and Material Safety
United States Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Starostecki:

We have received for our review and comment copies of the Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0404).

Attached to this letter please find the response from our Department of Transportation. We have received no comments from any other State agency.

The State Clearinghouse for Pennsylvania has no objection to the materials presented in the EIS.

Sincerely,

Richard A. Heiss

Richard A. Heiss, Supervisor
Pennsylvania State Clearinghouse

RAH:ar

Attachment

cc: File

POOR
ORIGINAL

OMB Approval No. 29-R0218

FEDERAL ASSISTANCE

1. TYPE OF ACTION: ☐ PREAPPLICATION ☐ APPLICATION ☐ NOTIFICATION OF INTENT (Opt.) ☐ REPORT OF FEDERAL ACTION

2. APPLICANT'S APPLICATION: a. NUMBER; b. DATE 19

3. STATE APPLICATION IDENTIFIER: a. NUMBER; b. DATE ASSIGNED 19

4. LEGAL APPLICANT/RECIPIENT
a. Applicant Name: U.S. Nuclear Regulatory Commission
d. City: Washington
f. State: D.C.
g. ZIP Code: 20555

5. FEDERAL EMPLOYER IDENTIFICATION NO.

6. PROGRAM: a. NUMBER; b. TITLE: NA

7. TITLE AND DESCRIPTION OF APPLICANT'S PROJECT
REVIEW AND COMMENT ON THE DRAFT GENERIC ENVIRONMENTAL IMPACT STATEMENT ON HANDLING AND STORAGE OF SPENT LIGHT WATER POWER REACTOR FUEL (NUREG-0404)

8. TYPE OF APPLICANT/RECIPIENT: NA

9. TYPE OF ASSISTANCE: NA

10. AREA OF PROJECT IMPACT

11. ESTIMATED NUMBER OF PERSONS BENEFITING

12. TYPE OF APPLICATION

13. PROPOSED FUNDING

14. CONGRESSIONAL DISTRICTS OF: a. APPLICANT; b. PROJECT

15. TYPE OF CHANGE

16. PROJECT START DATE

17. PROJECT DURATION

18. ESTIMATED DATE TO BE SUBMITTED TO FEDERAL AGENCY

19. EXISTING FEDERAL IDENTIFICATION NUMBER

20. FEDERAL AGENCY TO RECEIVE REQUEST: NA

21. REMARKS ADDED ☐ Yes ☐ No

22. THE APPLICANT CERTIFIES THAT

CLEARANCE COPY

23. CERTIFYING REPRESENTATIVE: a. TYPED NAME AND TITLE: Richard W. Starostecki, Chief

964047

Pennsylvania Clearinghouse
Governor's Budget Office
P.O. Box 1323
Harrisburg, PA 17120
717-787-8046

PSC SAI NO. [illegible]-78-[illegible]
U.S. Nuclear Regulatory Com.
Draft EIS Generic
on Handling & Storage
of spent light water
power reactor fuel.

FIRST STAGE REVIEW
Preapplication/Notification of Intent
AGENCY REVIEW COMMENTS

INSTRUCTIONS: To be completed by review agency and returned to State Clearinghouse. Check one or more appropriate boxes. Indicate comments below. Return copy 1, 2 and 3 to the State Clearinghouse. Retain copy 4 for your official records. Attach triplicate sheets if necessary.

PART I: Declaration of Interest

[✓] No Interest Declared – Complete Part V and return copy 1 and copy 2 to State Clearinghouse.

[ ] Interest Declared – Complete Parts II, III, IV and V and return copy 1 and copy 2 to State Clearinghouse.

PART II: Identification of Agency Review Criteria (Agency plans, programs, policies and/or laws)

PART III: COMMENTS (Include results of preliminary contact made with applicant and suggestions for improving project proposal)

POOR ORIGINAL

PART IV: Recommended State Clearinghouse Action (This action will not be honored by the State Clearinghouse unless Part II and Part III above have been completed)

[ ] Recommend Approval

[ ] Recommend Disapproval

[ ] Request the opportunity to review final application.

[ ] Request the opportunity to review environmental impact statement.

PART V: Certification	Authorized Agency Signature	Agency	Date
	R C Seaman		

COPY 2. APPLICANT COPY – Return to Pennsylvania State Clearinghouse

840469

Natural Resources Defense Council, Inc.

917 15TH STREET, N.W.
WASHINGTON, D.C. 20005
202 737-5000

Western Office
2345 YALE STREET
PALO ALTO, CALIF. 94306
415 327-1080

New York Office
122 EAST 42ND STREET
NEW YORK, N.Y. 10017
212 949-0049

September 15, 1978

RECEIVED SEP 20 1978

Mr. Clifford Smith
Office of Nuclear Material
Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Smith:

Enclosed is a report prepared by NRDC which clearly indicates that it is technologically feasible to store spent fuel at reactor sites by simply building additional spent fuel storage pools where necessary. We are also enclosing copies of two letters which we have sent to the Department of Energy and a response received by us from the Department of Energy indicating our concern with the problem of adequate consideration of the at-reactor storage option. Would you please consider all of these materials as supplements to our comments on NUREG-0404 filed with you on June 6, 1978.

Sincerely,

Anthony Z. Roisman
Staff Attorney

Enclosures

Recycled Paper

1-172

Natural Resources Defense Council, Inc.

917 15TH STREET, N.W.
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NEW YORK, N.Y. 10017
212 949-0049

August 1, 1978

Dr. John M. Deutch, Director
Office of Energy Research
Department of Energy
Washington, D.C. 20585

Dear Dr. Deutch:

We were encouraged by your letter of June 27, 1978, assuring us that with respect to the formulation of a policy for the management of nuclear wastes both the Interagency Nuclear Waste Management Task Force and the Department of Energy intend to comply fully with the requirements of NEPA. The purpose of this letter is to question the application of that principle to DOE development of specific proposals for interim storage of spent fuel.

As we are all aware, the spent fuel storage policy announced in October, 1977, did not comply with NEPA. The only way to achieve any possible compliance with NEPA with respect to that policy is to conduct all analyses, studies and NEPA reviews subsequent to that announcement as though it had never been made. Thus, DOE would fully explore in its impact statements on spent fuel storage policy the alternatives that the further production of spent fuel is allowed only as a last resort, that spent fuel storage problems are handled by the industry without any government involvement, that no one-time fixed fee is established for waste management services at this time, and that spent fuel is stored at the reactor and not away from the reactor. Similarly, studies being conducted by DOE on spent fuel storage should be unbiased in their efforts to uncover facts which would favor any one or more of the possible spent fuel storage policies.

It appears to us that with respect to spent fuel storage policy, despite the appearance that there is compliance with NEPA, in fact DOE has developed its NEPA reviews and conducted its studies to support the pre-announced spent fuel policy. We are led to this conclusion by two major factors.

First, DOE has never conducted a thorough study of the technical feasibility of at-reactor storage, including construction of additional spent fuel pools at operating reactors and expansion of the dimensions of spent fuel pools for reactors under construction and proposed for construction. A recent GAO report on spent fuel storage policy was critical of DOE's narrow view of the possible solutions to the spent fuel storage problem and listed utility solution of its own spent fuel storage problems as the highest priority for DOE consideration. We are attaching a preliminary report prepared by NRDC which reveals that less than one-quarter acre is needed to accommodate a spent fuel pool that will hold the lifetime supply of spent fuel from a large reactor and that all operating reactors examined appear to have more than ample space for such a facility.

Second, DOE appears to be on the verge of committing substantial resources to establish the feasibility of using spent fuel storage capability at the Barnwell Reprocessing Plant and the Savannah River Plant for spent fuel storage facilities without awaiting completion of NEPA reviews which are intended to explore, inter alia, whether such use is needed, whether it is feasible, and how such use would jeopardize our efforts to persuade foreign countries to indefinitely defer reprocessing. Although the impetus for this premature resource commitment appears to come from the Senate Energy and Natural Resources Committee, we believe it is incumbent upon DOE to advise the Senate Committee that the answer to the questions posed will come as part of the ongoing NEPA process and not apart from it. In addition, it must be clear that under NEPA, similarly detailed feasibility studies will be conducted of all reasonably available options to avoid the inaccurate impression that Barnwell and Savannah River are leading candidates for interim spent fuel storage.

As you have indicated on a number of occasions, public acceptance of a nuclear waste plan is essential to its success. The efforts by DOE to prematurely commit to a particular spent fuel policy and to pursue that commitment even while undertaking NEPA reviews is destroying public confidence in the integrity of the process and endangering the entire waste management plan. To avoid further erosion of public confidence and to bring DOE actions in line with its words with respect to compliance with NEPA, we request that prior to issuance of any draft or final NEPA statement on spent fuel policy:

Dr. John M. Deutch
August 1, 1978
Page three

1. DOE conduct the studies and analyses necessary to fairly assess options to the previously announced spent fuel policy, including particularly a study of the technical feasibility of at-reactor storage;

2. DOE thoroughly explore in the draft and final impact statements all reasonably available alternatives to the announced spent fuel storage policy in similar depth to exploration of the announced policy;

3. DOE conduct feasibility studies of possible uses of the Barnwell and Savannah River facilities for spent fuel storage only as part of feasibility studies of all reasonably available methods of storing spent fuel and take positions with respect to such alternatives only as part of a final NEPA review.

We would appreciate an answer to this letter by August 9, 1978.

Sincerely,

Anthony Z. Roisman
Staff Attorney

Thomas B. Cochran
Staff Scientist

Attachment

cc: Dr. James R. Schlesinger
Michael J. Lawrence
Dr. James Liverman
J. Gustave Speth

POOR ORIGINAL

1-174

<u>Analysis of Space Available for</u>

<u>Storage of Spent Fuel at</u>

<u>Existing Operating Reactor Sites</u>

Natural Resources Defense Council
917 15th Street, N.W.
Washington, D.C. 20005

July, 1978

960408

Introduction

Although the Department of Energy has announced a spent fuel policy dependent upon use of away-from-reactor-storage (AFRs) for accumulated spent fuel, there is no evidence that DOE has investigated the potential for expansion of spent fuel capacity at reactors (ARs) by building new spent fuel pools. Because of numerous environmental and political problems inherent in the use of AFRs,*/ their use should be avoided if at all possible. The attached analyses attempt, on the basis of readily available data, to explore the potential for ARs. The most significant finding is that a storage pool large enough to accommodate 40 years of spent fuel from a reactor could be installed on less than 1/4 of an acre. The smallest reactor site for any operating reactor is 83.63 acres and the average reactor site is over 1,000 acres.

Before further effort is expanded on development and approval of AFRs, we believe DOE should thoroughly analyze the relevant data and determine definitively whether there is any technological reason why the use of expanded ARs cannot meet any legitimate need for spent fuel storage space.

*/ See two NRDC analyses of these problems, "Away From Reactor Storage Facilities: Our Next Nuclear Waste Blunder?," June 6, 1978, and "Nuclear Waste, Too Much Too Soon," June 1, 1978.

Spent Fuel Storage Area for Lifetime Reactor Requirements (based on Morris, Illinois, figures) */

Conversion factors:

1 gal = 231 in^3

1 ft^3 = 1728 in^3

1 gal = 0.13368 ft^3

1 acre = 43,560 ft^2

Morris data:

700 tons fuel

675,000 gal = 90,234 ft^3 of water in the pool

Pool depth = 28.5 ft

Area = $\frac{90,234}{28.5}$ = 3166 ft^2 or 56' x 56'

If spent fuel capacity = 1200 tons fuel (lifetime reactor requirement)

$\frac{1200}{700} \times 3166\ ft^2 = 5428\ ft^2$ or 73' x 73'

$\frac{5428}{43,460}$ = 0.125 acres

*/ Data based on informal document entitled "Activities at Morris Operation," prepared by E. E. Violand of General Electric Company, attached to NRC Site Visit Report dated November 28, 1977, NRC Docket No. 70-1308.

Acreage at Operating Reactor Sites

There are presently 68 commercial power reactors licensed to operate in the United States. Sixty-seven of these units are actually in operation.[1/] These generating stations are located at 48 separate sites, which vary greatly in size, ranging from 4,738 acres for the Crystal River facility, to a mere 83.63 acres for San Onofre Unit 1 on the Camp Pendleton Marine Reservation in California. Data on site acreage for 53 reactors at 38 separate locations was obtained from either Preliminary Safety Analysis Reports or the Environmental Reports on file with the NRC. Data was not available for 12 reactors at 8 sites, and material available for 3 reactors at the remaining 2 sites did not specify acreage in site descriptions.[2/] The data obtained from the NRC is set forth in Table I, supplying the names of the 68 reactors, the acreage of the sites on which they are situated, and the names of the companies which own these sites. Taken together, these 38 sites comprise a total of 38,369 acres, averaging 1,010 acres per site.

Each utility listed is assumed to have legal title to the acreage listed, unless specified otherwise. The PSARs and ERs examined varied in the extent of their discussion of site ownership. Most stated that the applicant owned/controlled the reactor site. Others did not. In one instance, joint ownership is described in detail.[3/] In the case of Brown's Ferry, the 840-acre site is owned by the federal government, but is in the custody of the Tennessee Valley Authority.

The information on the various uses to which different parts of the site are put also varies significantly. Most site descriptions list a general acreage figure without further breakdown. Some, however, are quite specific, such as the description supplied for the Edwin I Hatch Nuclear Plant, Unit 1, set forth below:

Plant area	23
Cooling tower area	25
Substation	18
Construction area	18
Railroad yard	22
Visitors center	4
Access road	4
Spoil and borrow area	87
Total acreage	201

An interesting aspect is that from the small amount of evidence available, it appears that acreage requirements for nuclear-related facilities are quite small. Reactors themselves probably require less than 10 acres, as the 7.5 figure for Beaver Valley indicates.[4/] Acreage requirements are dependent to a certain extent upon design parameters, such as whether or not a facility has a once-through or tower cooling system, but the site acreage for San Onofre suggests that as few as 83.63 acres can be required. Even the figure of 201 acres presented above is quite small, being only 8.9% of the 2,244 acre site on which it it situated, and only 20% of the 1,010 acre average for the sites examined. NRC estimates that the land requirement for facilities directly related to the operation of the reactor itself is well under 100 acres and probably less than 50, but the average of land utilized as set forth in the summary and conclusions of the environmental impact statements issued by the NRC is 100 - 150. This average, however, includes facilities such as parking lots and visitors centers. NRC also indicates that most utilities purchase enough land for a 200-foot radius around the reactor for an exclusion zone, which would be approximately 288 acres.

Table 1

Nuclear Station/Operator	Acreage
Arkansas Nuclear One, Unit 2 Arkansas Power & Light Co.	1,164
Beaver Valley Power Station Duquesne Light Co.	449
Big Rock Point Reactor Consumers Power Co.	NA
Brown's Ferry Nuclear Plant, Units 1, 2 and 3 Tennessee Valley Authority	840
Brunswick Steam Electric Plant, Units 1 and 2 Carolina Power & Light Co.	NA
Calvert Cliffs Nuclear Power Plant, Units 1 and 2 Baltimore Gas & Electric Co.	1,135
Donald C. Cook Nuclear Power Plant, Units 1 and 2 Indiana-Michigan Electric Co.	650
Cooper Nuclear Station Nebraska Public Power District	1,090
Crystal River Nuclear Station, Unit 3 Florida Power Corporation	4,738
Davis-Besse Nuclear Power Station Toledo Edison Co. and Cleveland Illuminating Co.	950
Dresden Nuclear Power Station, Units 1, 2 and 3 Commonwealth Edison Co.	953
Duane Arnold Energy Center Iowa Electric Light & Power	500
Joseph M. Farley Nuclear Station, Unit 1 Alabama Power Co.	1,850
James A. Fitzpatrick Nuclear Power Plant Power Authority of the State of New York	702
Fort Calhoun Station Omaha Public Power District	382
Fort St. Vrain Reactor Public Service Co.	2,238

Robert Emmet Ginna Nuclear Power Plant Rochester Gas & Electric	338
Haddam Neck Plant, Unit 1, or the Connecticut Yankee Nuclear Power Plant Connecticut Yankee Atomic Power Co.	525
Edwin I. Hatch Nuclear Plant, Unit 1 Georgia Power Co.	2,244
Humboldt Bay Power Plant Pacific Gas & Electric Co.	142.9
Indian Point Nuclear Generating Station, Units 1, 2 and 3 Consolidated Ed'son Co.	239
Kewaunee Nuclear Power Plant Wisconsin Public Service Corp.	900
Lacrosse Boiling ter Reactor Dairyland Power Co perative	NA
Maine Yankee Atomic Power Station Maine Yankee Atomic Power Co.	740
Millstone Point Power Reactor, Units 1 and 2 Northeast Nuclear Energy Co.	500
Monticello Nuclear Generating Plant, Unit 1 Northern States Power Co.	1,325
Nine-Mile Point Nuclear Station, Unit 1 Niagra Mohawk Power Corp.	900
North Anna Nuclear Station, Unit 1 Virginia Electric & Power Co.	1,075
Oconee Nuclear Station, Units 1, 2 and 3 Duke Power Co.	2,000
Oyster Creek Nuclear Power Plant Public Service Gas & Electric Co.	800
Palisades Plant Consumers Power Co.	487
Peach Bottom Atomic Power Station, Units 1 a... 2 Philadelphia Electric Co.	600
Pilgrim Nuclear Power Station Boston Edison Co.	517

Point Beach Nuclear Plant, Units 1 and 2 Wisconsin-Michigan Power Co.	NA
Prairie Island Nuclear Generating Station, Units 1 and 2 Northern States Power Co.	NA
Quad Cities Station, Units 1 and 2 Iowa-Illinois Gas & Electric Co.	560
Rancho Seco Nuclear Generating Station, Unit 1 Sacramento Municipal Utilities District	2,480
H. B. Robinson, Unit 2 Carolina Power & Light Co.	NA
Salem Nuclear Generating Station, Unit 1 Long Island Lighting Co.	NA
San Onofre Nuclear Generating Station, Unit 1 Southern California Edison Co.	83.63
St. Lucie, Unit 1 Florida Power & Light Co.	1,132
Surrey Power Station, Units 1 and 2 Virginia Electric & Power Co.	840
Three-Mile Island Nuclear Station, Units 1 and 2 Metropolitan Edison Co.	NA
Trojan Nuclear Plant Portland General Electric Co.	623
Turkey Point, Units 3 and 4 Florida Power & Light Co.	1,524
Vermont Yankee Nuclear Power Station Vermont Yankee Nuclear Power Corp.	125
Yankee Rowe, Unit 1 Yankee Atomic Power Co.	NA
Zion Station Nuclear Power Plant, Units 1 and 2 Commonwealth Edison Co.	NA

Footnotes

1/ The Indian Point Nuclear Generating Station, Unit 1, is described as not being in commercial operation, but not yet decommissioned.

2/ The three units for which information was available but which did not specify site acreage were the Lacrosse BWR and the Brunswick Steam Electric Plant, Units 1 and 2. Files are not available on the following units: Big Rock Point, Point Beach Units 1 and 2, Prairie Island Units 1 and 2, Robinson Unit 2, Salem, Three-Mile Island Units 1 and 2, Yankee Rowe Unit 1, and Zion Station Units 1 and 2. These files are temporarily unavailable.

3/ The 449-acre site for the Beaver Valley Station is almost entirely owned by Duquesne Light Co., which controls 441.5 acres. The remaining 7.5 acres on which the reactor itself is located are owned jointly by Duquesne, Ohio Edison and Pennsylvania Power Co. The only other instances of joint ownership discovered occurred at the Kewaunee facility where 1.13 of the 900 acres are owned by the town of Carlton, Wisconsin, the remainder being under the control of the Wisconsin Public Service Corp. Joint ownership is certainly of far greater significance in the instance of Beaver Valley than Kewaunee. Other situations such as these may well exist, but the lack of detail in the PSARs and ERs make this difficult to determine.

4/ See footnote 3.

POOR ORIGINAL

904055

Department of Energy
Washington, D.C. 20585

September 7, 1978

Mr. Anthony Z. Roisman
Dr. Thomas B. Cochran
Natural Resources Defense
Council, Inc.
917 Fifteenth Street, N.W.
Washington, D. C. 20005

Dear Gentlemen:

Thank you for the comments and suggestions in your August 1, 1978, letter concerning NEPA compliance regarding DOE's spent fuel activities. DOE intends to comply fully with NEPA requirements in the development of specific proposals for interim storage of spent fuel. As part of this process, DOE has issued for public comment a draft Generic Environmental Impact Statement (GEIS) evaluating the environmental impacts of various options for interim storage of domestic spent fuel. Another draft GEIS analyzing the environmental impacts of a range of options with respect to the U.S. offer to accept and store in the U.S. limited quantities of foreign spent fuel in support of U.S. nonproliferation objectives is in preparation. Finally, a third draft GEIS is under preparation concerning the environmental impacts of alternative approaches to the establishment of charges associated with accepting spent fuel for storage and disposal. The comment periods for all three GEISs are currently planned to expire at the same time.

With regard to the specific requests contained in your letter, DOE GEISs will analyze a range of storage options including expansion of spent fuel storage capacity at reactors (decentralized storage) and the use of away-from-reactor (AFR) storage facilities (centralized storage). Alternatives to the announced spent fuel policy, including not implementing the policy, will be fully explored. Only if on the basis of that analysis and other appropriate policy considerations it is determined that the use of AFRs and the Government's involvement in interim spent fuel storage are acceptable,

Mr. Anthony Z. Roisman
Dr. Thomas B. Cochran   2.

will DOE proceed to implement this option in accordance with NEPA and other applicable requirements. Any site specific or other studies related to options under consideratic will be conducted in a manner consistent with DOE's NEPA responsibilities.

Your continued interest in DOE's spent fuel activities is appreciated. Your views will be particularly welcome on the draft GEISs. A copy of the domestic spent fuel draft GEIS has already been sent to you. Copies c: the remaining draft GEISs will be sent to you upon their issuance.

Sincerely,

John M. Deutch
Director of Energy Research

Natural Resources Defense Council, Inc.

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202 737-5000

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New York Office
122 EAST 42ND STREET
NEW YORK, N.Y. 10017
212 949-0049

September 15, 1978

Mr. Rob. .t D. Thorne
Assistant Secretary for
 Energy Technology
U.S. Department of Energy
Washington, D.C. 20545

Dear Mr. Thorne:

For almost a year the Department of Energ has been attempting to determine what is the best cour e of action to follow in order to solve the problem created by the increasing quantities of spent fuel generated by nuclear reactors for which permanent disposal is not available. As set forth in our letter of August 1, 1978, to John Deutch (copy attached), the best and most available solution to this problem is to require that utilities expand at-reactor storage capacity. By letter dated September 7, 1978 (copy attached), Dr. Deutch assured us that this possible solution would be analyzed in the DOE GEIS on spent fuel.

Despite this assurance and despite the fact that at-reactor storage has substantial benefits, the DOE draft GEIS (DOE/EIS-0015-D) does not analyze the at-reac r storage of spent fuel. Instead, the draft GEIS analyzes a decent--lized storage option which includes extensive reliance   lispersed and independent from reactors away-from-react r storage facilities, as well as transshipment of spent fuel between reactors. This is not a substitute for the markedly diff ent solution which would require utilities to build ad itional spent fuel storage pools at the reactor as required and to utilize away-from-reactor storage only if at-reactor storage was technologically impossible or created unacceptable health or safety risks.

In a conversation with Mike Lawrence of DOE, he justified the failure of the draft GEIS to analyze at-reactor storage of spent fuel on the totally discredited theory that if the government did nothing the utilities and private companies would build some away-from-reactor s ent fuel facilities and would ship spent fuel between reactors.

Of course, if that is a risk and if at-reactor storage is the best solution to the problem, then DOE could propose adoption of a law prohibiting away-from-reactor storage and/or NRC could refuse to license away-from-reactor storage facilities and inter-reactor shipments on the ground that they were contrary to DOE policy and, pursuant to NEPA, did not represent the best course of action. The DOE excuse for not considering the at-reactor storage solution has been definitively rejected by the courts and would be again. See Natural Resources Defense Council v. Morton, 456 F.2d 827 (D.C. Cir. 1972).

In order to correct this serious deficiency in the draft GEIS, DOE must prepare a supplement to that draft and circulate it for comment prior to preparation of a final GEIS. The lengthy period available for comments on the draft GEIS (comments are due February 15, 1979) permits the preparation and circulation of this supplement without substantial delay in the completion of the environmental review.

Our purpose in writing you is to advise you at an early date of the most glaring legal defect in the draft GEIS and to urge you to take the steps outlined to correct that defect.

We will be pleased to discuss this letter with you and the actions we request at your earliest convenience. We believe, in view of growing pressures for some action on the spent fuel storage problem, that the actions requested in this letter must be taken immediately and urge you to give them your highest priority.

Sincerely,

Anthony Z. Roisman
Staff Attorney

Attachments

cc: Dr. John M. Deutch

CHAPTER 2. STAFF'S RESPONSES TO COMMENTS

EUGENE H. CRAMER

Comment A-1:

1. THE HAZARD OF ACCUMULATING SPENT FUEL ASSEMBLIES IS NOT ADDRESSED.

Chapter 4.2 considers "Health Impacts" in a broad and uneven fashion--giving in some detail the results of transportation accidents (and of missile accidents) with no consideration of the effects of accumulation of fuel. Appendix G repeats a variety of facts of fuel assemblies and includes an ORIGEN printout of fission product curies and grams, and a graph of heat generation vs time.

On Page 4-9, the unsupported statement is made "...The radiological impacts of this older fuel (is) factors of ten lower than that of the less cooled fuel and results in a small incremental impact to health and safety." This is unduly optimistic unless restricted to the noble-gas fission products, although quite true for the bulk of fission products if allowance is made for the extremely unlikely possibility of fuel element melting upon a total loss of water in the pool more than three months after reactor shutdown.

The enclosed "Relative Spent Fuel Pool Hazard" directly probes the technical safety problem that would be created by requiring a full-sized PWR to store its lifetime spent fuel supply at-the-reactor (AR). The Ingestion Toxicity Index (ITI) option of ORIGEN was used to sum the hazard of all 921 isotopes; computing the volume of water necessary to dilute the isotopes at all times to drinking water tolerance.

The resultant Figure 1 is worthy of inclusion with the miscellaneous data in Chapter 4 and Appendix G because of the startling perspective given:

i) Only after 25 years of 1/3-core discharge would the ITI of the accumulation equal the ITI of a full-core discharge after 1 year operation--both evaluated 10 days after shutdown (Fig. 1).

ii) If the unit were operated 36 years and the full core discharged, the resulting ITI would only be about 85% larger than the ITI of a full core discharged after 1 year operation (Fig. 1).

iii) Figure 3 shows that the more mobile gaseous radioactivity is approximately two factors-of-ten less than the total radioactivity in a fuel element more than 100 days after shutdown.

iv) Figure 4 shows that the gaseous radioactivity (the controlling hazard) is present for only a few days after reactor shutdown--alone justifying the GEIS conclusion.

This analysis lends great credibility to the statements in the GEIS--Figure 1 would go a long way to supporting the GEIS somewhat generalized discussions.

Response A-1:

Physically aged spent fuel is an inert material, particularly in the chemically passive environment of storage pools. The accumulation *per se* has very small impact, as noted throughout this statement and in the references cited in this comment.

It is correct that the potential radiological impacts from spent fuel are restricted since credible mechanisms for accidental release from the storage pool environment are limited.

The comment made regarding the relative toxicity index, although a simplistic use of this part of the ORIGIN code, does, as indicated in the comment, support the general findings of this statement.

Comment A-2:

2. EXCESSIVE RESTRICTION OF REFERENCES TO LICENSING CORRESPONDENCE UNFAIRLY PORTRAYS INDUSTRY CAPABILITIES.

Selecting a model licensing case is excellent for giving guidance on what is (or was) considered important in licensing. Appendix D is well written for overall comprehension, and serves this limited purpose well.

However, the whole point of U.S. Reactor Licensing is to approve/disapprove someone else's designs on safety-only grounds, so that Licensing cannot be the totality of the effort. Thus it is disappointing that no industry experience is recognized or referenced in Appendix D, and Chapter 3.

Attached to this critique is a set of papers presented to the American Nuclear Society June 1977 which are quite pertinent--and should be referenced.

Response A-2:

The intent in Appendix D was to give the reader an understanding of what is involved in augmenting storage capacity at existing nuclear power plants. This appendix was intended to be illustrative rather than all-inclusive. Consequently, all literature references and licensing actions on this subject are not cited in the appendix.

Comment A-3:

3. THE VALUE OF UNRECOVERED FUEL IS NOT LISTED.

Chapter 1.1 (Pg. 1-2) references GESMO for cost-benefits of recovering uranium and plutonium, thus avoiding the awkward political question of discarding some $300 BILLION worth of energy from spent fuel discharged before the year 2000.

However, this avoidance should be faced so long as this section unfairly leaves an uneducated reader wondering why industry was so stupid to attempt reprocessing in the first place. Nor should any quantification of reprocessing benefits stop with statements that "reprocessing could reduce electricity costs by some 1%"--the full truth should be told that "U.S. Reprocessing has been indefinitely banned by Presidential Policy as a means of international politics in stopping breeder reactor development."

Response A-3:

This statement is limited to an evaluation of the environmental impact of the interim storage of spent fuel until policy decisions are made regarding its ultimate disposition. The use of a time frame to the year 2000 was selected as a reasonable bounding condition for this evaluation. An evaluation of the cost-benefits of reprocessing spent fuel is beyond the scope of this statement.

TEXAS ENERGY ADVISORY COUNCIL

Comment B-1:

CREDITABLE ALTERNATIVE

In evaluating your draft, we agree that shutting down the operating nuclear plants is unacceptable. However, your suggesting that the replacement alternative (if nuclear plants were shut down) would be coal plants overlooks several important constraints on the actions of electric utility management. An impending shutdown of nuclear plants may not be recognized until the last moment as far as a utility planning effort is concerned. Short lead times of less than five years would necessitate the use of oil fired gas turbines or combined cycle plants. Further utility management would be faced with the dilemma of whether the nuclear shutdown would be permanent in which case capital intensive coal plants should be built or whether the shutdown is a short term problem (less than five years) in which case cheap oil plants should be built. Specific regions have experienced difficulties even utilizing coal plants as part of their generation mix. The Kaiparowits and Intermountain projects are examples of failures to develop coal plants. Strict air pollution standards in the Midwest and Northeast might preclude additional coal units from being built.

If we are correct in our suggestions that the substitute fuel source in the absence of storage is oil rather than coal, then the tradeoffs of importance are between waste storage and imported crude oil and its inherent problems.

Response B-1:

In the context of this statement, a phased replacement of nuclear by coal-fired power plants is considered. Should there be an abrupt cessation of nuclear power generation without adequate lead time to implement an orderly transition, emergency measures having short-term economic impact in addition to that shown in this statement would result.

Comment B-2:

AWAY-FROM-REACTOR POOL STORAGE

We also agree with your assessment that private industry does not at this time have away-from-reactor pool storage excess capacity. Further private industry would probably not be involved in the issue of spent fuel storage at away-from-reactor pools unless government writes legislation accepting final responsibility for the spent fuel and guaranteeing profits. The only entity which might provide away-from-reactor pool storage will probably be the federal government. Your draft fails to analyze the probability that the government would develop away-from-reactor pool storage in a timely manner. With the amount of spent fuel rapidly increasing and with the long periods of time required for regulatory review and facility development, adequate storage may not be developed on a timely basis; thus, some operating nuclear plants may be forced to shut down by as early as 1985. Further, there is no indication of whether domestic utilities will have preference for spent fuel storage or foreign utilities complying with U.S. policy of buying back spent fuel. The NRC's acceptance of a policy of indefinite storage will in fact lead to some problems in the supply of electricity.

For the base case in your analysis of indefinite storage of spent fuel, the following options should be considered as possible:

a) The federal government fails to provide adequate legislation to encourage private industry to build away-from-reactor spent fuel storage.

b) The federal government fails to authorize funding for away-from-reactor spent fuel storage on a timely basis.

Response B-2:

The scope of this statement is limited to the impact of interim storage of spent fuel pending its ultimate disposition. Whether such storage is provided by private industry or by the federal government is a policy matter being addressed by the Department of Energy and the Congress.

Comment B-3:

OTHER ALTERNATIVES

We think you have ignored the most logical alternative to spent storage. The best alternative is reprocessing. Regardless of whether you feel the President or Congress will or will not support reprocessing, it is an alternative which must be considered as viable as shutting down nuclear plants and replacing their output with that from additional coal or oil plants. In comparing indefinite spent fuel storage with reprocessing, close attention should be paid to the following points:

a) Long term effect on the price of uranium supplied to utilities with and without the recovery of uranium and plutonium from spent fuel.

b) Economic effects of avoiding reactor shutdown by reprocessing since shutdown is probable under the indefinite spent fuel storage case.

c) Economic effects of removing a stumbling block which has impeded nuclear development by allowing reprocessing. Indefinite spent fuel storage would continue to impede nuclear development.

POOR ORIGINAL

It appears to us that the NRC was negligent in performing its duties by terminating the GESMO hearing without coming to a conclusion. Had GESMO been completed, a reasonable assessment of the need for reprocessing versus the advisability of indefinite storage of spent fuel versus shutting down nuclear plants would already be available.

One is forced to question the logic of the NRC's actions. Had the President said he desired reprocessing, the NRC would still have continued its independent analysis of reprocessing and alternatives. The President did say that he wanted to defer reprocessing. Does that mean that the NRC should immediately stop its independent review of reprocessing versus other alternatives?

364061

Response B-3:

The scope of this statement is limited to the interim storage of spent fuel through year 2000. Disposition of spent fuel either by reprocessing or disposal is beyond the scope of this statement.

The GESMO hearing and related NRC actions are also beyond the scope of this statement.

LT. COL. EMIL G. GARRETT

Comment C-1:

1. The draft statement in considering the option of termination of nuclear power and conversion to coal fired power generation implies that the construction of coal fire plants would not be economically feasible in the Northeast. This view is in sharp conflict with reality. In June 1977, Central Maine Power applied to the Maine Public Utility Commission for the construction of a 600 MWE coal fired plant on Sears Island. Further, stockholders and consumers have been notified of the intent to construct the plant. (See enclosed press report). Maine is the most remote of the Northeast states and it would be logical to assume that if coal fired power is feasible in Maine - it must be feasible in other Northeast states. The only other assumption that could be made is that Central Maine Power is going to build a plant that is not economically feasible.

Response C-1:

The comment appears to refer to Section 3.5 of the Executive Summary of the draft statement. The discussion within that section is directed to the "termination alternative" in which an otherwise usable nuclear power plant hypothetically would be shut down for lack of spent fuel storage, requiring the construction of a replacement coal-fired plant. The associated capital cost would be substantial, of course, as discussed in Section 7.4 of the main body of the statement (not the Executive Summary). At locations remote from coal fields, considerably increased fuel shipping costs also would be incurred, as was noted in Section 3.5 of the Executive Summary. The staff intended no implication as to the economic feasibility of "from scratch" coal-fired plants.

Comment C-2:

2. Again, in considering the termination option the draft statement presents the impact of coal fired power in a deceptive manner. The report discusses the release of radioactive substances released in the stack gases of coal fired plants but does not provide a detailed quantitative and qualitative comparison of releases from nuclear plants. Reference to the three published reports, (one of which deals with a hypothetical plant) cannot be regarded as an adequate justification for the views presented by the draft statement.

Response C-2:

Contrary to the comment, there is no detailed discussion of "the release of radioactive substances released in the stack gases of coal fired plants." However, a reasonably detailed discussion of radioactive releases from nuclear power plants is provided in Table S-3, Title 10, Code of Federal Regulations, Part 51. Those releases were the basis for the estimates of mortality from disease (cancer) given in Table 4.2 of the draft statement. More details are provided in reference 16 of Chapter 4 of the draft statement.

The staff does not agree with the comment that "the impact of coal fired (is presented) in a deceptive manner." Details are provided in the references, which are readily available.

Further, the staff disagrees with the conclusion that "Reference to the three published reports... cannot be regarded as adequate...." Reference 16 of Chapter 4 (discussed above) also shows that the results obtained by the NRC staff are consistent with independent estimates by several other authors.

Lt. Col. Garrett also may find the comment (U-3) from the Department of Health, Education and Welfare on p. 4-5 of the draft statement to be further elucidating.

Comment C-3:

> 3. The potential for the release of radioactive materials from spent fuel pools is not given adequate consideration. The draft statement does not reflect the fact that it is common knowledge that a scenario for black mail and sabotage exists immediately after reactor core re-fueling. Destruction of off-site power lines, sabotage of emergency power sources, and breaching the reactor pool with shaped charges would not present logistic problems of large magnitude.

Response C-3:

The discussion and analyses presented in Chapter 4, "Environmental Impacts," cover radioactive releases, both routine and accidental, associated with increased storage of spent fuel, both at a nuclear power plant (at-reactor, or AR) and at an away-from-reactor (AFR) storage facility. The radiological hazards associated with postulated sabotage attempts were also considered by the staff, with the conclusion that the protection of spent fuel in AR and AFR storage locations is essentially the same--hence, spent fuel storage at either location has little relative significance from the standpoint of altering any existing risks posed by potential acts of sabotage directed at spent fuel pools.

Relative to the comment regarding a scenario involving sabotage of spent fuel immediately following reactor core refueling, the scope of the draft statement was limited to issues pertinent to alternative storage modes and therefore only those fuel assemblies suitable for AFR storage, viz., "aged" assemblies, were considered in the course of analyzing the impacts of increased spent fuel storage. Generic concerns relative to sabotage of other materials (such as newly discharged fuel) at existing nuclear power plants are not germane to this particular review.

STATE OF NORTH CAROLINA, UTILITIES COMMISSION

Comment D-1:

> A) In estimating the need for future storage capacity it was assumed that 414 GWE of nuclear capacity would be installed by the year 2000. This estimate is about 10% greater than a 1977 ERDA estimate of 380 GWE by 2000. The NRC's estimate seems even larger in conjunction with recent postponements and cancellations of future nuclear facilities. It appears that this report is overstating the near term requirements of storage capacity of spent light water power reactor fuel.

Response D-1:

NRC's estimate of 414 GWe of nuclear capacity that would be installed by the year 2000 was based on the GESMO proceeding "super low" growth projections. Since some of the reactors will not yet have discharged any fuel in the year 2000, the total capacity is not representative of fuel-discharging capacity. As indicated in Table 2.1 of the draft statement, fuel-discharging capacity would be 383 GWe, which is essentially similar to the ERDA estimate cited in the comment. The values now projected in the final statement represent the staff's best updated estimate of future capacity.

Comment D-2:

> B) In the transshipment of spent fuel assemblies there is no mention of who (private concerns or Federal agency) will perform this operation.

Response D-2:

A person licensed by the NRC to receive, possess, use, and transfer spent fuel is the shipper (in practice usually the utility firm). To transport the spent fuel, the licensee is required to use packaging that has been certified by the NRC. The actual transportation of the properly packaged spent fuel may be conducted in common carriage, contract carriage, or private carriage.

364063

Comment D-3:

> C) In reference to the transshipment scenario, the conclusion reached indicates that such an approach has little value since the net of full storage facilities remains relatively constant with the reference case. However, it was not emphasized that such an approach would keep older nuclear plants operating several more years as compared to the termination scenario. Hopefully, this time extension would allow for the completion of a permanent storage facility or construction of independent temporary storage facilities.

Response D-3:

It is expected that in some individual cases, transshipment of spent fuel from the storage pool of one reactor to that of another reactor will occur, as in the recent movement of spent fuel from the H. B. Robinson Station to the Brunswick Station. However, as stated in the draft statement, transshipment as a stand-alone alternative is likely to be useful only as a solution to short-term problems. While it is questionable whether interutility transshipment will be practiced to any significant extent since one utility company might be reluctant to store another utility's spent fuel and thus compromise its capacity to store its own fuel, the potential for it and for intrautility transshipment with compacted racks at reactor basins are examined in the final statement.

Comment D-4:

> D) We strongly disagree with the assumption that conservation programs will have little impact on projected need for electricity in the future, especially when the study period extends to the year 2000.

Response D-4:

The staff agrees, and the first paragraph of Section 3.3.3 has been changed.

Comment D-5:

> E) When replacing terminated nuclear facilities with coal, NRC's analysis gave coal units a much higher capacity factor, whereas, the studies in our possession indicate that capacity factors of base load coal and nuclear units are within a few percentage points of each other. As further justification for replacing nuclear units with less coal units (not a one for one exchange), it was stated that the fossil units operate closer to nameplate ratings than nuclear units. In the electric utility industry the important rating for judging unit performance is more likely to be its (maximum) dependable capacity, not nameplate capacity.

Response D-5:

The final statement has been modified to use the same capacity factors for coal and nuclear. It is now indicated that coal capacity to replace nuclear capacity would have to be one-for-one (i.e., megawatt for megawatt).*

*R. G. Easterling, "Statistical Analysis of Power Plant Capacity Factor," U.S. Nuclear Regulatory Commission, NUREG/CR-0382, p. vi, February 1978.

STATE OF WEST VIRGINIA, OFFICE OF ECONOMIC AND COMMUNITY DEVELOPMENT

Comment E-1:

> The viewpoint presented in this study appears to be less than objective because of the unquestioning acceptance of the safety and lack of risk involved with storage and transportation of nuclear wastes.
>
> This position seems especially noteworthy when one considers the general preconception of the inherent risks associated with nuclear waste materials. This dichotomy in the estimates of risk involved with transportation and storage of nuclear wastes should be closely investigated. If this basic conclusion of the study is not substantiated, there are serious questions concerning the other conclusions.

POOR ORIGINAL

964064

> This analysis seems to gloss over certain rather significant questions. If all technological problems with waste storage and transportation have been solved, why have nuclear facilities and plants in Illinois, Kentucky, and West Valley, New York ceased operations? Why have some states outlawed the transportation of nuclear wastes in those states? The generally held view that there remain substantial risks in nuclear waste storage and transportation immediately comes to mind. It also is noteworthy that although nuclear plants have been operating for decades in the U.S., the problem of wastes has yet to be adequately addressed. To continue the practice of worrying about waste storage after the wastes are created will undoubtedly result in increasingly serious difficulties. Even the storage facilities referenced in this impact statement are planned for interim storage only until 1985 when permanent storage is to be available. The latest findings show, however, that permanent storage facilities will not be developed by this target date. Is it not questionable to continue development of nuclear energy without having solved the inherent waste management problems of the industry?
>
> At the very least, it would seem that transportation of wastes should be minimized. If it is true that technology has been perfected to allow the safe transport of nuclear wastes to away-from-reactor sites, there must at least be more stringent regulation of such transportation with very strict enforcement of these regulations. First, however, it must be demonstrated that such technology has been developed.

Response E-1:

Within the context of this study, spent fuel is not considered a waste. The risks involved in the transportation and storage of spent fuel have been examined in depth; the findings of this statement are conservative and are adequately substantiated.

Comment E-2:

> The low risk factor that is claimed is actually the premise on which is based the finding that coal powered generation is a less-than-optimal alternative. This, of course, is an issue of critical importance to West Virginia. The Administration's impetus for coal-powered electrical generation over the next few decades must also be considered in light of the study's findings. I believe coal-powered generation is a more viable alternative than is indicated by the findings of this Impact Statement.

Response E-2:

The conclusion that generation of electricity by burning of coal is more injurious to human health than generation of electricity by use of nuclear energy is supported by many published studies (see below); on the other hand, the staff knows of no studies which arrive at the contrary conclusion.

H. Inhaber, "Risk of Energy Production," Atomic Energy Control Board Report AECB-1119, Ottawa, Canada, 1978.

R. L. Gotchy, "Health Effects Attributable to Coal and Nuclear Fuel Cycle Alternatives," NUREG-0332, 1977.

C. L. Comar and L. A. Sagan, "Health Effects of Energy Production and Conversion," in: J. M. Hollander (editor), Annual Reviews of Energy, Vol. 1, p. 581, 1976.

L. B. Lave and L. C. Freeburg, "Health Effects of Electricity Generation from Coal, Oil, and Nuclear Fuel," Nuclear Safety, 14(5):409, 1973.

L. D. Hamilton, "The Health and Environmental Effects of Electricity Generation," Brookhaven National Laboratory, 1974; also "Energy and Health," in: Proceedings of the Connecticut Conference on Energy, December 1975.

B. L. Cohen, "Impacts of the Nuclear Energy Industry on Human Health and Safety," Am. Scientist, 64:550, 1976.

D. J. Rose, P. W. Walsh, and L. L. Leskovjan, "Nuclear Power - Compared to What?", Am. Scientist, 64:291, 1976.

S. M. Barrager, B. R. Judd, and D. W. North, "The Economic and Social Costs of Coal and Nuclear Electric Generation," Stanford Research Inst. Report, March 1976.

D. W. North and M. W. Werkhofer, "A Methodology for Analyzing Emission Control Strategies," Comput. Ops. Res. 3:187, 1976.

K. A. Hub and R. A. Schlenker, "Health Effects of Alternative Means of Electrical Generation," in: Population Dose Evaluation and Standards for Man and His Environment, International Atomic Energy Agency, Vienna, 1974.

"Comparative Risk - Cost-Benefit Study of Alternative Sources of Electrical Energy," U.S. Atomic Energy Commission, WASH-1224, December 1974.

AMA Council on Scientific Affairs, "Health Evaluation of Energy-Generating Sources," Jour. Am. Med. Assn. 240:2193, November 10, 1978.
Union of Concerned Scientists, "The Risks of Nuclear Power Reactors," H. Kendall (Director), 1977.
Nuclear Energy Policy Study Group, "Nuclear Power-Issues and Choices," Ballinger, Cambridge, MA, 1977.
R. Wilson and W. J. Jones, "Energy, Ecology, and the Environment," Academic Press, New York, 1974.

Comment E-3:

A further difficulty with away-from-reactor sites is the issue of ownersh , of such sites and assumption of risk. It would seem that t e responsibility for such installations should be borne by those who benefit from the electrical production. The power companies involved should absorb all the costs associated with nuclear electric generation, including waste disposal costs. The federal government should not assume such risks and costs when the benefits accrue to only that portion of the populace serviced by the nuclear plant.

It might well be that there is a fourth alternative to the problem of waste storage. The limitation of further expansion of nuclear power until technology does, in fact, reach an acceptable level of safety would provide another approach. When all storage costs are considered with other associated costs of production, the economics of nuclear power production may be questionable. If wastes have to be retrieved and stored elsewhere in the future additional costs would be nearly impossible to fully assess. It would appear that in view of such facts, the development of coal-powered generating plants would be more feasible and certainly more aligned with the Administration's policy of greater dependence on coal to resolve our short-run energy problems.

Response E-3:

It is stated in the comment that the ownership and assumption of risk for AFR storage "should be borne by those who benefit from the electrical production" associated with the production of the spent fuel. The staff believes that (1) no contrary position is advanced in this statement, and (2) the general endorsement of the proposition advanced is a matter for Congressional consideration.

The comment appears also to suggest a moratorium on further expansion of nuclear power "until technology does, in fact, reach an acceptable level of safety." The suggestion seems to lie outside the scope of the statement. Also, the Commission licenses any "nuclear expansion" only after a determination of "acceptable safety."

STATE OF KANSAS, DEPARTMENT OF ADMINISTRATION

Comment F-1:

Table ES-3 Executive Summary requires a bit more descriptive unit than "excess mortality". Is the unit deaths per year or for the period to year 2000.

Response F-1:

The staff agrees that it would be helpful if the table were more descriptive. Table ES-3 is based on early staff testimony that was later published as draft NUREG-0332 (September 1977). In that document, it is noted that excess mortality is synonomous with premature death. Therefore, in the case of radiogenic cancer, for example, excess mortality does not mean more people in a given population will die, since every member of the population will die at some time from some cause. Premature death implies that some members of the population will die (statistically) at an earlier time than they would have had they not received a radiation dose.

The "excess mortality" figures represent projected deaths 90 years into the future (i.e., a 40-year environmental dose commitment period per annual fuel requirement, with a 50-year dose commitment for each of the 40 years). Since publication of the document, the staff has extended the dose commitments up to 1000 years into the future. Table ES-3 has been revised (see response to comment X-10.1).

Comment F-2:

Pages 4-14 paragraph 4.2.2.1 First paragraph following Day Event list describes remaining byproduct materials inventory in percent. The use of percent is not particularly helpful in view of the fact that for many the removal of 90+ percent of anything seems to imply that none remains. This type of nonsense is no more acceptable than the nuclear opponent who describes the occurance of 2 cases of leukemia in a population where one is expected as a 1000% increase. In both cases the numbers are being used editorially not to mathematically describe a system. Such use of the editorial number is not helpful in impact statements.

Response F-2:

The actual values are shown in Table 4.4. It is pertinent that 98.9% of the activity in spent fuel has decayed away in the first year after reactor shutdown. This is the primary reason for the differences in the design requirements for the spent fuel storage facility at a nuclear power plant compared to an independent spent fuel storage installation (ISFSI).

U.S. DEPARTMENT OF COMMERCE

Comment H-1:

When considering the alternative of terminating nuclear power plant construction, the additional release of CO_2 into the atmosphere which would result from increased fossil fuel burning should be considered. Climatologists suspect that increased CO_2 could significantly increase global temperatures in the next century, leading to the melting of Arctic ice and alteration of the climate. Any change in weather and climate could have adverse impacts on agriculture and other activities. The National Academy of Sciences report, "Energy and Climate," (1977) states that the "climatic effects of carbon dioxide release may be the primary limiting factor on energy production from fossil fuels over the next few centuries."

Response H-1:

The staff agrees that climatic effects of CO_2 production may be the primary limiting factor on energy production from fossil fuels; however, the staff also believes the matter to be speculative at this time and not a subject that may be treated objectively in this statement.

Comment H-2:

We believe that all of the generic options discussed for handling and storage of spent light water power reactor fuel could be exercised without adversely impacting fishery resources provided that proper consideration is given to facility siting, design, and operation from the inception of the project. At the time a specific facility and location are proposed, the NMFS would be critically interested in reviewing the proposal for environmental compatibility with fisheries.

Response H-2:

Storage of aged spent fuel both in reactor basins and in independent spent fuel storage installations does not have a significant potential for affecting fishery resources because of the small amount of heat discharged by the fuel and the design restrictions on effluents. Emphasis in the licensing of such facilities will be placed not only on design and operating conditions, but also on evaluation of alternative sites available to the licensee.

U.S. DEPARTMENT OF THE INTERIOR

Comment I-1:

> Groundwater
>
> The analysis of replacement with coal-fired facilities does not indicate comparison of potential groundwater impact. We suggest that the inclusion in the final statement of at least a brief analysis of potential groundwater impacts from the use of coal-fired facilities would be appropriate.

Response I-1:

The potential for groundwater impacts from the use of coal-fired facilities is recognized. However, the staff believes that such impacts could be prevented or minimized through the use of control technology that is presently available. Further discussion or analysis of these impacts is beyond the scope of this statement.

Comment I-2:

> Pool Storage
>
> It is not clear what the effects of a total loss of water for moderation in pool storage may be -- other than perhaps the unshielded radiation hazard. This should be addressed in the final statement in terms of both effects and probability of occurrence.

Response I-2:

Given the present regulatory requirements for spent fuel storage pools, the total loss of water is considered an incredible event. However, radiation from a dry pool forms a site-boundary-distance limiting factor in accident analysis.

Comment I-3:

> Site Requirements
>
> We suggest that the final statement provide a discussion of site requirements for spent-fuel storage facilities. Although site evaluations will be done on a case-by-case basis, we also believe it would be desirable in the final statement to establish some generic criteria, such as avoidance of flood plains.

Response I-3:

The NRC position on the siting of an independent spent fuel storage installation (ISFSI) is set forth in the proposed regulation 10 CFR Part 72, which was published in the Federal Register on October 6, 1978. Such a facility may be located on the site of another licensed nuclear facility, such as a nuclear power station, or may be located at a separate site. The rationale underlying the siting requirements is that although the potential risk is small due to the relatively inert nature of aged spent fuel, sound sites should be selected for such installations.

DETROIT EDISON

Comment J-1:

- Unfortunately, it now appears that the 1985 target date for an operational geologic repository for high-level nuclear waste has slipped to the early 1990's. While we see no drastic impact from this slippage on the findings in NUREG-0404, the report should be appropriately updated so as not to detract from its credibility.

Response J-1:

The comment is noted, and the final statement has been updated.

Comment J-2:

- The 1985 away from reactor (AFR) storage requirements as given in Table 1.1 are a little higher than would be estimated from utility data gathered by EEI. Our estimate is 1300-1500 MT storage requirements with full core removal capability and compact on-site storage compared with 1900 MT given in Table 1.1. However, this difference has only a small impact on the need for AFR storage capability.

Response J-2:

The staff's estimate of 1985 AFR storage requirements with onsite full-core reserve capability and compact storage was based on projections incorporating the best information available to the staff when the draft statement was written. The projections have been updated in the final statement by the use of more recent information. The staff agrees that the differences between the EEI and its own projections will not materially affect the conclusion regarding the need for AFR storage capability.

Comment J-3:

- The analysis of shipping cask requirements does not take into account the possibility of shipping more assemblies per cask than now licensed. Five year cooled fuel should have different shielding and cooling requirements than 120 day cooled fuel.

Response J-3:

This statement is correct, but the shipment of cooler fuel would not affect present NRC package certificates. To exploit shielding and cooling advantages afforded by cooler fuel, new package designs would have to be developed and approved by the NRC.

Comment J-4:

It may be prudent to begin design and licensing of such casks now as a step toward solving shipping problems and helping to reduce the cost. However, before industry can be expected to take such a step, it will be necessary for the government to commit to a definite plan for AFR storage.

Response J-4:

The NRC is a regulatory agency. The regulatory provisions for certification of spent fuel shipping casks are in place. Design of such casks is a function of the licensee.

Whether or not the Federal Government will make a commitment to AFR storage which is authorized by Congressional legislation is not clear at present.

WISCONSIN ELECTRIC POWER COMPANY

Comment K-1:

> Any report of this nature which includes data in respect to the operations of existing nuclear facilities and the projected operations of plants currently under construction is, of course, subject to operating changes and may, therefore, reflect the situation only as of some date prior to publication. Examination of the Appendix tables indicates several areas where, we believe, information is already out of date. It may be appropriate for the NRC staff to consider making the final EIS more current by utilizing the spent fuel storage data recently submitted to, and summarized by, the Department of Energy. To assist you in updating the Appendix data for Point Beach Nuclear Plant, we have attached copies of our responses to the spent fuel storage questionnaires of both DOE and the House of Representatives Subcommittee on Oversight and Investigation of the Committee on Interstate and Foreign Commerce.
>
> Obviously, changes in the projected discharges of spent fuel will result in changes in available storage space for each year and changes in the specific dates by which reactors would need to cease operation.

Response K-1:

The staff appreciates the information provided by Wisconsin Electric. This has been used with other new information to update the final statement.

Comment K-2.1:

> The economic analysis appearing on Page 6-9 concerning the cost increase if 1000 MW of nuclear capacity were forced to shut down is entirely unrealistic. We have calculated, for example, that the replacement power for our Point Beach Nuclear Plant, which is of approximately 1000 MW capacity, would require an additional expenditure of $206 million for fuel alone, or about 20 times the value appearing in the Draft EIS.

POOR ORIGINAL

Comment K-2.2:

> Further in respect to these costs of nuclear plant shut-down because of lack of spent fuel storage capability, we suggest that these economics be calculated for the time at which they are expected to occur, namely in the early 1980's, with comparative cost and price data applicable to the period of time rather than to historic costs of times past in which substitute generation was not required.

Response K-2.1 and K-2.2:

The calculated fuel cost for replacement power for the 1000-MWe Point Beach Nuclear Plant is cited in the comment as $206 million (presumably annual) and is said to be "about 20 times the value appearing in the Draft EIS." Since at 60% capacity factor this figure corresponds to about 40 mills/kWh, the estimate presumably assumes oil-fired replacement power, with considerable allowance for escalation. (40 mills/kWh compares to current typical retail prices to residential customers in much of the United States.)

As noted in the responses to Comments K-3 and O-4, the staff believes that it is reasonable to assume that replacement generation would be largely coal-fired if the hypothetical termination alternative were implemented. With respect to the suggestion that shutdown costs be estimated for the time of occurrence, this appears to mean in then-current dollars for a range of times in the 1980s. The staff believes that the "real" estimates (1976 dollars) which appeared in the draft statement and have been updated for the final statement are more useful since the need for a grossly uncertain forecast of future inflation is avoided. It is certainly possible (even likely) that real prices, of fossil fuels, for example, will change; however, credible forecasts of such changes appear impossible to achieve. In any case, modest changes in real prices would have almost no effect on the qualitative result of the analysis. The dominant economic effect of the hypothetical shutdowns under the termination alternative would remain the heavy cost of replacement plants.

Comment K-3:

> It is extremely unlikely that sufficient coal-fired generation exists to replace present nuclear capacity that might be forced to shut down because of lack of spent fuel storage capability. The usual and expected result of nuclear plant shut-down would be replacement of this capacity with older, inefficient generation or with peaking capability, almost all of which would be oil-fired.
>
> No mention is made of demand changes that would be required for such replacement capability. It is virtually certain that few, if any, utility systems would have sufficient spare or reserve capacity to allow replacement of their nuclear generation without having to purchase such capability from sources outside their system to the extent it is available. No mention is made of the consequences of not being able to replace nuclear capacity by alternative generation sources.

Response K-3:

The staff view was (and is) that since the hypothetical phasing out of nuclear plants as their storage pools filled under this alternative would take place over a number of years and would be predictable with reasonable accuracy, it would be feasible by-and-large to construct replacement coal-fired plants in time to avoid major national dislocation of electrical energy supply. The staff agrees with the thrust of these comments with respect to the difficulties which individual utility systems would encounter, in some cases requiring increased use of oil-fired generating capacity for several years. That a major national economic penalty would result from selection of the termination alternative is, of course, one of the major conclusions of the statement, developed particularly in Section 7.4.

PORTLAND GENERAL ELECTRIC COMPANY

Comment L-1:

> We offer for your use the following comments on NUREG-0404, the NRC generic environmental impact statement on spent fuel storage. Our comments are somewhat limited because of the relatively short time for review. If the NRC extends the comment period, additional comments might be warranted.
>
> The data used in the analysis of spent fuel storage need is not correct for Trojan. Correct data using the EIS assumptions is provided in the attached memo from Mark Litterman.
>
> The fuel usage assumptions for Trojan are also in error. The maximum fuel usage is really the normal usage for the plant. The minimum usage assumes a 42 bundle reload. Under current specifications and limitations, the minimum reload appears to be 48 bundles.
>
> The Draft report erroneously assumes Trojan has 340 spent fuel assembly locations in its spent fuel racks. In actuality Trojan has only 280 spent fuel locations in its spent fuel racks. The following corrections should be included in the final report.

Response L-1:

The staff appreciates the information provided by Portland General Electric Company. This has been used with other new information to update the final statement.

Comment L-2:

B. Section 7.0: The section states that conservation alone cannot compensate for the loss of electrical generating capacity from reactor shutdowns caused by the lack of spent fuel storage and that coal will be the primary replacement energy source. This hypothesis is used in the impact statement to evaluate the consequences of reactor shutdown. While we do not disagree with this conclusion, we recommend that additional justification be provided in this regard to avoid later controversy on this subject.

Response L-2:

The staff believes that the treatment of the topic is adequate and that conciseness, whenever achievable, is helpful to the typical reader.

Comment L-3:

C. Page B-4, Section 1.2 and Appendix D: These sections discuss design codes and regulatory requirements applicable to spent fuel storage facilities. These sections should reflect that these codes and regulatory requirements have evolved with time and, as such, the particular design features in individual plants may differ somewhat depending when the plants were designed and licensed.

Response L-3:

In Appendix B, Section 1.2, safety considerations are addressed in the context of present codes, standards, and regulatory guides pertinent to spent fuel storage. Appendix D was written to be illustrative of the expansion of spent fuel storage facilities at nuclear power plants. The staff agrees that particular design features in individual plants may differ somewhat, depending upon when the plants were designed and licensed.

Comment L-4:

H. Page B-22, Section 3.1.3: We recommend that the discussion of spent fuel storage experience include the work of Dr. A. B. Johnson which is described in Document BNWL-2256, Behavior of Spent Nuclear Fuel in Water Pool Storage.

Response L-4:

The statement has been updated to include information on recent operating experience.

Comment L-5:

The assumption on rack modification for Trojan was 2.5 times existing space. This is not correct for Trojan.

The sweeping assumptions of minimum usage and rack expansion were incorrect for Trojan and are questionable on a generic basis.

Response L-5:

The factor used to determine the effect of compact storage on the increase in storage capability is an average value for all plants and was based on the best information available to the staff. It should not be surprising that the factor used does not agree with that in effect for any specific reactor.

Comment L-6:

We have reviewed the coal fired plant termination case impacts of Appendix C of the Generic EIS for handling of spent fuel from light water power reactors.

The model plant description covers both pulverized coal fired and cyclone furnace fired units, which are called "current technology". We feel that cyclone fired units should no longer be considered "current practice".

The cyclone furnace inherently produces higher levels of oxides of nitrogen (NO_x) and hence it is unlikely that future coal fired units would use cyclone furnaces. Even before the present NO_x limitations went into effect, its use had declined. ~~American Electric Power,~~ The largest ~~single~~ users of cyclone units in the 50's and 60's, have decided not to buy additional cyclone units, largely because the cyclone type furnace limited their coal procurement choices to those coals which had ash characteristics suitable for cyclone firing. A change to pulverized coal firing gave them a much broader choice of coal supplies. In the last few years, only two cyclone fired units have been sold to utilities, one of approximately 125 megawatts in 1974 and one of approximately 450 megawatts in 1975.

The description of the model plant mentions a steam pressure of 3500 psig. We feel that the current trend is for units with nominal steam pressure of 2400 psig, rather than the nominal 3500 psig supercritical pressure cycle.

Many other items are somewhat out of date. For example, it is assumed that no scrubber system would be required if low sulfur coal is used, and it is assumed that Intermittent Control Systems would provide a cost effective emission control. It is currently unlikely that scrubbers could be omitted or that an intermittent control system would be an acceptable emission control method. In the listing of scrubber types, the venturi and the moving bed are listed as most widely used. Currently, the trend is toward the use of the spray chamber type of scrubbers.

The Section 5.1.1 on electrostatic precipitators and Table C.4 on emissions contain various inconsistencies. Section 5.1.1 shows fly ash residuals from 0.4 - 1% leaving the precipitator. Table C, on the contrary, shows emissions as low as 0.13% of the total ash in the fuel. The statement in Section 5.1.1 with respect to reduced collection efficiency of cold precipitators is misleading, since either a cold or a hot precipitator would be designed to meet the required emission limits. The assumption of precipitator efficiency on cyclone fired units equal to precipitator efficiency on pulverized coal fired units is totally unrealistic. Hence all of the data on particulate matter from the cyclone fired units are incorrect.

Response L-6:

The staff agrees that the use of cyclone-fired units has declined and that the current trend is for units of lower pressure. Of the approximately 300 coal-fired electrical power generating plants ordered in the years 1970 through 1977, only about 10% are designed for steam conditions of 3500 psig or greater.

Both pulverized coal burners and cyclone furnaces have been included in the impact statement as examples of the major steam generating types for purpose of comparison. It is not intended to imply that either is preferred. However, each does represent a type of current technology.

The staff agrees that with the developing requirements for emission control, it is unlikely that scrubbers could be omitted from any plant. It also believes that the most cost-effective type will be used, be it venturi, moving bed, or spray chamber. Also, the staff understands that under current EPA requirements, intermittent control is not considered as a viable alternative for controlling emissions.

Section 5.1.1 has been corrected. The range of fly ash residuals leaving the precipitator should have read 0.1-1%. Emissions listed in Table C.4 are based on the assumptions given in Section 6.1. The staff agrees that the precipitator would have to be designed to meet the emission limit. For the reasons stated and the conditions given in Section 5.1.1, the staff believes that hot precipitators are basically more efficient than cold precipitators.

The staff appreciates PGE's comments; however, any changes that would be made to Appendix C would not change the conclusions reached in Section 4.1.2.

POOR ORIGINAL

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STATE OF TEXAS, BUDGET AND PLANNING OFFICE

Comment N-1:

1. Page ES-8, section 4.1.4; page ES-11, second paragraph; page 8-1, paragraph 3: Attention is invited to the predictions made on page ES-11 that "...action will be taken on policy issues pertaining to the ultimate disposition of spent fuel by mid-1980's," and that "...the situation is manageable for some time beyond then, provided that the planning for AFR storage is initiated in a timely fashion."

In elaboration of the foregoing, an important assumption and further prediction is made on pages 8-1 and -2, that if "...the national objective of an operational geologic repository for high-level nuclear wastes and possible disposal of spent fuel by 1985 is attained, the amount of spent fuel requiring away-from-reactor storage is not great. Only if there is a serious slippage in the startup date for such a facility will a large amount of spent fuel require away-from-reactor storage in the last decade of this century. Even under these circumstances, only 6 storage pools of...(7,000 MT) would be required by the year 2000."

Finally, attention is invited to the statement made on page ES-8 that "...extended spent fuel storage, per se, does not foreclose any options on the future storage and possible ultimate disposal of spent fuel as nuclear waste materials. Rather, storage of spent fuels for a period of time could be beneficial as it would provide time for the decay of short-lived radionuclides; subsequent storage and disposal need then only provide for the long-lived radionuclides."

In the light of the foregoing statements from the DGEIS, the TDWR suggests that an explanation be given of the ultimate disposal of spent nuclear fuel if nuclear fuel reprocessing facilities cannot be licensed, and if a national policy on the ultimate disposal of spent nuclear waste is not attained by the mid-1980's -- as anticipated in the DGEIS. Is it implied in the said statements quoted from the DGEIS that full reserve capacities of the spent nuclear fuel can be stored indefinitely at the existing AR and AFR storage pools? Also, is to be assumed from the quoted statements that spent fuels and radioactive wastes stored indefinitely on an "interim" basis using water pool storage technology, will be "retrievable" indefinitely?

Response N-1:

Consideration of the ultimate disposition of spent fuel, whether through reprocessing or disposal in a repository, is beyond the scope of this statement. The bound of year 2000 for such disposition was chosen for purposes of conservatism. Even with delays in full operation of a national waste repository, as recently projected in the Deutch Report ("Draft Report of Task Force for Review of Nuclear Waste Management," U.S. Dept. of Energy, DOE/ER-0004/D, February 1978.) and the "Report to the President by the Interagency Review Group on Nuclear Waste Management" (TID-29942, March 1979), this bound is still conservative. This statement is concerned with interim storage of spent fuel through the end of this century, not indefinite storage.

Comment N-2:

2. Page 4-3, section 4.1.2 (Termination Case); page 7-1, section 7.1.1.2 (Water): TDWR believes that the discussion on water use impacts associated with nuclear and coal-burning power stations should mention the necessity for future, more detailed coverage on a "project-specific" basis. Detailed analysis appears to be especially vital in the case of "storage-only" facilities (i.e., Independent Spent Fuel Storage Installations -- ISFSI) for the reasons mentioned in Section 6 (The Need for More Definitive Standards and Criteria to Govern the Licensing of One or More of the Alternatives Considered), page ES-9; Section 6, page ES-13; and Section 6, page S-3.

Therefore, a firm proviso should be introduced in the DGEIS to require future, detailed, project-specific analyses of water systems management requirements to ensure that uninterrupted adequate cooling and shielding is provided for the growing inventory of spent fuel to be stored at AR and AFR storage sites. The complex water need and use requirements associated with nuclear plant operational systems which are discussed briefly in Section 1.2 (Spent Fuel Pool) and Section 1.3 (Heat Dissipation), pages H-2 through H-6 of

Appendix H in Volume 2 should be reflected in Section 8.0 (Findings), pages 8-1 through 8-3 of Volume 1, and in Section 8.2 (Findings), pages ES-11 through ES-13 of the Executive Summary.

In general, TDWR believes that the publication and development of the subject generic impact statement should not be regarded as precluding any requirements of a site-specific impact statement for spent fuel storage. The impacts noted in the generic statement are too general to allow an adequate analysis of specific impacts at a given site.

Response N-2:

This generic statement is not intended to substitute for the detailed evaluations required for individual licensing actions. Such licensing actions are taken on individual applications, which are site-specific, and include evaluations of the impacts of the proposed nuclear facility (such as an ISFSI) on the proposed site. Such evaluations include water use. Incidentally, it is not expected that the water-use requirements for storage of aged spent fuel will be large; for example, the GE Morris Operation, which stores some 350 MTU of spent fuel, requires only about 5000 gallons of water per day for the entire installation.

Comment N-3:

3. Page ES-10, third paragraph; and page B-32, third paragraph: It is believed that further consideration should be given to the impacts of the statutory in-transit exemption of spent nuclear fuel from physical protection, incident to shipments to away-from-reactor storage sites. The reasoning given on page ES-10, third paragraph, for the exemption assumes that the hypothetical removal and dispersal of spent fuel material would be lethal to "those who might try to remove the contents by disassembly of the cask end covers." However, no time period is established between such initial exposure and ensuing incapacitation and death. Hence, it is not certain to what degree a spent fuel could be dispersed in the enviroment by a subversive act.

In view of the foregoing, it appears that further special consideration should be given to the technical criteria for exemption of spent fuel from security requirements for protection under 10 CFR Part 73 because it is regarded as "a special nuclear material (SNM) that is not readily separable from other radioactive material and that has a dose ra e greater than 100 rem per hour at a distance of three feet when there is no intervening shielding." (See page B-32, third paragraph.)

Response N-3:

The impacts corresponding to attempted acts of theft or sabotage of spent fuel during transportation have been analyzed and are discussed in the NRC's "Final Environmental Statement on the Transportation of Radioactive Materials by Air and Other Modes" (NUREG-0170). The results presented in the referenced FES generally are applicable to movements of spent fuel by road and rail. Portions of this generic statement on spent fuel storage dealing with the present in-transit exemption (10 CFR 73.6) have been revised to incorporate a reference to the results of the NUREG-0170 study and discussion of the staff's current conclusions regarding protection of spent fuel shipments.

GULF STATES UTILITIES COMPANY

Comment O-1.1:

Omission of commercial reprocessing of spent fuel as an alternative to storage is unacceptable. Since other countries are reprocessing commercial spent fuel and since the probability of the U.S. doing so in the near future must be seriously considered, this alternative must be treated.

Response O-1.1:

The scope of this statement is limited to the interim storage of spent fuel through the year 2000. Consideration of the disposition of spent fuel, either by reprocessing or disposal, is beyond the scope of this statement.

Comment 0-1.2:

3.2 Permitting the Expansion of Spent Fuel Storage Capacity at Reprocessing Plants (p.ES-5)

The statement that "there are no reprocessing plants in operation at the present time" needs qualification as it applies to U.S. commercial nuclear power. Foreign commercial, research and defense reprocessing is going on as is U.S. government activities. The remaining portion of this paragraph is deceptive. It does not deal honestly with the alternative of using existing commercial reprocessing sites for fuel storage. Government caretaking (even ownership) of such reprocessing and spent fuel storage facilities needs more thorough evaluation.

Response 0-1.2:

The scope of this statement is limited to the handling and storage of domestic spent light water power reactor fuel, that is, commercial domestic spent LWR fuel. In this context the statement that "there are no reprocessing plants in operation at the present time" as it applies to U.S. commercial nuclear power is correct.

Comment 0-1.3:

4.0 Cost-Benefit Analysis of Alternative (p.ES-7)

General - The analyses of alternatives are incomplete in that reprocessing is not explicitly treated.

Response 0-1.3:

As stated above, reprocessing considerations are beyond the scope of this statement.

Comment 0-2:

Executive Summary

3.0 Methods for Dealing with the Problem of Extended Spent Fuel Storage (p.ES-5)

The "life expectancy" of LWR spent fuel in water pool storage is not explicitly treated. It should be evaluated in this document to determine the effects of protracted storage versus reprocessing. During the Fifties, government officials assured Congress that defense production liquid waste tanks would last 500 years; this, of course, was incorrect. Analogously, it is very important that an explicit statement on a verifiable minimum "lifetime" of spent fuel in water storage be made.

Response 0-2:

In the draft statement, it was stated that "Experience to date indicates that under proper storage conditions, LWR spent fuel can be stored under water for long periods without serious degradation of the fuel cladding." This sentence referenced the document "Behavior of Spent Nuclear Fuel in Water Pool Storage" (BNWL-2256) by A. B. Johnson, Jr. This reference was, however, more specific in its discussion of a storage time frame of 20 to 100 years:

"Based on current experience and on an assessment of the relevant literature, prospects are favorable to extend storage of spent nuclear fuel in water pools, recognizing the following considerations:

- Zircaloy-clad fuel has been stored satisfactorily in pools up to 18 years; stainless-clad fuel has been stored up to 12 years.
- Low temperatures and favorable water chemistries are not likely to promote cladding degradation.
- There are no obvious degradation mechanisms which operate on the cladding under pool storage conditions at rates which are likely to cause failures in the time frame of probable storage."

This final statement includes greater detail on this subject.

POOR ORIGINAL

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Comment 0-3:

3.5 Ordering the Generation of Spent Fuel to be Stopped or Restricted (Termination of Nuclear Power Production) (p.ES-9)

The statement that "the replacement of nuclear power generating capacity by coal fired plants because of filled reactor plant storage pools is technically feasible" is highly questionable.

In light of the extreme difficulties encountered by both coal and nuclear generation in coming on-line, it strains credibility to imagine the possibility of the above statement. The statement implies a certain ease in bringing about 50,000 MWe of extra coal generation on-line in a relatively short time to replace nuclear plants forced out of service (it is more believable that the slack would be taken up by expensive oil-fired generation where possible). Some quantification to justify the "technical feasibility", or magnitude of this task is called for. The implication that continued nuclear generation is merely a matter of choice rather than national necessity needs correction.

4.1.2.2 Replacement with Coal-Fired Facilities (p.4-3)

After stating in the Executive Summary that though "technically feasible" coal replacement of nuclear would entail severe economic, social and environmental costs, NRC states in this section that the only "economically feasible replacement" is coal. This contradiction should be resolved and made perspective to what is actually possible.

6.2 Termination Alternative (p.6-9)

The replacement of nuclear by coal generation as treated herein seems to imply that sufficient excess existing coal-fired capacity would be available. As noted previously, this is not a plausible assumption. The case for such replacement should recognize that older, presently less used oil-fired generation would be called on since totally new coal units could not appear virtually overnight. The most believable replacement for shutdown nuclear plants would be oil-fired generation. This should be acknowledged and evaluated along with the resulting oil importation problem and any resulting power shortages.

Response 0-3:

See response to comment K-3.

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Comment 0-4:

Main Report

4.0 Environmental Impacts (p.4-1)

General - The impact of nuclear power restriction on our human national environment has been inadequately treated (i.e., NEPA was passed to improve our citizens' human condition, not to attempt to hold static naturally changing environmental conditions). The environmental impact due to nuclear power restriction and resultant increased needs for greater oil and natural gas imports needs to be addressed. To the extent that nuclear power cannot be replaced expeditiously, the economic, social and health effects of power shortages should be treated.

Response 0-4:

The comment appears to address the "termination alternative." The staff believes that if this alternative were to be implemented, the prompt replacement of the hypothetically "choked-off" nuclear plants by coal-fired plants would be feasible in most cases, albeit at greater economic cost, since the shutdown date of each affected plant could be predicted with reasonable accuracy. Increased use of existing gas- and oil-fired plants might be required as an interim measure in some cases, but the staff believes that the incremental environmental impacts would be small since the increased non-coal fossil fuel use would be balanced by less use of coal.

Similarly, because whatever interim instances of marginal supply capability that might occur under the termination alternative would be predictable and subject to alleviation by modest planned curtailments, the staff believes that the associated health and social effects would be negligible and the economic effects small in comparison to the direct cost of plant replacement.

This orderly shutdown of nuclear power plants is quite different from an abrupt termination, which would have much greater impacts.*

*"Response to the Jeanine Honicker Petition for Emergency and Remedial Action: An Overview Regarding Radiation Exposure as Related to the Nuclear Fuel Cycle," pp. 24-33, available in U.S. Nuclear Regulatory Commission Public Document Room, Project File M4.

Comment O-5:

4.1.2.2.2 Operational Impacts (p.4-5)

"Questions of global thermal balance including the effect of additional production of CO_2 from replacement coal plants are beyond the scope of this document." This foregoing statement appears unacceptable since the NRC sees fit to treat the global effects of Kr-85 emissions in Section 4.2.1.1 (p.4-11). Obviously the same basis for comparison of nuclear and coal should be used. Both in this se n and in its supporting Appendix C, CO_2 effects should be evaluated globally or drop such evaluation of nuclear power plant emissions.

Though NRC does note that radioactive emissions from coal plants occur, it implies they are directly due to thorium and uranium and neglects to mention radium which appears to be the worst actor on a specific and perhaps gross basis. Coal's radiological effects should be more closely examined in this section and in Appendix C with reference to regional supplies (e.g., Appalachian coal versus Western coal).

Response O-5:

The effects of the additional production of CO_2 are of concern; however, they are purely speculative at this time. On the other hand, considerable information has been developed on radiological effects. Therefore, the staff believes it is appropriate to treat the global effects of Kr-85 in this statement.

It is not the staff's intent to imply that radiological effects of coal plant emissions are due solely to thorium and uranium. These elements are the precursors of a number of radioactive isotopes, including radium, which are in secular equilibrium and which are considered in assessing radiological effects.

It is beyond the scope of this statement to consider regional supplies in assessing radiological effects. Further discussion of the comparison of radiological effects of emissions from coal and nuclear plants is given in response to a comment (T-3.1) by the Ohio EPA.

Comment O-6:

In the discussion of electrical energy consumption growth scenarios it is unclear to what extent consequential effects of "reasonable" (punitive?) Federal actions to induce conservation would be counterproductive. For example, in the State of Georgia severely inverted residential electric rates are currently spurring a consumer shift over to natural gas service. However, in Texas consumers are shifting over to use of more versatile fuel-source electricity to cut down on the use of the natural gas this state produces. Now visualize the national effect of Federally initiated, highly inverted electrical rates while natural gas continues to be Federally controlled below value at a price which discourages greater production.

Response O-6:

The staff agrees that the forecasting of electrical energy demand is risky; however, the intent of the section cited is only to illustrate that even those forecasts which assume a substantial move toward increased true conservation indicate sufficient increase in need for electrical energy to rule out the hypothesis that nuclear power plants could be regarded as "surplus" during the next few decades.

STATE OF NEW MEXICO, DEPARTMENT OF FINANCE AND ADMINISTRATION

Comment P-1:

2.1 Generation of Spent Fuel

This section should identify the percentage of total electrical generating capacity that the projection is supposed to represent. Current estimates of nuclear power generation contribution to the total electrical output vary from 5 percent to 9 percent. Does this projected growth rate anticipate a larger, smaller, or static percentage of the total? This could easily be accomplished in Section 2.2 of the main text.

Response P-1:

The nuclear power capacity projection used in the draft statement was taken from the GESMO study (NUREG-0002). The super low growth value of 414,000 MWe nuclear capacity by the year 2000 given in the GESMO proceedings testimony was used. It would correspond to some 33% to 50% of the total power generated in the year 2000, depending upon what percentage of the base load would be carried by nuclear plant capacity. This would be considerably larger than the approximately 10% of power now generated by nuclear plants. (A low growth estimate of 507,000 MWe nuclear capacity in the year 2000 is given in the GESMO document. This value would correspond to some 40% to 60% of the total power generated in year 2000.)

Comment P-2:

4.1 Impacts on Public Health ....

Table ES-3 should be extended to give a true picture of what it's supposed to represent. What does this actually interpolate to mean in gross numbers of excess mortality from 1975 thru 2000? This could be discussed in Section 4.2 of the main text.

Response P-2:

The staff agrees and has provided additional discussion in Section 4.2.5 of the final statement. (See also the responses to comments F-1 and X-10.)

Comment P-3:

8.2 Findings

6. If the six storage pools (the size of the Exxon facility) mentioned in subsection 3 are actually licensed and built, will the individual states in which they might be located have any recourse if they do not wish to have the facility? The Department of Energy's proposed Waste Isolation Pilot Plant near Carlsbad, New Mexico has encountered widespread opposition and for this reason (among many others) the likelihood of realizing a practical geologic disposal by 1985 is rather dim. This seems to make the Away-from-Reactor sites a virtual certainty. If public opposition were sufficiently strong to preclude a timely addition of AFR sites, how would the gathering wastes be handled?

Response P-3:

Licensing of spent fuel storage installations is a responsibility of the Nuclear Regulatory Commission, a Federal Government agency; however, states and their citizens may have a voice in such decisions through the public hearing process.

The question in regard to possible public opposition to licensing of ISFSI is speculative and beyond the scope of this statement.

POOR ORIGINAL

Comment P-4:

7. Naturally the NRC staff would find that cessation of nuclear power plant operation and prohibition of new plant construction to be undesirable and unnecessary. NRC's assumption is that there will be no "catastrophic" releases of radioactive materials to the degree covered in the October 30, 1975 Reactor Safety Study in which the worst accident considered would cause 3,300 "early" deaths, 45,000 early injuries, and $14 billion in property damage. Although these statistics relate to reactor operation and not particularly to the subject of the DGEIS, it does point up the lethal nature of the subject being dealt with. One major transportation accident which released substantial radiation would easily dwarf the 15-120/0.8 GWY(e) excess mortality of coal power generation presented in Table ES-3.

Response P-4:

The health impacts to the environment as a result of the handling and storage of spent light-water power reactor fuel are covered in Section 4.2. That section includes consideration of a spectrum of potential accidents, e.g., criticality events, fires, explosions, a low probability missile impact, loss of pool water, and consequences of transportation accidents.

As the comment has alluded, the risks from spent fuel storage are not comparable to, and are in fact far lower than, those from reactor operations. This primarily is due to the greatly reduced radioactivity and heat generation rates present in aged fuel as compared to freshly discharged reactor fuel. For example, after 160 days (the probable minimum time for receipt at an away-from-reactor storage facility) more than 97% of the fission product activity, including a large majority of the volatile iodines and noble gases, would have decayed away. Similarly, the heat generation rate of spent fuel after one year is less than 1% of its rate when discharged from the reactor. As stated in the document, calculations indicate that for spent fuel at least one year old, loss of pool water, even though considered to be a highly unlikely event, should not result in fuel failure as a result of high temperatures.

A spectrum of transportation accidents also has been examined, and although the staff concludes that the consequences of a major release from a spent fuel shipping cask could be severe, the low probability of such an occurrence during transportation makes the risk from such accidents very small.

Based on the above considerations, the staff reaffirms its conclusion that the environmental and health impacts of spent fuel storage are dominated by new spent fuel, and whether older fuel is present or disposed of has little impact on health and safety as a whole.

Comment P-5:

1.3 Scope of This Treatment

A footnote for this section points out that the DOE's policy is to take title to spent fuel and its final disposition. This will not alter the estimated amounts of spent fuel to be stored until the year 2000; however, it could certainly alter whether the DOE or a private industrial firm would ultimately construct and operate the proposed AFR sites. It should be clearly delineated in the final GEIS whether the federal government will construct and operate such facilities. In addition, DOE's policy regarding acceptance of spent fuel assemblies from foreign countries' reactors should be explored in regard to the impact on transportation and storage requirements. Obviously, such acceptance will alter the risk analyses and total costs estimates.

Response P-5:

The impacts of the DOE's policy have been considered in an EIS prepared by the DOE ("Draft Environmental Impact Statement, Storage of U.S. Spent Power Reactor Fuel," U.S. Dept. of Energy, DOE/EIS-0015-D, August 1978).

This present NRC statement was prepared in response to the directive of the NRC Commissioners, as described in Section 1 of the Executive Summary, and is concerned only with matters falling within the jurisdiction of the NRC.

Comment P-6:

2.1.3 Design Assumptions of Existing Technology for Storing Spent Fuel Away-from-Reactors

News media have reported that Nuclear Fuel Services has abandoned the West Valley, New York plant and asked the State of New York to assume responsibility for disposal of radwaste at the site. If so, this could mean the technology of AFR storage is not so far advanced as supposed. Please elucidate on the NFS West Valley situation.

Response P-6:

The disposal of radioactive waste at the NFS West Valley plant is not pertinent to the technology for interim spent fuel storage.

Comment P-7:

2.2.2 Storage Capacity through 2000

This section should clearly define the projected number of reactors and their probable size and locations required to compose the aggregate capacity. This would seem necessary in order to estimate train-miles or truck-miles required to transport the spent fuel to arrive at a complete risk analysis during transportation phase.

Response P-7:

While it is true that estimates of routine exposure and the number of accidents in a unit of time depend on the number of vehicle-miles traveled in that time, it turns out that the risk, as represented by the expectation value for latent cancer fatalities, is very small. Consequently, errors in this parameter are tolerable even though the risk is directly proportional to the miles traveled. While a detailed scenario for the physical layout of the industry would certainly help the completeness of the risk analysis, lack of such a scenario does not change the conclusion that the risk is very small.

Comment P-8:

3.1.5.2 Possibility of New Facilities

In light of the policy decision cited in Section 1.3 above and assuming that the Federal Government, instead of private industry, will build and/or operate AFR storage facilities, what would be the probable phasing requirements and what are the most logical and appropriate locations?

Response P-8:

In response to Presidental policy, the Department of Energy (DOE) has announced a spent fuel storage policy under which U.S. utilities will be given the opportunity to deliver spent fuel to U.S. Government custody in exchange for payment of a fee. DOE has issued a draft environmental impact statement (DOE/EIS-0015-D) that analyzes the environmental impacts of the implementation or non-implementation of this policy. Both the DOE and the NRC statements address the phasing requirements of AFR storage facilities. Assessment of the locations and the need for specific information will be the responsibility of DOE.

Comment P-9.1:

3.1.6 Transportation Requirements for AFR Storage

This section should provide an estimate of train-miles or truck-miles per year to be expected so that some judgement on the magnitude of the problem is apparent. Obviously, the miles traveled are to be enormous since shipment to AFR storage will require either 499 truck casks or 92 rail casks by 2000.

After computing the miles traveled, the figures should be applied to the Accident Probabilities per Vehicle Mile in Table 4.7 so that a probable frequency for each accident severity can be estimated. This should be relatively simple since all the factors are already "given": a) tonnages to be hauled, b). rate of spent fuel to be shipped from various reactors, and c). probable locations of AFR facilities, transportation routes and mix of carrier mode (Section 4.2.1.3).

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Response P-9.1:

The average distance for both truck and rail between current reactors and possible AFR storage sites has been estimated to be about 1600 km (1000 miles).* In its most recent risk analysis, the NRC ascribes an average distance of 2500 km (1500 miles) to a typical truck shipment of spent fuel and 1200 km (700 miles) to a typical rail shipment of spent fuel.**

---

*"Transportation Accident Risks in the Nuclear Power Industry 1975-2020," U.S. Environmental Protection Agency EPA-520/3-75-023, Table 10, p. 41, November 1974.

**"Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes," U.S. Nuclear Regulatory Commission NUREG-0170, Table A-5, p. A-13, December 1977.

If we assume the largest distance (1500 miles) for both truck and rail and a 50-50 mode split for truck and rail, the number of shipment-miles (SM) for any given year will be given by

$$\begin{aligned} SM &= 0.5\ (0.5\ BWR + PWR) \times 1500 \quad \text{(truck)} \qquad (1)a \\ &+ 0.5\ (0.06\ BWR + 0.15\ PWR) \times 1500 \quad \text{(rail)} \qquad (1)b \\ &= 750\ (0.56\ BWR + 1.15\ PWR), \end{aligned}$$

where "BWR" represents the number of BWR spent fuel assemblies shipped in that year and "PWR" means the number of PWR assemblies shipped. This formula assumes that truck casks accommodate two BWR assemblies or one PWR assembly and that rail casks accommodate an average of 16 BWR assemblies or six PWR assemblies. If cask capacity were to change, the coefficients of BWR and PWR naturally would have to be changed accordingly.

This formula can be put in terms of the weight in MTHM of spent fuel shipped annually (SFA) on the basis that a PWR element contains about 0.5 MTHM and a BWR element about 0.2 MTHM. Assuming one-third of the spent fuel shipped each year is BWR fuel, the number of shipment-miles for any year becomes

$$\begin{aligned} SM &= 750\ (0.56\ BWR + 1.15\ PWR) \\ &= 750\ (0.56 \times 0.2 \times 0.33 + 1.15 \times 0.5 \times 0.67) \times SFA \\ &= 280 \times SFA. \end{aligned}$$

From the information in Table 2.1, the derived shipping activity from this scenario for the base case (230 GWe) is:

Year	Spent Fuel Shipped Annually (MTHM)	Shipping Activity (10^5 Shipment-Miles/yr)
1979	40	0.11
1980	100	0.28
1981	170	0.48
1982	210	0.59
1983	360	1.0
1984	580	1.6
1985	690	1.9
1986	790	2.2
1987	900	2.5
1988	970	2.7
1989	1070	3.0
1990	940	2.6
1991	1190	3.3
1992	1230	3.4
1993	1520	4.3
1994	1720	4.8
1995	2040	4.8
1996	2210	5.7
1997	2440	6.8
1998	2800	7.8
1999	2840	8.0
2000	3030	8.5

From Table 4.7 probabilities for accidents of different severities thus range as follows:

Accident Severity	(Acc/10^6 ship-mi)	Range of Annual Accident Rates (1979-2000) (acc/yr)
Minor	2	0.7 - 4
Moderate	0.3	0.1 - 0.7
Severe	.008	0.003 - 0.02
Extra Severe	2×10^{-5}	7×10^{-6} - 4×10^{-5}
Extreme	1×10^{-7}	4×10^{-8} - 2×10^{-7}

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Comment P-9.2:

4.2.4 Considerations and Assumptions Used for Offsite Transportation Accident Analysis

This section states that "the consequences of a major release of radioactive material from a spent fuel shipping cask could be severe ...." A full revelation of such consequences should (or must) be made no matter how low the probability is assumed to be. The transportation link is the most vulnerable portion of the cycle under consideration, and people living on the potential transport routes or near AFR sites have the right to know what the risks are, in real terms which are not couched in scientific and mathematical jargon (e.g., statements such as "this probability would be about 4×10^{-14}" are largely unintelligible to the general public). Conclusions on the consequences of a severe accident should be clearly delineated in a manner exhibited in Section 6.5 of "Possibility of Release of Cesium" by Marc Ross (Nuclear Fuel Cycle, Union of Concerned Scientists, MIT Press, Cambridge, 1975).

Response P-9.2:

Risk of public health and safety consequences from transportation accidents is properly presented as a probability function of both the possible radiological dose and the number of people that might receive the dose, such as in Tables 4.8-4.11. The word "risk" connotes a potential event, not one that has occurred. A simpler presentation of risk, albeit one in which some information is lost, is the expectation value of radiological consequences. This format is used in the most recent NRC assessment of risks from transportation, which essentially updates and improves the analysis of WASH-1238 (Reference 19 of Ch. 4 of the draft statement; this reference is updated in the final statement noting that draft statement NUREG-0034 is now the final statement NUREG-0170).

In this assessment, these risks are found to be so low that no regulatory changes in the transportation system are required.

Comment P-10:

4.2.2.9 Dry Waste Materials

How much of this type of waste would accumulate through the projection period? Where would it be disposed of and how would it be transported? What would be the costs related to transportation and disposal?

Response P-10:

Very little dry radioactive waste material results during storage of spent fuel in an independent spent fuel storage installation. However, waste is produced during the receipt and handling of transfer casks and the transfer of spent fuel to the storage pool. The operators of one installation presently storing spent fuel report that about 0.7 m^3 (25 ft^3) of low-level waste material per metric ton of fuel has been produced in the past. The recycling (rather than disposal after single use) of such items as protective clothing is expected to greatly reduce this volume in the future.

Presently, the annual average amount of all solid radioactive waste shipped from a nuclear power plant is about 420 m^3 (15,000 ft^3). This is based on the semiannual reports from the operating nuclear power plants for the years 1972 to 1976. Approximately half of this is dry waste material. A small fraction of this volume, about 1%, is the solid waste from operation of the spent fuel pool. This amount of solid waste from operation of the spent fuel pool will not be changed significantly by an increase in the spent fuel capacity at a plant.

The solid radioactive waste from operation of the spent fuel pool is low-level waste. This waste is disposed of at licensed burial sites. It is transported by truck or by rail. The shipping and disposal cost is about \$700/m^3 (\$20/ft^3) of waste.

Comment P-11:

4.2.3.7 Lowering of Pool Water Level

What is the definition of a "skyshine dose"?

Response P-11:

The term "skyshine" is used in nuclear technology to designate the radiation from a source that might reach an area by scatter from the atmosphere or overhead objects even though direct-line radiation is intercepted by shielding. The event discussed in the statement considers that direct-line radiation would be contained by the below-grade walls of the empty ISFSI pool but assumes that there would be no water or above-grade structural shielding over the top of the fuel assemblies. Some radiation would be scattered from the atmosphere and cause an exposure dose to anyone that might be at the site boundary.

Comment P-12:

4.3.2.2 Life Style/Quality of Life

The nuclear fuel cycle will also cause local societal stresses impacts and adjustments. The uranium mining area known as the Grants Uranium Belt is undergoing all the stresses of boom-town economic conditions. Transportation corridors for spent nuclear fuel will surely feel stress as the shipments increase in the late 1980's. In addition, localities will feel stresses and adjustments in an area selected as a location for an Away-from-Reactor storage site, particularly if those sites are expanded or later chosen as nuclear fuel reprocessing sites.

Response P-12:

Societal stresses and adjustments accompany nearly all commercial and industrial change, and the staff agrees that any industrial or commercial activity associated with the establishment of AFR facilities might induce some societal stress. Such consequences would be addressed in a site-specific manner in the EIS prepared for any AFR facility proposal submitted to the NRC for licensing consideration.

Comment P-13:

5.4 Spent Fuel in Transient

"The high radiation level of the contained fuel and the heavy shielded casks required for safe transport are viewed as adequate protection from malevolent acts." And in Section 7.0 of the Executive Summary it states, ".... the localized direct radiation hazard would be lethal to those who might try to remove the contents by disassembly of cask end covers." It seems that such "safeguard" assumptions are inadequate in that a). it presumes that a determined group could not have the expertise and facilities to handle the contents of a truck cask, and b). although the unknowledgeable or clumsy miscreant would be exterminated by his own recklessness, he could still release substantial radioactivity to a localized area.

Response P-13:

See response to comment N-3.

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Comment P-14:

6.2 Termination Alternative

It would seem desirable to thoroughly investigate the likelihood of anticipated regional shortfall of electrical energy consumption vs. present excess capacity. A substantial migration to the "sunbelt" states is now under way and expected to intensify by 2000. Conservation is still a viable alternative but will not be achieved by administrative jawboning or feeble public relations attempts.

The cost comparisons contained in this section do not include the substantial hidden subsidies to the nuclear power industry. Some sources estimate ERDA's enrichment services to be worth at least 1.0 mill/kwh to the nuclear power industry. The Price-Anderson Act could provide as much as 3.8 mills/kwh. Research and development costs provided by government are probably incalculable but were estimated by the Investor Responsibility Research Center in January, 1975 to be about $5 billion. These costs are all spread over the taxpaying public and make it appear that nuclear power is a bargain when it in fact may not be.

> One other cost not considered in the rate comparison is decommissioning of nuclear plants. When one considers the additional costs (mothballing at $3 to $5 million plus $60,000 to $100,000/year for surveillance; entombment at $18 to $30 million plus $15,000 to $25,000/year; or dismantling at $36 to $60 million) involved here, the rate comparison might be less attractive for nuclear.
>
> It would certainly be worthwhile for NRC to address these issues that have so long been ignored.

Response P-14:

It is suggested in the comment that the regional balance between generating capacity and demand for electrical energy may be affected by regional differences in population growth rates, particularly those due to migration to the "Sunbelt" areas. Without discounting regional differences, the staff believes that most demand forecasting procedures take at least implicit account of service-area demographic trends.

The comment also criticizes the cost estimates given in Section 6.2 for neglect of "substantial hidden subsidies to the nuclear power industry" and of decommissioning costs for nuclear plants. The staff believes that the "neglected" cost elements are irrelevant to the purpose of the section, which is to provide the estimates needed for elevation of the incremental cost of the termination alternative. For example, the (real-dollar) decommissioning cost of a nuclear power plant is not likely to be changed significantly by premature shutdown due to unavailability of spent fuel storage.

BABCOCK & WILCOX

Comment Q-1:

> (2) B&W has investigated two methods of storing spent fuel not mentioned in NUREG-0404. These are:
>
> a. The possibility of disassembling the fuel assembly and close-packing the fuel rods in storage cans.
>
> b. It is possible to suppress the neutron interaction between assemblies to a sufficiently low level by placing poison material in the control rod channels.
>
> We believe both of these proposals show good technical promise for high density storage. If the cost per assembly for storage racks continues to increase, or if very high capacities for long term on-site storage are required, these techniques may prove viable. To help ensure completeness of your report, we recommend that both storage methods be mentioned in NUREG-0404 as possible future alternatives.

Response Q-1:

This statement treats spent fuel handling and storage on a generic basis. In an attempt to present a conservative assessment of potential environmental impacts, present technology was assumed. However, as expressed in Section 3.1.7, this approach was not meant to exclude new designs that may be developed over the next few years.

GPU SERVICE CORPORATION

Comment R-1:

> First, the statement develops a storage supply and demand assessment that, when combined with the conclusions that result from the cost/benefit and environmental analyses of the "curtailment of nuclear power" alternative, clearly points to the requirement for aggressive and timely implementation of the DOE Spent Fuel Storage Policy. The statement should therefore explicitly recommend such action, justified by analyses developed in the course of this review.

Response R-1:

The conclusion that aggressive and timely implementation of the DOE Spent Fuel Storage Policy is required is the commenter's own. The conclusion of this statement is that additional spent fuel storage capacity, both at reactors and at ISFSIs, will be required and can be accommodated without significant impact to the environment. Whether such storage is supplied by public or private means does not influence the conclusions of this statement.

Comment R-2:

> Second, the statement indicates that the two current "storage only" facilities were licensed under 10 CFR Part 50 and 10 CFR Part 70, neither of which regulations are directly applicable to away-from-reactor storage facilities. While action is underway to develop 10 CFR Part 72 "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation," the statement should recommend that the development and publication of this important regulation be accelerated so as to provide a timely interface with the actions of DOE in implementing its policy.

Response R-2:

Proposed 10 CFR Part 72 was issued for comment on October 6, 1978.

Comment R-3:

> Third, the statement should address the requirement for close coordination between the federal agencies involved in the continued or future licensing of rack compaction or away-from-reactor storage plans, whether they be a part of individual utility plans or national policy.

Response R-3:

The only federal agency directly involved in licensing at-reactor storage capacity increase is the NRC. Licensing of ISFSIs could involve another federal agency as a licensee. In that event, the "coordination" would follow as a result of the normal licensing process.

Comment R-4:

> Fourth, the statement should be revised to reflect more current data as it relates to the DOE Waste Disposal and current industry plans. In the DOE Task Force Report on Waste Disposal, the original 1985 target date for an operational geologic repository was indicated to be unrealistic and has since been supplanted by a 1988 objective. This slippage, and any further delays, will increase the requirement for AFR facilities. Further, while announced plans of GE (in terms of expanding the Morris facility) or Exxon (in terms of a reprocessing plant) might indicate industry capabilities, they cannot be assumed available for planning purposes.

Response R-4:

In recognition of the uncertainty in developing plans, this statement was written to cover the period to the year 2000 as a bounding condition.

Comment R-5:

> Fifth, while conservative, the cost benefit analysis for the curtailment of nuclear generation presumes all lost nuclear capacity would be replaced on a one to one basis by coal-fired generation. Given the lead times to new construction, the

> financial capabilities of most utilities, the uncertainty present in licensing coal units and in setting environmental compliance standards, and the fact that several stations are nearing loss of storage circumstances with shorter lead times than new generating stations, it would be more realistic to assume that a portion of lost generation will be purchased through interchange at significantly higher costs than new coal generation.

Response R-5:

See response to comment K-3.

Comment R-6:

> Finally, section 3.1.5.1., entitled "Existing Spent Fuel Storage Facilities," only addresses Federal facilities. This section should be expanded to include commercial and possible hybrid (e.g., joint utility and government) facilities and address the possibilities of federal contracting or acquisition of these storage capabilities.

Response R-6:

Section 3.1.5.1 is a subsection of 3.1.5 that addresses the use of government-owned facilities to store spent fuel. Commercial, privately owned facilities that might be considered as AFR facilities are discussed in Section 3.1.3.

Comment R-7:

> In summary, then, GPU finds the statement to be an adequate analysis but also believes the statement, in view of its potential use as an instrument of policy, should present clear recommendations.

Response R-7:

The scope of this statement is limited to consideration of the impacts of interim storage of spent fuel through the year 2000. The NRC is a regulatory agency; it is not NRC's function to establish national policy.

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STATE OF OHIO, ENVIRONMENTAL PROTECTION AGENCY

Comment T-1.1:

> General: We are still dissatisfied with the lack of progress of the high level waste disposal program. We had indicated some of our problems as early as 1974 in letters addressed to James Liverman, namely that the waste disposal program was proliferating paper rather than projects or results. Four years later, we find the program even more diffuse and still foundering. It is not at all clear from the subject document where responsibility for the decisions lie, how the decisions will be made, or what the criteria of acceptability for any decision will be. Also, it seems evident that some degree of risk will be entailed in fuel element disposal no matter what disposal route is chosen. Again beyond the statutory language "as low as reasonably achievable" there is no indication of what an acceptable risk would entail.

Response T-1.1:

The scope of this statement is limited to an appraisal of environmental impacts attributable to interim storage of spent nuclear reactor fuel pending the resolution of national policy concerning the ultimate disposition of such fuel. The high-level waste disposal program, *per se*, is beyond the scope of this statement.

Comment T-1.2:

Specific comments: p. ES-11. "Although the Staff is confident that action will be taken on policy issues pertaining to the ultimate disposition of spent fuel by the mid 1980's ---". We question the basis of such confidence. Ten years ago the staff was confident that the problem would be solved by now.

p. 8-1. "Only if there is a serious slippage in the startup date for such a facility will a large amount of spent fuel require away from reactor storage in the last decade of this century." Prudence as well as past performances and the massive institutional barriers noted previously dictate that Nuclear Regulatory would do well to plan on this contingency.

Response T-1.2:

In order to conservatively bound the spent fuel storage problem, the staff assumed for this statement that all spent fuel generated would be stored for an interim period extending through the year 2000. Ultimate disposition of spent fuel, whether by reprocessing or disposal, is expected to be implemented prior to the year 2000.

The NRC now is developing the regulatory base for the licensing of spent fuel storage in AFR installations. A proposed 10 CFR Part 72 "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation" (ISFSI) was published in the Federal Register on October 6, 1978. A series of supporting regulatory guides and national standards are now being developed.

Comment T-2:

At the same time that NUREG-0404 was issued, the "Deutsch" Report (Report of Task Force for Review of Nuclear Waste Management DOE/EK-0004/D) was also issued. The conclusions of this task force should also be heeded and will undoubtedly be quoted by many respondents. Although we endorse in general the conclusions of the Deutsch report, we are not in thorough agreement with some of its generalizations. For example, if it is "inappropriate and premature to decide now whether or not WIPP should be used for the permanent disposal of high-level defense wastes,"(p.3) it is equally inappropriate and premature to use the facility as a demonstration of spent fuel disposal (next paragraph). The statement that "scrupulous adherence to the NEPA process is an essential part of the waste management program and DOE efforts in this regard must be strengthened.", (p.4) is meaningless unless the weaknesses of the present DOE program are pointed out. Many state environmental agencies, including our own, have commented upon the need for reform of the NEPA process, especially upon the never ending parade of environmental statements about waste disposal projects which are being perpetually postponed. The instant GEIS seems simply another paper tiger in this parade. The next statement that "Substantial additional work on the GEIS is needed" is also meaningless unless exact areas of deficiency are delineated.

The Deutsch report concludes that geologic disposal can be achieved in a safe and environmentally acceptable manner and that discussions with representatives of the USGS found them to be in agreement with this statement. However, a careful perusal of USGS circular 779 "Geologic Disposal of High Level Radioactive Wastes - Earth Science Perspectives" shows that although USGS may agree with the concept of ultimate geologic storage, they have many reservations and pose a number of unanswered questions concerning such storage, especially storage in bedded salt. Before such storage could be implemented to USGS satisfaction many years and many dollars would have to be spent on research and development. Even then, some of the geologic answers could be in error by a factor of ten. With these uncertainties plagueing the program we wonder when, if ever, an ultimate disposal facility will be built.

Two conclusions from the Deutsch report with which we agree wholeheartedly are that "highest priority should be assigned to demonstrating the capability to place existing military wastes and existing spent fuel from light water reactors into ultimate disposal", and that the 1985 date will probably not be met, 1988 is a more realistic target date.

We would also urge all concerned, DOE and Nuclear Regulatory to describe GEIS efforts which have taken place abroad and to expand cooperative programs with foreign reactor operators and waste management agencies. It appears that the European countries, especially Sweden, are less enthusiastic about salt disposal than is the U.S., and even the Germans are apparently having misgivings about the disposal of High-Level Wastes at Asse. Based on the information in USGS 779 and ORNL-4555 (Project Salt Vault, a Demonstration of the Disposal of High Activity Solidified Wastes in Underground Salt Mines) there would seem to be sound technical reasons behind this as follows: the containers cannot be expected to retain their integrity over long periods of time. Brine pockets would migrate towards the waste canisters because of the thermal gradient. Ultimately, the radionuclides would be dissolved in concentrated brine. Migration of these radionuclides

> can, of course, be impeded by adsorption on soil particles (as happened (fortunately) in the case of the Hanford spills. But in bedded salt, the opportunity for adsorption is virtually nil and even in soil, adsorption from concentrated brine solution would be highly unlikely. Hence, other geologic formations should be more actively considered.
>
> In summary, evaluations of the waste management situation even before the GEIS appeared indicate considerable institutional barriers to the management of high level reactor wastes as well as some technical uncertainties. Observing that it took nearly two and one half years to simply prepare the GEIS makes us doubtful that any of the proposed schedule will be met.

Response T-2:

The subject of high-level waste disposal and its discussion in the Deutch Report ("Draft Report of Task Force for Review of Nuclear Waste Management," U.S. Dept. of Energy, DOE/ER-0004/D, February 1978) is beyond the scope of this statement.

Comment T-3.1:

> p. 4-5 and 4-6. The articles on radioactivity from coal plants grossly exaggerate the extent of these emissions. (The Eisenbud and Petrow article is especially out of date). The most recent article on this subject is by Barber and diGiorgio, and this prompted a reply from our agency which is enclosed with these comments.

Response T-3.1:

To a large extent, this criticism does not apply to the document under review. To reply, there are at least two recent analyses of the radiation doses due to radioactivity releases from coal-fired and nuclear power plants. McBride et al., in Oak Ridge National Laboratory Report ORNL-5315 (1977), go through an analysis which concludes that the population-dose from a coal-fired plant is greater. On the other hand, the United Nations Scientific Committee on Effects of Atomic Radiation, in their 1977 Report to the General Assembly, give a somewhat larger population dose from nuclear plants (p. 212 vs p. 88), largely dominated by releases from BWRs (based on data on 1974 emissions, which have now been substantially reduced).

Actually, there are many qualitative differences between emissions from coal and nuclear plants. For example, the population dose from coal is localized, while that from nuclear is largely worldwide, and different body organs are involved. If effects over tens of thousands of years are included, the effects of nuclear plant emissions become considerably larger, whereas if effects over tens of millions of years are included, effects of coal-fired plant emissions are much larger still.

The most reasonable conclusion is that the effects of radioactivity released from the two types of plants are comparable, but for the coal-fired plants the radioactivity is far down on the list of harmful releases.

Comment T-3.2:

> p. 4-14. The statement about 129I is a remarkable non sequitur. The very long half life of 129I implies also a very low specific activity, 1.4 dpm/g. According to the TERMOD tables one microcurie of 129I would deliver a dose of 3.961 REM to the thyroid. Simple calculation therefore shows that under TERMOD conditions, which are conservative, to deliver a dose of one millirem to the thyroid from 129I would require a disintegration rate of 560 disintegrations per minute or 400 g. of 129I. Since a thyroid only weighs about 20 g., it is clearly impossible for any appreciable dose to the thyroid to come from 129I. Indeed this is even stated in the paragraph. Therefore, if any dose to the thyroid cannot be obtained from 129I, why should its release to the environment be minimized?

Response T-3.2:

The referenced statement on page 4-14 of the draft statement requires correction. The specific activity cited for ^{129}I is 1.4 dpm/g iodine, where background ratio of $^{129}I/^{127}I$ ranges from 4.8×10^{-10} to 3.1×10^{-9}. Thus to receive a dose of the same order as that natural dose from

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the ^{40}K in the thyroid would require $^{129}I/^{127}I$ ratios about 10,000 times background.* If all the iodine in an adult were ^{129}I, the dose to the thyroid would be 54.7 rem/yr, where the Federal Radiation Council maximum permissible dose rate is 1500 mrem/yr.**

With regard to thyroid dose from ^{129}I, NRC policy is to keep all radiation exposure as low as reasonably achievable.

*"Environmental Report, Nuclear Fuel Services Reprocessing Plant, West Valley, New York," received 13 December 1978, Docket 50-201, pp. 5.1-19. Available for review in NRC Public Document Room.

**J. K. Soldat and Betty Klepper, "Radiation Doses from Iodine-129," "Radioecology of Iodine-129," Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research, Part 2, Ecological Sciences (NBWL-1850 PT2), B. E. Vaughan et al., pp. 42-44, January 1979.

Comment T-4:

> p. 4-15. Recent applications to the Ohio Power Siting Commission have predicted burnups of 32,000 MWd/MTU. This probably does not change the results of table 4.4 very much. We would like to know if the 25,000 MWd/MTU is a more realistic figure than the 32,000 figure quoted for Erie 1 & 2 and Davis-Besse II and III.

Response T-4:

The staff believed that in preparing the draft statement, a conservative approach to fuel burnup (and consequent fuel usage) should be taken, and the conservative values were consistent with operating experience.

In the final statement, more recent experience is incorporated.

Comment T-5:

> p. 7-1. First paragraph. "The other, called the reference case, solves the problem by providing for additional spent fuel storage." We wish to emphasize that this does not solve the problem, it merely postpones, and in some ways exacerbates the problem. It is obvious that the failure of the waste management program to provide repositories for high-level waste has now necessitated the construction of additional storage facilities. In no way can this be considered solving the problem. This should be referred to throughout the document as interim storage.

Response T-5:

In the context used, the termination alternative does not "solve the problem" of the need for additional interim spent fuel storage, but rather eliminates it. However, as the findings of this statement show, this is done at a greater environmental and economic cost than the interim storage solution of the reference case. The question of ultimate disposal is beyond the scope of this statement.

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Comment U-1:

> *Chapter 4. In this chapter there is a discussion of the incremental health impacts associated with the alternatives of the termination and reference case storage of spent fuel. The radiological impact from spent fuel storage is considered to be primarily from release of ^{85}Kr from leaking fuel elements, transportation of spent fuel, and occupational exposure of plant personnel. The population dose from these operations appear to be minimal based on analysis of the possible release mechanisms. The occupational exposure of workers based on reactor experience is within acceptable limits. However, as the MT of fuel in storage increases the exposures could become unacceptable. Thus, additional control techniques may be needed to decrease the workers exposures based on operational experience.*

Response U-1:

The additional impacts from spent fuel storage will not continue beyond the time reprocessing or ultimate disposal of spent fuel becomes an operational step in the fuel cycle. For this statement this has been conservatively assumed to be by end of the year 2000.

Comment U-2:

Page 4-13. Data from studies on the management of nuclear waste show that that transportation and transportation accidents are likely to be the major source of population exposure. The conclusion in the statement that the overall impact of spent fuel transportation is essentially insignigicant may not have fully taken into consideration the findings from new studies of high level waste management along with the AEC report, WASH-1238, "Environmental Survey of Transportation of Radioactive Material to and from Nuclear Power Plants."

Response U-2:

Possibly one report guiding the commenter's thinking here is "Determination of Performance Criteria for High-Level Solidified Nuclear Waste," NUREG-0279, July 1977). The finding of that study is that of all the management processes (storage, transportation, emplacement in a geological repository, etc.) applied to high-level waste (which would include spent fuel according to some), the transportation process bears the greatest fraction of the risk. The most recent NRC environmental statement on transportation of radioactive material, NUREG-0170, finds that under the present regulatory system, the risk to public health and safety is so low that no regulatory changes are necessary. Thus, even though transportation may present a relative risk greater than other elements in the nuclear power fuel cycle, the magnitude of the risk is insignificant.

Comment U-3:

On page 4-5, in evaluating the termination case relative to release of radioactive materials from coal fuel plants it should be pointed out that ^{226}Ra is a significant source of environmental contamination that results from burning coal. It is likely that the actual public health hazard from ^{226}Ra in the surface piles of coal ashes is greater than from ^{226}Ra in geologically isolated high-level waste from nuclear power. Also, the amount of ^{226}Ra in ashes from coal containing higher than average concentrations of uranium is comparable to the concentrations of ^{226}Ra found in uranium mill tailings.

Response U-3:

The staff generally agrees with these suggestions. However, it should be noted that most U.S. coal ash would have substantially lower concentrations of Ra-226 (and Th-230) than uranium mill tailings, and the potential health hazards (e.g., from Rn-222 releases) are currently the subject of considerable debate. This question will be discussed in the final version of NUREG-0332, "Health Effects Attributable to Coal and Nuclear Fuel Cycle Alternatives" (reference 16 to Chapter 4 of the draft statement).

Comment U-4.1:

Page 4-13 to 4-26. Discussion of safety and accident considerations indicate that there is no mechanism available for release of radioactive material in significant quantities from the facility, i.e., atmospheric dispersion. The statement that the inventory of radioactive material in aged spent fuels may be in the order of a billion curies or more and that very little is available in a dispersable form suggests that there is a potential for environmental contamination and possible population exposure. In the highly unlikely event of an accident at one of these facilities it is believed that a radiation emergency response plan should be developed and tested to assure protection of the public health and safety.

Response U-4.1:

Even though the potential risk to public health and safety is considered to be very small (see Sec. 4.2.2), proposed 10 CFR Part 72, "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation" (ISFSI), specifically requires an emergency plan as part of any license application.

Comment U-4.2:

> *The statement on page 4-18 that a range of potential accidents and natural phenomena events have been analyzed is not considered to be adequate. In particularly some discussions should be included on the probabilities and consequences from tornadoes and earthquakes.*

Response U-4.2:

The range of potential accidents and natural phenomena events is analyzed in the subsections following the statement cited by the commenter. The impact of a tornado-generated missile's penetrating into a spent fuel pool is discussed in Section 4.2.3.2.

The impact of pool water loss is discussed in Section 4.2.3.7. Since pools and racks are constructed to a Seismic Category I standard and all piping penetrations are restricted to near a pool's surface, a substantial loss of water due to an earthquake is very unlikely.

STATE OF CALIFORNIA, THE RESOURCES AGENCY OF CALIFORNIA

Comment X-1:

> 1. Choice of Alternative Scenarios. The scenarios chosen for evaluation do not reflect the range of realistically available options for managing spent fuel. The three alternatives presented are increased storage, transshipment, and termination. The termination alternative is inappropriate for this statement. The transshipment alternative does present a bounding case for spent fuel management methods; but no environmental, health, or safety impact analysis is performed for this case. The increased storage alternative as described obscures the choices that must be made concerning storage technologies: dispersed vs. centralized, wet storage vs. dry, and so on. Thus, the alternatives chosen do not clarify the issues in a useful way. We have commented generally on each of the alternatives, followed by an outline of a more appropriate choice of alternatives to be analyzed.
>
> Reduction of the comparative analysis of spent fuel management options to a coal vs. nuclear comparison follows only because of the alternatives that have been chosen for analysis in this statement. As pointed out previously, the statement should be rewritten to provide guidance in choosing among the management alternatives.
>
> The paragraph beginning "A replacement of nuclear generating capacity..." is logically flawed. It is true that coal plants can also generate electricity, but this does not lead to the conclusion that "...the only real option...is to continue generating electricity." Furthermore, this conclusion is beyond the proper scope of this document.
>
> The alternatives presented do not really address the issues. See general comments on choice of alternatives.

POOR ORIGINAL

Comment X-2:

2. Comments on Alternatives as Presented.

   a. It is clear that the most common choice for utilities in managing spent fuel has been the expansion of storage capacity at the reactor site. Alternative 1 as presented includes this among the options it examines, but no comparative environmental analysis is made of the various storage technologies assumed under this alternative. At-reactor compact storage, away-from-reactor storage pools, current government facilities, and a design-stage SURFF technology are all treated together. Detailed analysis is confined to current reactor site and AFR technologies; 14 pages are devoted to description of pool storage health and safety effects but no space is given to dry storage. Environmental impacts of dry vs. wet storage are dismissed with a one paragraph description of the INEL facility which concludes that "...the facility does not appear to have any ecological impact on the surface or groundwater environment" (p. 4-3).

3. Recommended Choice of Alternatives. A more useful selection of scenarios for evaluation would focus on three key questions: dispersed vs. centralized storage; maximum vs. minimum transshipment of spent fuel; choice of technology for storage. The alternatives proposed below would allow comparison of environmental impacts for a broad range of answers to these questions.

   Alternative 1 -- Centralized Storage, Minimized On-Site Storage Expansion. This scenario assumes that centralized AFR storage facilities (perhaps government-operated) are made available by a specified target year, e.g. 1985. Pending AFR availability, spent fuel is transshipped between existing pools to the extent necessary to minimize the need for expanded reactor-site storage capacity.

   Alternative 2 -- Centralized Storage, Minimized Transshipment. This alternative is similar to alternative 1 except that reactor-site storage capacity is expanded to the extent necessary to minimize or eliminate the need for shipment of spent fuel between reactors.

   Both Alternative 1 and Alternative 2 should include comparative evaluations of different types of AFR storage, specifically of pool storage vs. the various proposed dry-storage techniques.

   Alternative 3 -- Dispersed Storage, Minimized Transshipment. This scenario envisions maximum expansion of reactor-site storage pools. Comparative analyses would be made for different methods of on-site expansion: re-racking in existing pools, expansion of existing pools, construction of new pools on-site. Transportation of spent fuel would be limited, and would only be used to maintain full core reserve or reload capability while storage expansion takes place.

   Alternative 4 -- Dispersed Storage, Minimized Expansion of Existing On-Site Storage Capacity. This alternative is similar to the transshipment case presented in the draft statement, though more realistic assumptions should be made for storage capacities at new reactors. Environmental and other impacts of the increase in transportation should be evaluated; loss of full core reserve and reload capability over time should be estimated.

POOR ORIGINAL

964093

In the introduction to the findings the statement is made that on-site and AFR storage have essentially equal environmental impacts, but that "[t]his conclusion is based on existing water pool storage technology." Dry storage is expected to have equivalent low impact "[b]ecause of the physical characteristics of aged spent fuel...." This qualification is not made clear in the full document, where judgements of dry storage environmental impacts appear to be based on an uncritical acceptance of the designers' goals and not on the age of the spent fuel.

The finding that dry storage techniques will be feasible and environmentally acceptable is not supported by detailed analysis or by demonstration of any of these techniques.

The discussion of dry storage facilities is misleading in that it presents a large amount of detail on technologies which are today only in the conceptual design stage, but fails to justify the conclusion that environmental impacts from such facilities will be equivalent to or less than those from pool storage facilities.

Response X-1 and X-2:

The staff believes that alternatives presented do bound the available options. Further evaluation of the transshipment stand-alone alternative is not justified as this is only a near-term solution and not a viable option through the year 2000. However, as an option in the reference-case alternative wherein at-reactor storage is augmented, it receives further consideration in the final statement. Relative to dispersed versus centralized and wet versus dry storage, individual methodologies were evaluated within the context of the reference case. Dry storage of LWR spent fuel is not a fully developed and licensed method of storage. However, examination has shown no insurmountable obstacles to its development. At such time as an application may be received, NRC will evaluate such proposal. The comment quotes selectively from page ES-9 of the draft statement, "A replacement of nuclear generating capacity. . . the only real option is. . . to continue generating electricity." This quote fails to note the essential clause "if the power base is to be maintained."

Comment X-3.1:

b. Although transshipment is identified as an alternative for analysis, "environmental impacts and financial factors of this alternative were not examined" (p. 3-34). The "safety analysis" (Section 3.2.1.3) consists of a two-sentence dismissal of any safety problems in spite of the greatly increased transportation and handling requirements associated with this alternative. The reason given is that transshipment is "only a means for postponing the spent fuel storage problem." This is not convincing since all spent fuel storage technologies short of final disposal are interim solutions. Therefore, transshipment should not be ignored. Instead the analysis should focus on two questions: (1) how long will transshipment allow storage expansion to be postponed? (2) what are the relative impacts of transshipment vs. increased on-site storage?

The statement that the incremental environmental impact of increased transportation is insignificant is not supported by analysis in the summary or in the text of the report.

964094

POOR ORIGINAL

Response X-3.1:

The transshipment scenario has been updated and includes discussion of question (1). As for question (2), recent NRC environmental statements* indicate that increased spent fuel transportation, such as would happen if transshipment is chosen instead of increased onsite storage, would result in an insignificant impact on the environment. Because of the expected infrequent use of transshipment and the estimated short transportation distance (about 150 miles) for transshipment, the environmental impacts for transshipment are negligible. The option of transshipment does not introduce safety considerations that are not taken into account in the regulations, hence the concise argument of Section 3.2.1.3.

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*Final Environmental Statement on Transportation of Radioactive Material by Air and Other Modes," U.S. Nuclear Regulatory Commission, NUREG-0170, December 1977.

Comment X-3.2:

> **Although extension of the time period to 2000 is reasonable, it leads directly to the staff's dismissal of the transshipment option as "...only a means for postponing the spent fuel storage problem..." (p. 3-34). This is not consistent with the recognition of spent fuel storage as "...an interim action, not a final solution."**
>
> **If AFR storage becomes available in the mid- to late 1980's, as projected by DOE, then the fact that "...transshipment provides some relief for about the first decade" is significant. By rejecting transshipment because it is "only a short-term solution," this summary of the transshipment case conflicts with the original statement that spent fuel storage is an interim solution.**

Response X-3.2:

Spent fuel storage, whenever it occurs, is recognized as an interim solution in comparison to spent fuel reprocessing or spent fuel disposal in a geologic repository as final solutions. A spent fuel storage problem occurs when demand for storage space exceeds supply. Transshipment allows expansion of stored fuel into unoccupied spaces to prevent this congestion. Whether spent fuel storage is congested or not, the storage itself is not affected by transshipment.

Comment X-3.3:

> **The description of the transshipment alternative is confusingly presented, making it difficult to judge the validity of the assumptions, the analysis, or the conclusions.**
>
> **The assumptions appear to involve two major flaws:**
>
> Comments
>
> 1. Because it is assumed that the capacity of spent fuel pools would be the same as they were in January 1976 (over two years ago), no allowance is made for increased storage. Even those reactors which have already increased storage capacity are disregarded. As pointed out in the comment referring to p. 3-3, applying the 2.5 expansion factor to the storage capacity given in Table 3.1 implies that storage capacity can exceed requirements in each year from 1976 to 2000. Even with no transfers between PWRs and BWRs, this combination of compact storage and transshipment would lower the requirement for AFR storage.

POOR ORIGINAL

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2. No allowance is made for storage capacity at any reactors coming on line after 1986. If the CESMD "super low" growth projection is used (as it is elsewhere in the statement), spent fuel pools for several reactors other than those listed in Table 3.5 will become available for transshipment.

Response X-3.3:

The transshipment scenario has been updated and takes into account these arguments.

Comment X-4.1:

c. The "termination case" is seriously flawed in concept and the purported choice -- coal vs. nuclear -- is not supported. An analysis of the large question of nuclear vs. other electricity-generating technologies appears to be seriously out of place in this impact statement.

Replacement of nuclear plants with coal plants is not a spent fuel management alternative; it is an electricity supply alternative.

The specific choice of coal as the only available alternative is also deficient. Other alternatives do exist -- stringent conservation, oil, replacement of electricity at the point of use, or even new nuclear plants. The latter option points out the flaw in methodology: if it is assumed that utilities would choose to build all-new generating capaci instead of new pool storage, there is no obvious reason not to build a new nuclear plant with a larger pool. A more credible alternative would be the construction of new storage facilities at the existing reactor, similar to Stone and Webster's design which has been submitted to NRC as a topical report (SWECO-7601).

The EIS should also discuss conservation techniques (such as Building Standards) and other viable electric generating technologies that could lessen the storage problem. These conservation techniques could reduce the need for additional "new" capacity, as existing nuclear baseload capacity would subsequently not be needed to the degree discussed in the DEIS.

Response X-4.1:

The comment mistakes the nature of the "termination alternative," which is the purest of spent-fuel management alternatives, namely that of eliminating the problem at its source. If the termination alternative were implemented (which certainly would not occur by free choice of the affected utilities), replacement generating plants would be necessary unless either (1) equivalent excess generating capacity already existed or (2) a sharp drop in consumption of electrical energy could be tolerated. The two "escape clauses" appear very likely (see discussion in Sec. 7.4.1.2).

The environmental and economic cost of replacement generation is therefore a highly probable cost of the termination alternative and so should be considered. Coal-fired plants are the only likely choice (consistent with the nature of the termination alternative under which numerous nuclear plants would have been made valueless by fiat) since the Powerplant and Industrial Fuel Use Act of 1978 and prior expressions of national policy essentially prohibit the use of oil and natural gas as fuels for new baseload or intermediate generating plants.

Construction of new plant-fuel storage facilities at nuclear plants is a variant of the reference case which is discussed in the final statement.

POOR ORIGINAL

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Comment X-4.2:

The conclusion that "...it seems unlikely that new reactors would be put into service..." if storage pools at old reactors fill up does not follow. The interim storage problem could be solved for new reactors by building large capacity pools from the outset. Thus, given the scenario presented here, replacement of old nuclear capacity with new nuclear capacity (with larger storage capacity) would be a feasible option. This points out the flaw in the reasoning behind the choice of this alternative -- in essence, an entire nuclear plant would be built for the sake of its associated storage pool. See general comments on choice of alternatives and on alternatives as presented.

Response X-4.2:

Replacing a nuclear plant with a new nuclear plant because the spent fuel storage pool is filled is obviously economically unsound. The statement on page 3-34 of the draft that no new nuclear plants would be built if plants were being shut down because of lack of spent fuel storage seems highly reasonable.

Comment X-4.3:

Finding number 7, based on the "termination alternative," includes the statement that ".. the prohibition of construction of new nuclear plants is not necessary." This does not follow from the termination case analysis, which is based on the replacement of existing plants with coal-fired plants. The phrase should be deleted.

Response X-4.3:

"Prohibition of construction of new nuclear plants is not necessary" since viable measures for interim spent fuel storage do exist. Reference to the termination alternative in finding number 7 is limited to replacement of existing nuclear power generating capacity. Future nuclear generating capacity, of course, will be individually judged on a cost-benefit basis with other competing alternatives, including coal-fired power generation.

Comment X-5:

B. SAFEGUARDS CONSIDERATIONS

The "Safeguards Considerations" chapter (Chapter 5.0) fails to provide any analysis of the safeguards threat to on- or off-site spent fuel storage facilities. All that is presented is a brief summary of certain provisions of 10 CFR Part 73. There is no comparative analysis of the relative vulnerability of at-reactor or AFR storage, no discussion of environmental consequences of sabotage attempts, and no economic analysis of the impact of physical protection measures on storage costs.

In fact, there is little if any attempt to give any analysis in terms of environmental impact with respect to safeguards considerations. Although many safeguards considerations are in terms of non-quantifiable, i.e., civil liberties and anticipated or perceived threats, addressing these problem areas is still warranted given the potential magnitude of the hazards compared to alternatives such as coal and solar.

The Safeguards Chapter, only three pages long, clearly does not fulfill the role of an environmental impact analysis. It should therefore be expanded to include a discussion of the above issues.

> **Physical security measures are already in place at a reactor site, but a new security system would be needed at an AFR storage facility. Therefore, construction of independent facilities would have a greater impact on the need for guards, equipment, etc., than would on-site expansion.**

Response X-5:

As noted in the response to comment C-3, the staff has concluded that the protection (which includes the physical characteristics and conditions of storage, along with specific security provisions) of "aged" spent fuel at both reactor and away-from-reactor locations is essentially comparable--therefore, increased storage at either location has little relative significance from a safeguards standpoint. In view of the nature of the comments received on this aspect of the draft statement, Chapter 5 of the final statement has been modified to specifically address certain potential security-related impacts of increased spent fuel storage at alternative locations.

Comment X-6:

> **C. ANALYSIS OF ECONOMICS NEEDED**
>
> **1. Implementation costs of viable conservation techniques sufficient to reduce rate of energy consumption equal to the energy generated by the waste fuel to be stored in facilities over and above existing capacity should be described.**
>
> **2. Estimate what the cost to the utilities would be to store spent fuel under each alternative (per unit of waste or mills/Kwh). This data is essential in determining the impacts on rate payers, an area the DEIS failed to analyze.**
>
> **D. SCOPE AND INTENT OF THE STATEMENT**
>
> **Section 1 of the summary states that the staff was directed to examine alternatives for spent fuel management "...with particular emphasis on developing long range policy." This purpose appears to have been lost in the draft statement. By casting the issue as "spent fuel management vs. nuclear shutdown," long range policy choices among storage alternatives are obscured.**

Response X-6:

In the staff's opinion, a meaningful response to the first request is impossible; even a reasonable effort to define the range of such costs would require an enormous amount of energy-econometric modelling, far beyond the model forecasts of FEA and the Ford Foundation Energy Policy Project referred to in Section 7.4 of the draft statement. Since those forecasts predict increasing consumption of electrical energy for at least a decade even with aggressive federal promotion of "reasonable" energy conservation measures (although the predicted increase is less than without increased conservation effort), the input assumptions which would lead to forecast of substantially falling consumption necessarily would subtend implementation of conservation measures well beyond those earlier considered "reasonable." The viability of such extended approaches to conservation is *a priori* dubious, particularly until the success of present federal efforts, such as subsidies for solar heating and building insulation, can be judged.

With respect to the unit cost of spent fuel storage (the second request in the comment), the results given in Table 7.3 of the draft statement may be translated readily to approximate cost per kWh. The estimated cost per year of operation of spent fuel storage for a 1000-MWe nuclear plant is given as $8.1 million (1976 dollars) for a real annual rate of return on capital of 1%, with lower estimates for higher rate-of-return assumptions. Such a plant would generate 4.38 billion kWh per year at a capacity factor of 0.5. The estimated cost per kWh is thus 1.85 mills for the 1% assumption, 0.9 mills for the 2% assumption, etc.

Comment X-7:

The draft statement also appears to be directed at proving that AFR storage will be needed. From the figures presented in Table 3.1 and in the "Transshipment" section, it appears that compact storage at reactors combined with transshipment could reduce or eliminate the need for large storage-only facilities. This is not meant to suggest that such a policy is the preferred one; however, to illustrate accurately the bounding cases for spent fuel management some such alternative should be analyzed. Instead, every scenario chosen requires that large amounts of AFR capacity be made available in the mid-1980's and beyond.

Response X-7:

In its September 16, 1975, statement that a generic environmental impact statement would be prepared, the Commission envisioned a period extending only to the mid-1980s. Because of changes in national policy and the subsequent indefinite deferral of reprocessing, the period of the statement was extended to the year 2000. The scope of this statement addresses the impact of additional interim spent fuel storage. Consequently the alternatives were selected to bound the situation developing.

See response to comment AK-1.1.

Comment X-8:

As the projected generation of spent fuel is highly influenced by the assumption that 414 GWE of nuclear power will be constructed by the year 2000, the EIS should update and justify the estimates in Table ES-1. For example, does the projection take into account the present status of the proposed Sundesert and Stanislaus nuclear plants in California.

Response X-8:

Table ES-1 includes the projection of spent fuel discharged both from reactors currently operating and from new reactors expected to be in operation by the year 2000. Since there will be a time delay between start of reactor operation and the year of first spent fuel discharge, the staff has projected a total of 383 GWe of capacity discharging spent fuel in the year 2000, although a total of 414 GWe was expected to be in operation at that time. The projection does not take into account the named plants in California since there is no indication at present that they will be constructed.

Comment X-9.1:

The statement that maintenance of a full core reserve is not a safety matter should be supported. Has a detailed analysis been performed to verify this position?

That "many" power plant operators find maintenance of a full core reserve desirable is understating the case. Has any reactor owner indicated that he is willing to forego FCR?

Has any reactor operator proposed to operate for any length of time without FCR? Is the "no-FCR" case a realistic one?

POOR ORIGINAL

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Response X-9.1:

Historically, power reactor facilities have included spent fuel storage pools designed to store the fuel discharged during a refueling plus some additional space. Generally, the additional space provided has been for a full core so that if a need to unload the core should occur, space would be immediately available. NRC has endorsed and encouraged this design philosophy. The attached letter, which was sent to all power reactor licensees to alert them to an inspection requirement that could necessitate unloading the entire core, is an example of NRC endorsement.

The regulatory staff has assessed the above condition and postulated various other conditions that illustrate the benefits of being able to completely unload the reactor, such as reducing the accumulated man-rem dose during certain maintenance or inspection activities. In all cases, however, the conditions presented that might require unloading the core could be permitted to exist and the unloading put off or delayed until space was made available by shipping stored fuel to some other location. No postulated event or safety consideration required immediate core unloading. The ECCS with its redundancy and the reactor vessel with its integrity provide assurance that the core is a safe location to keep fuel already in the core for an indefinite period.

None of the postulated conditions were judged adequate to establish a regulatory requirement. No compelling safety basis was presented; however, benefits from prudent design, operability of the facility, and reduction of man-rem exposures should be self-evident. Therefore, the licensing staff will continue to point out these benefits to applicants but will not, at this time, impose a requirement of fuel storage capability.

Licensees recognize the benefits of being able to unload the reactor, but not all licensees have taken steps to assure that a full core reserve is available. Today about six reactor stations, with one or more reactors, are operating without a full core reserve (FCR). During the past four years other stations also have operated without a FCR. Licensees have increased the spent fuel pool storage capacity to prevent a prolonged reactor shutdown because of an inability to discharge spent fuel during a reload, but not all licensees have requested an increase in storage capacity that provides an FCR.

Comment X-9.2:

It should be made clear that Table ES-2 assumes no transshipment of fuel.

Response X-9.2:

The staff agrees. The matter has been clarified in the final statement.

NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Docket No. 50-285

Omaha Public Power District
ATTN: Mr. Theodore E. Short
Division Manager - Production
Operations
1623 Harney Street
Omaha, Nebraska 68102

Gentlemen:

RE: FORT CALHOUN

As you undoubtedly know, the current shortage of offsite fuel storage spac and fuel reprocessing capability has curtailed the ability of some operatir reactor facilities to ship spent fuel to an offsite location. This situation will probably continue to exist for several more years. Conseque spent fuel is accumulating in onsite spent fuel storage pools; and as the available onsite storage space is used up, more facilities will not have adequate capacity to discharge a full reactor core to the storage pool.

The capability to discharge a full core from the reactor vessel to the stor pool is considered to be an operational consideration rather than a safety problem. However, it should be noted that in some facilities, complete co unloading may be necessary to perform some of the required reactor coolant system inservice inspections. Thus, the inability to discharge a full core could preclude compliance with these inspection requirements and continued operation.

We suggest that you review the inservice inspection requirements in the NRC regulations and your Technical Specifications to determine whether they req discharging fuel, and review your schedule for performing these inspections in view of your projected fuel storage capability. If you find that your current inservice inspection schedules cannot be accommodated within your projected ability to discharge fuel, you should consider advancing your inspection schedules accordingly or taking other action to alleviate the problem.

Sincerely,

Karl R. Goller, Assistant Director
for Operating Reactors
Division of Operating Reactors

cc: See next page

Attachment to Response X-9.1.

961101

Comment X-10.1:

> Table ES-3 is misleading, since the figures given for excess mortality due to nuclear generation are given with more precision than is warranted. A credible range of figures should be presented as is done for coal.

Response X-10.1:

The staff agrees that the use of the table alone, unsupported by a narrative, may be misleading. The basis for these numbers was staff testimony later incorporated into the draft of "Health Effects Attributable to Coal and Nuclear Fuel Cycle Alternatives" (NUREG-0332, September 1977). The text of that document clearly states that there is about an order-of-magnitude uncertainty in both sets of estimates (coal and nuclear).

Since that time, the Commission has directed the staff to reevaluate the long-term radon-222 impacts of the uranium fuel cycle. In addition, the availability of a new global carbon model has permitted the staff to provide a long-term impact estimate of carbon-14 releases. Table ES-3 has been revised in the final statement.

With regard to the question of precision implied by the values in Table ES-3, the staff would like to point out that the totals for both fuel cycles represent the sums of estimates of fuel cycle component impacts, many of which are only one significant figure.

The ranges in the revised Table ES-3 reflect long-term health impact estimates for 100 to 1000 years into a very uncertain future. It is believed there is about an order-of-magnitude uncertainty in the lower range value (0.59), and perhaps two or more orders-of-magnitude uncertainty for the upper range value (1.7), depending on numerous assumptions on long-term stability of mill tailings, human populations, and medical advances in the cure and prevention of cancers and genetic defects.

It is not yet possible to estimate long-term health effects from the coal fuel cycle (e.g., "greenhouse" effect, subsidence of mines, acid mine drainage, leaching of toxic heavy metals from fly ash and flue gas desulfurization sludges). However, recent evaluations by the National Institutes of Health indicate that the long-term impacts of the coal fuel cycle will add significantly to the short-term health risks such as shown in Table ES-3. As a result, it is probable that the uncertainty associated with the long-term effects of the coal fuel cycle will also be more than one order-of-magnitude (e.g., at 1000 years).

Comment X-10.2:

> The conclusion that expansion of at-reactor storage capacity "...can be taken without significant effect on health and safety..." appears to prejudge the outcome of the NRC's consideration of pending licensing proceedings on this subject.
>
> The sentence beginning "Away-from-reactor spent fuel storage..." does not seem to have any point. What distinction could be made between AFR storage facilities and "storage only" type facilities?

Response X-10.2:

The NRC licensing actions with respect to increased at-reactor spent fuel storage capacities have been conducted in accordance with NEPA. All licensing actions completed have resulted in negative declarations with regard to significant environmental impact. Nevertheless, the Commission did state in its September 16, 1975, announcement of intent to prepare this generic statement that,

> "While the Commission believes, as earlier indicated, that the matter of spent fuel storage capacity can adequately be addressed on a case-by-case basis within the content of individual licensing reviews, it also believes that, from the standpoint of longer range policy, this matter can profitably be examined in a broader context. It views the preparation of a generic environmental impact statement as a suitable vehicle for such an examination."

The second comment is well taken; the sentence has been revised to make clear the point that AFR storage facilities are separate structures that may exist on the site of a reactor or other facility or that may stand alone at another site.

Comment X-11.1:

> **Although the Barnwell plant storage capacity is now limited to 350 metric tons (not 400 as stated), recent testimony before Congress by AGNS officials indicated that this could be extended to 2000-3000 metric tons if necessary.**

Response X-11.1:

The Barnwell spent fuel storage installation has not been licensed. Should an amendment application for capacity expansion beyond the present application capacity of 400 MTU of spent fuel be received, it will be reviewed.

Comment X-11.2:

> **Given the termination of the Exxon licensing proceeding, it is misleading to present the storage pool at the proposed Exxon reprocessing plant as a potential storage facility.**

Response X-11.2:

The reference to the Exxon facility has been deleted in the final statement.

Comment X-11.3:

> **Since the NFS or GE Morris facilities were not designed as independent spent fuel storage installations, they should not be used as examples of the successful operation of ISFSI's. Handling techniques, surrounding structures, personnel training and availability may all be different for facilities designed solely for spent fuel storage.**
>
> **Characterizing GE Morris and the NFS plant as "storage only" facilities is misleading since they were not designed for this purpose. This emphasizes the urgent need for release of 10 CFR 72 and supporting regulatory guides.**
>
> **The statement, "Presently, there are several fuel storage pools functioning as ISFSI's, though their original purpose may have been different" is misleading. There are <u>two</u> facilities currently serving as ISFSI's -- GE Morris and NFS -- and <u>neither</u> was intended to serve as a storage-only facility.**

Response X-11.3:

In writing the statement, the staff has used the most current information available regarding existing and potential spent fuel storage facilities. Although some of the storage pools are auxiliary to reprocessing plants, they still are storage facilities and require no lesser degree of licensing control and regulation than a storage facility alone would. The GE Morris operation is licensed under Part 70 for storage of spent fuel as an operating independent spent fuel storage installation.

Comment X-12.1:

> The meaning of the statement "the situation is manageable for some time beyond [the mid-1980's]..." is unclear. At what point would the situation become unmanageable? How long is "some time"? When must planning for AFR storage begin in order to be "timely"?
>
> The finding that "Even under these circumstances, only six storage pools of the size of the projected Exxon facility (7000 MT) would be required by the year 2000" (emphasis added) seems to downplay the significance of such a shortage in storage capacity. In light of the suspension of hearings on the GE Morris expansion, the termination of the Exxon license proceeding, and the uncertainties surrounding the government spent fuel policy, the possible 41,000 MT shortfall by 2000 could become very serious.

Response X-12.1:

As shown in this statement the situation is manageable at least through the year 2000.

The need for planning for AFR storage is specific to individual utilities. In general the staff estimates that a five-year lead time is needed to bring such an installation on line. In anticipation of such need the NRC has published proposed 10 CFR Part 72 "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation" (ISFSI) and has a series of supporting regulatory guides under development.

The staff agrees that if no action is taken to ensure adequate additional storage capacity, a serious problem could develop.

Comment X-12.2:

> The figure of 63,000 MTHM AR storage seem incompatible with the projected requirements for 41,000 MT of AFR storage given in Table 1.1. That this is due to lack of transshipment should be stated clearly in the table.
>
> Table 1.1 is poorly defined. It should say more clearly why the additional AFR capacity is required and should present the potential impact of transshipment. The case requiring additional capacity in 1976 should be amplified -- what actually happened? It should also be made clear whether or not the additional AFR storage needs are in addition to current capacity, and if so what storage is considered to be currently available.

Response X-12.2:

It is noted in the text that Table 1.1 is a summary table with data extracted from Table 3.1. Additional discussion of AFR capacity required and transshipment is presented in Chapter 3. The final statement updates results from 1976. Existing AFR installations are discussed in Section 2.1.3 of the draft statement.

Additional AFR capacity is required as the "at-reactor" capacity is used up by spent fuel discharges from each of the reactors. If an empty storage reserve for one full core is maintained at the reactor, the storage space is more rapidly used and away-from-reactor facilities would be required at an earlier date. Increasing AR storage (as by compaction described in Chapter 3) would naturally reduce requirements for AFR storage.

Nothing "happened" to change the year from 1979 to 1976. This is the natural result of including a full core reserve (FCR) in the storage requirement. One FCR is equivalent to three to four years' discharges, so the time for AFR would be reduced about three years, from 1979 to 1976.

Current AFR storage capability is between 900 and 1000 MT, depending on the type (BWR or PWR) of fuel stored, of which about 500 MT has been used. This remaining (existing) capacity is considered to be a part of the total AFR requirement indicated in Table 1.1.

Comment X-12.3:

> The estimate of 22.4 MT/GWe for spent fuel discharged per year is lower than most other published estimates and conflicts with the 30 MT/GWe figure given on page 2-3. The recent waste management task force report used an estimate of 25.4 MT/GWe. Since a low estimate is a non-conservative assumption, this number should be more adequately justified.

Response X-12.3:

In the draft statement, the staff arrived at 32 MT per GW year (the "about 30 MT" of p. 2-3) for an overall maximum discharge by assuming a reactor efficiency of 32.5%, an average burn-up of 28,500 MW days per MT, and a plant factor of 80%. The average was assumed to be about 70%, or 22.4 MT. In the final statement, spent fuel discharge projections have been updated.

Comment X-12.4:

> The executive summary states that an inventory of 41,000 MT of spent fuel might require storage in the year 2000 -- "only" six times the capacity of the projected Exxon facility. On page 2-5 the statement is made that increasing the projected nuclear capacity 'does not alter the conclusions of this study."
>
> Since the reference case would require approximately forty times the current AFR capability, and the GESMO "Low Growth" case would increase this by about another 40%, the question becomes "how large a storage requirement would be regarded as significant"?

Response X-12.4:

The value 41,000 MT in the draft statement subsequently has been found to be an overestimate. The amount of at-reactor storage for reactors coming on line from 1990 through 2000 was underestimated. Consequently, only 21,000 MT of ISFSI storage would be required in the year 2000. Nevertheless, six ISFSI is not a great number, whether these are the size of the Exxon design or smaller. The largest part of the 95,000 MT of spent fuel generated would be stored in at-reactor pools.

In the GESMO low-growth case the number of reactors operational in the year 2000 would have a total capacity of 507 GWe. To reach such a level of generation capacity would require a very sharp increase in reactors licensed in the period from the late 1980s to the year 2000. However, with compact storage, the spent fuel from these reactors could be accommodated in their own reactor pools through the year 2000. Thus, no additional ISFSI capacity would be required.

It should be noted that nuclear power growth projections and resulting spent fuel generation and storage requirements are updated in the final statement.

Comment X-12.5:

> A useful addition to Table 3.1 would be a column listing available pool capacity with compact storage. If the estimated 2.5 expansion factor is applied to the non-compact capacity figures presented, it appears that storage capacity exceeds discharge plus full core reserve in every year from 1976 to 2000. This seems to imply that allowing transshipment between reactor pools could limit the requirement for AFR storage to zero. (See comment referring to pp. 3-27 to 3-34.)

Response X-12.5:

Spent fuel capacity with compact storage is shown in the final statement. The transshipment alternative has been reexamined in the final statement.

Comment X-12.6:

> To set an upper limit on the potential for reactor-site storage, the highest possible expansion capability should be assessed. For example, Table 3.4 indicates that several reactors have exceeded the 2.5 expansion factor estimated for Alternative 1. If this is commonly achievable and if reactors are built with greater initial storage capacities, the requirement for AFR storage can be drastically reduced.

Response X-12.6:

Values for at-reactor expansion capacities have been revised in the final statement.

Comment X-13:

> Finding number 4 fails to mention the possible effects of long-term corrosion on zircaloy-clad fuel. A recent study for DOE, "Behavior of Spent Nuclear Fuel in Water Pool Storage" (BNWL-2256) recommended that detailed examinations of fuel bundles stored for long periods be conducted, especially if storage under water is expected to last longer than 20 years. This report identified several factors needing further study, including: behavior of defective fuel in pool storage, effects of changes in pool temperature and water chemistry on fuel condition, hydriding of zircaloy due to galvanic coupling, fission product attack on the inner wall of the cladding, and the incidence and consequences of corrosion due to residual stress, crud layer build-up, and crevice corrosion.

Response X-13:

The author (A. B. Johnson, Jr.) of the report BNWL-2256 which is referenced in this comment has indeed suggested that surveillance of fuel stored for 20 years or longer be conducted to confirm the existing evidence that spent fuel pool storage is technically feasible for decades. The proposed 10 CFR Part 72 for ISFSI spent fuel storage requires a surveillance program for spent fuel storage. (Also see response to comment Y-4.1.)

Comment X-14:

> Finding number 8 should acknowledge that the adequacy of the S-3 table is currently being questioned and that changes in 10 CFR 51 may be required.

Response X-14:

Finding number 8 simply states that the impact of additional interim spent fuel storage as projected in this statement does not require any changes in the S-3 Table. Justification of the adequacy of the S-3 Table is beyond the scope of this statement.

Comment X-15:

> Because of the brevity of the discussion of spent fuel permanent disposal in GESMO, an analysis of such an option would be useful.

Response X-15:

This statement addresses the impact of additional interim spent fuel storage; the consideration of permanent spent fuel storage is beyond the scope of this statement.

Comment X-16:

> The assumption that reactors coming on line from 1986-2000 will provide only 1.5 cores of storage capacity is clearly unwarranted. Most operators plan to build capacity sufficient for ten years or more. Even for existing reactors, the NRC staff estimates that compact storage can provide approximately 2.5 x 1.5 cores = 3.75 cores' worth of capacity. It is unclear, then, why new reactors would be built with so limited a capacity.
>
> It is recognized that this is intended as a conservative assumption; however, it drastically inflates the requirement for AFR storage. If it is assumed instead that post-1985 reactors will provide sufficient storage for ten years' discharge (still a conservative assumption), the year 2000 AFR requirement reduces from 41,000 MT to less than 11,000 MT.

Response X-16:

In the draft statement, the staff used available information to determine that the reactors authorized to expand their pools could achieve an average 250% increase in their storage capacity. There is now regulatory indication that reactors under construction will have increased spent fuel storage capacity. The staff agrees that increases greater than the average 2.5 multiple are possible. The staff also points out that space for 3.75 cores will accommodate about 11 years of discharges without consideration of FCR. It should be noted that in the draft statement, the calculation of ARF storage required to the year 2000 takes into account expanded capacity of future reactors (through equivalent compact storage--see Table 3.1).

In the final statement, the average factor for reactor pool storage capacity increase has been updated to 3.0 to reflect present experience.

POOR ORIGINAL

964107

Comment X-17:

> The references cited do not support the conclusion that "[c]onservation is not expected to materially affect the projected need for electricity." Reference 14 projects that fuel requirements for central station electricity generation could be cut to less than half the "historical growth" scenario by increased conservation. This directly contradicts the NRC staff's interpretation of that study. (A Time to Choose: America's Energy Future, Ford Foundation Energy Policy Project, pp. 28-29, 76.)

Response X-17:

The first paragraph of Section 3.3.3 has been changed.

Comment X-18:

> Environmental effects of having to de-commission and de-contaminate the nuclear facilities after termination should be discussed.

Response X-18:

See response to comment AU-11.

Comment X-19.1:

> The ecological section is incomplete in that it fails to adequately discuss the environmental impacts of: dry vs. wet storage, dispersed vs. centralized storage, and maximum vs. minimum transshipment of spent fuel. In addition to assessing these issues the document should discuss the following specific impacts.
>
> 4.1.1.1 Compact storage increases the extent of potential environmental impacts by increasing the amount of radioactive material at the storage facility. Specifically, the report should discuss the change in magnitude of impacts from additional waste heat and accidental or abnormal events.

Response X-19.1:

The various storage techniques were examined individually in Section 4. As stated in Section 4.1, their collective contribution defines the reference case alternative.

As the spent fuel involved in increased at-reactor storage is aged fuel, progressively older as its quantities are increased, the changes in the magnitude of impacts from additional waste heat and from accidental or abnormal events are an incremental addition at least an order of magnitude less than those related to the freshly discharged fuel for which reactor pools are designed.

POOR ORIGINAL

964108

Comment X-19.2:

4.1.1.2 Wet Storage Facilities. Discuss the ecological and health impacts from accidental loss of cooling water (Section 4.2.3.8).

Response X-19.2:

The loss of cooling water from reactor pools is not a credible accident. The loss of cooling water from an ISFSI containing spent fuel aged more than one year does not represent a significant environmental impact. The water can readily be maintained at a purity of 5×10^{-4} μ Ci/mL. Cooling systems for such pools are normally operated intermittently.

Comment X-19.3:

4.1.1.3 Dry Storage. Identify, quantify and discuss the impacts from "above normal temperatures in soils immediately surrounding the storage area."

Response X-19.3:

Above-normal temperatures in soils immediately surrounding the storage area for below-ground cannister storage are local in nature, extending out to a maximum of about 25 feet. The localized higher temperatures could be expected to result in nothing more serious than a "drying-out" of the soil surrounding buried cannisters.

Comment X-19.4:

Explain the area and impacts that may become sterile and the probability of it occurring.

Response X-19.4:

Soil sterility effects would be highly localized, extending no more than 2 to 3 feet, because of the shielding characteristics of the soil to the gamma radiation emanating from the spent fuel.

Comment X-19.5:

Since a potential for leaching does exist, the EIS should discuss the probable impacts on the environment. If leaching of radioactive materials from a dry storage facility does occur scenarios should be constructed that describe the various degrees of impacts from leaching, including surface and ground water contamination. References that present more in-depth information on potential ecological impacts should also be included.

Response X-19.5:

Potential for leaching is a site- and design-specific problem. Licensing review would be directed towards assuring that any leaching would be precluded, and monitoring and surveillance requirements would be imposed on such a dry storage installation.

Comment X-19.6:

It is assumed that the missile enters the pool at an optimum angle of 45 degrees, a 45-foot row of fuel is attacked, resulting in a conservative release of radionuclides.

However, there may be more KR^{85} for dispersal if the "worst case" is used. What are the effects on the fuel rods; are they knocked over? Is their integrity diminished? Are the racks sufficiently rigid to withstand such an impact? (Although the racks may be designed to withstand a fuel rod drop, has it been designed for a 144 mile per hour m' :ile?)

Response X-19.6:

Relative to the analysis of damage to spent fuel by missiles, a "worst case" was assumed for the release of Kr-85. The fuel rods were assumed to be ruptured, but not knocked over since they are contained within storage racks. The storage racks are designed to be seismic resistant. The worst case is one in which individual fuel rods are ruptured, thus releasing the gap activity, which is primarily Kr-85.

Comment X-19.7:

Secondly, because of the initiating event (tornado), ambient air or meteorological conditions will be far from normal, which might agitate the "ORIGEN Code" calculations." Under tornado conditions and with a 13½" hole in the side of the fuel pool, a situation may exist (and should be discussed) where radionuclides are readily dispersable into the atmosphere and release of the cooling and moderating medium may leave faster than the auxiliary pumps can handle.

Response X-19.7:

The meteorological conditions of a tornado would disperse any (gaseous) activity released, thus reducing the calculated site boundary dose. Reactor storage pools have massive concrete walls that are tornado proof. ISFSI will be built essentially below grade and their pool walls also would be tornado-missile proof.

ENVIRONMENTAL COALITION ON NUCLEAR POWER

Comment Y-1:

In the document NUREG-0404 (Draft), the NRC chooses to select a reference option of compact storage at reactor(AR), with full core reserve, with additional storage provided away from reactor(AFR), and compare it with filling up the AR pools to capacity and switching to coal plants. However, the document refuses to consider (section 7,4.1.1) the cost-benefit analysis of these two chosen options. It would seem appropriate to declare such a decision in the beginning, and devote the document to a sincere comparison.

POOR ORIGINAL

964110

Response Y-1:

The comment seems to reflect a misreading of Section 7.4, which presents just such a cost-benefit analysis. Section 7.4.1.1, specifically, is intended merely to explain the scope of the analysis presented in the remainder of Section 7.4.

Comment Y-2:

> Sections 4.2.1.1 and 4.2.5 present material from NUREG - 0332 (draft) a which compares the health effects of coal and nuclear. Attached as an appendix are my comments and on that draft document which should be considered for modifications to Tables 4.2 and 4.12.

Response Y-2:

The staff has reviewed the comments on draft NUREG-0332 and has concluded that any attempt to extrapolate potential health effects billions of years into the future would be a meaningless exercise. However, the staff has attempted to estimate potential health effects as far as 1000 years into the future, and Table ES-3 has been revised (see also the response to comment X-10.1).

Comment Y-3.1:

> In section 2.2.1 the need for storage capacity is introduced based on a projection of 414 GWe in the year 2000.
>
> Many possible alternative predictions, are of course available, but the Department Of Energy suggests in its recent first annual report that 380 GWe for the year 2000 is a maximum. It might be possible to pick some number for projected capacity and show that the conclusion is independent of its exact magnitude. This might eliminate the awkward discussions of conservation's impact on projected growth as in section 3.3.3.

Response Y-3.1:

The 414 GWe used was considered as an upper bound for the draft statement. Projections have been updated in the final statement. The commenter's observation is correct. The conclusions reached in this statement are independent of this exact magnitude of the power projections. It has been shown that spent fuel storage does not represent a significant fraction of the environmental impact of the nuclear fuel cycle.

Comment Y-3.2:

> The airithmetic in section 4.1.2.2.2 seems to be in slight error. A 1GWe nuclear plant operating at 30% efficiency will produce 2.3 GW of waste heat, but a plant with 40% efficiency (coal) would produce 1.5 GW of waste heat, not 1.6 - 1.7 GW.

Response Y-3.2:

A range is given (1.6 - 1.7 GW) denoting a range of efficiencies, with the optimum of 40%. More accurately, this should be 1.5 - 1.8 GW. See Appendix C, page C-1, where an efficiency rate range of 36 to 40% is discussed.

Comment Y-4.1:

Chapter 3 of Appendix H x attempts to discuss the interaction of dissimilar metals in the presence of x an electrolyte of pool water. This topic needs considerable amplification. It appears necessary to extrapolate from limited experiences of time durations less than ten years to some assurance about being able to store fuel that is already a few years old for an additional 25 or so years. It would be unfortunate if leaks became as much a problem in this program as they are for the waste storage tanks at Hanford. It is also important to recognise that in this case there will be neutron and gamma irradiation from the spent fuel. This will help to enhance the chemical reactions. There are three classes of materials used, alloys of zirconium, aluminum and stainless steel. It would be useful to tabulate which alloys are involved, and the composition of each. With reference to section 3.1.2, it should be noted that zirconium sits between aluminum and the major elemental constituents of stainless steel in the series of oxidation potentials of elements. It would be useful to tabulate the various materials used as components of fuel assemblies and storage racks. This would be particularly useful for the experiences related in section 3.1.3 of appendix H.

Response Y-4.1:

Evidence to date indicates that corrosion rates of spent fuel cladding materials are so small that underwater storage is feasible for decades. The essentially deionized water of the spent fuel storage pool makes a poor electrolyte.

Spent fuel pellets are a highly refractory ceramic essentially insoluble in deionized water. Experience with even extensive cladding failure has demonstrated that storage pool water purity can be maintained.

The subject of potential fuel element degradation is discussed in detail in Reference 4 of Chapter 3 of the draft statement, "Behavior of Spent Nuclear Fuel in Water Pool Storage" (BNWL-2256). In Table 11 of that reference fuel assembly materials are identified. Appendix H of this statement has been revised to include that information.

If the practice of increasing the burnup of reactor fuel were to have an impact on the integrity of spent fuel cladding under conditions of interim storage, affected assemblies could be canned by available techniques.

Comment Y-4.2:

Section 3.3.2.1 discusses increased burnup of the fuel. The fuel cladding integrity is not solely dependent on the irradiation time but xx xxx in large part to the cladding - fuel interactions brought about by xxx changes in power level. Consideration should also be given to regeneration of fuel by bombarding with neutrons from a large proton accelerator. In this way uranium - 238 can be bred into plutonium and the fuel reused without reprocessing.

Response Y-4.2:

The statement was not meant to imply that cladding integrity is solely a function of irradiation time. The staff believes this is made clear in the remainder of Section 3.3.2.1. Consideration of regeneration of spent fuel by neutron bombardment from an accelerator is effectively a form of spent fuel processing and, as such, is beyond the scope of this statement.

Comment Y-5:

In section 1.5.2 of appendix B is a description of various shipping casks. The text suggests that there will be 13 truck and 6 rail casks available by late 1978. Table B-3 also gives availability at Jan. 1976. A clear tabulation of present and expected availabilities of each cask type would make the calculation clearer;

Response Y-5:

The staff's most recent information on cask availability is as follows:

Mode	Cask	Number Built	Number Under Construction
Legal weight truck	NFS-4	6	1
	NLI-1/2	5	-
		11	1
Overweight truck	TN-8	2	2
	TN-9	1	3
		3	5
Rail	IF-300	4	-
	NLI-10/24	2	-
		6	0

Comment Y-6:

It is suggested in section 3.1.2.1 that it would be possible to build an additional storage pool at some power plant sites. This should be considered in more detail. It is much easier to ship the spent fuel a hundred yards or so than to ship it 1000 miles as AFR would require. The hazards of shipping would be eliminated. The discussion in section 3.2.2.2 would suggest that there would be enough shipping casks to do the job. The objection raised in section 3.1.2.1 would seem to apply only to cases where the desire is to connect the two pools. If the existing building has facilities for long distance shipments, the same facility can be used to ship to the next building.

Response Y-6:

Section 3.1.2.1 has been clarified. The intent is to indicate that volume expansion of an existing reactor pool is generally impractical. It is not intended to rule out construction of additional storage capacity on a reactor site in a new structure.

Comment Y-7.1:

The dry caisson storage suggested in section 3.1.4.2.4 would subject large quantities of earth to neutron irradiation from the spent fuel. The activation products do not seem to have been evaluated. The temptation to ignore any leaks of activity into the soil is also large. The high temperatures in the earth near such a storage unit has the potential to vaporize ground water with results that may be explosive.

Response Y-7.1:

The dry caisson storage discussion is based on experience at the Idaho Nuclear Engineering Laboratory, where caisson storage has been satisfactory for HTGR spent fuel.* While there is no present similar experience for LWR spent fuel, as noted in Section 3.1.4.2.4, soils, radiation, and temperature would be monitored. Research on and development of dry storage for LWR spent fuel is being conducted by the Department of Energy at the Nevada Test Site.**

*M. J. Painter and H. S. Meyer, "Design and Operation of a Dry Spent-Fuel Storage Installation," Transactions of the American Nuclear Society, June 1979.

**"Safety Assessment Document for the Spent Fuel Handling and Packaging Program Demonstration at the Nevada Test Site," U.S. Dept. of Energy, Nevada Operations Office, NVO-198, December 1978.

Comment Y-7.2:

The RSSF discussed in section 3.1.4.2.2 would result in neutron irradiation of concrete and the resulting activation products.

Response Y-7.2:

Neutron irradiation of concrete shielding from spent fuel is not a significant problem.

Comment Y-8.1:

The 50 year dose commitment for 129-iodine in table 4.6 of section 4.2.3.2 is totally inadequate. The total dose should be projected for infinite time with the present world population as a first approximation.

Response Y-8.1:

There is no basis presented by the commenter to recommend his approximation to determine total dose due to I-129.

Comment Y-8.2:

The discussion of ruptured fuel needs a more solid numerical foundation from existing experience. This would seem to be a major expected release pathway. What fraction of the fuel can be expected to leak and how much would seem relevant here.

Response Y-8.2:

In the "Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants" (WASH-1238) a value of 0.25% release is used for spent fuel.* More recent estimation indicates this value may be conservatively high by more than a factor of 2. In NUREG-0017 the value of 0.12% is used.**

*"Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants," U.S. Atomic Energy Commission, WASH-1238, p. 79, December 1972.

**"Calculation of Release of Radioactive Materials in Gaseous and Liquid Effluents from Pressurized Water Reactors (PWR-Gale Code)," U.S. Nuclear Regulatory Commission, NUREG-0017, p. 1-5, April 1976.

Comment Y-9:

The conclusions in section 7.4.3 could use a little explanation and justification from the rest of the document.

Response Y-9:

This comment has been taken into consideration in preparation of the final statement.

Comment Y-10:

Supplemental comment on NUREG - 0404 (Draft), Generic Environmental Impact Statement on Handling and Storage of spent Light Water Power Reactor Fuel.

The foreword indicates on pages i and ii that the National Environmental Policy Act of 1969 (NEPA) in section 102(2)(C) calls for the preparation of a detailed statement on "alternatives to the proposed action". The action being considered here is to build away from reactor storage facilities. The chief alternative is not to build AFR facilities. This is the "Termination Case" of section 7.4, with the construction of coal fired generating capacity. It would seem that NEPA would require that these be compared completely, which is in contradiction with section 7.4.1.1. In addition the comparison of the health impacts of ~~section~~ Chapter 4 would also be required by NEPA. It may not be possible to resolve the health effects issue until the environmental impact of radon - 222 of table S-3 of 10C.F.R. 51.20 has been decided.

Response Y-10:

The alternative of the reference case in this statement addresses increased spent fuel storage both at and away from reactor. The scope of this statement is limited to the impact due to additional interim storage of spent fuel. The S-3 Table and its considerations of radon-222 are beyond the scope of this statement.

STATE OF TEXAS, BUDGET AND PLANNING OFFICE

Comment AA-1:

The economic comparisons between AR storage and coal-fired plants is unjustifiably biased against coal-fired plants. The use of coal as a power source is increasing and coal will supply a great percent of U.S. energy needs over the latter part of this century. If a true cost estimate of mining, processing and shipment of power plant coal feedstock versus uranium to be used and stored in AR pools were compared, coal would prove to be a more viable source of energy than is represented in this report. Plant construction and dismantling costs should be accurately reflected as well. The report Power Costs, of the House Environment, Energy and Natural Resources Subcommittee, should be considered in making these economic analyses.

Response AA-1:

The comparison presented in the statement (Sec. 7.4) rests primarily on the large capital costs required for the hypothetical replacement of the subject nuclear plants under the termination alternative, not on any economic assessment of the relative merits of coal-fired vs. nuclear plants.

SOUTHWEST RESEARCH AND INFORMATION CENTER

Comment AB-1:

1. There is no attempt to make a scientific presentation. There are no equations, formulae or any other evidence that a rigorous method was utilized in the DGEIS preparation.

2. Results of some analyses are presented in graphic, tabular and numerical forms, but neither the analyses nor the methodologies are presented with rigor.

3. There is no generic approach to the problem of human extinction, mortality, morbidity and economics for various spent fuel production rates and radioactive leak rates. Without systematic approaches to those dangers associated with a growing nuclear power industry, this GEIS has no hope of complying with the wisdom explicit in NEPA.

4. NRC staff has an interesting interpretation of what is called for in NEPA. For example, their "SAFETY ANALYSIS" (pp. 3-28; v.1) in the "TRANSSHIPMENT" section:

   "Fuel transshipment does not generate new safety problems. However, the staff will perform site specific analyses on case-by-case actions to verify this conclusion."

   Gadzooks, I'm speechless. Does the presence of "no new safety problems" preclude up-to-date presentations of scientific knowledge and understanding about the ageless problems of transportation safety? Does NEPA forbid transportation safety analyses? That clearly appears to be the case.

   Then there's that "However". What magnificent graciousness. "Staff will perform" preempts the purpose of NEPA--to provide a safety analysis of the actions proposed. In this case, the safety problems generic to the handling and storage of spent fuel from LWR's must be discussed in as much detail as possible in this GEIS.

   Then "the staff will perform site specific analyses on case-by-case actions to verify this conclusion." Why isn't NRC staff willing to just quote from NEPA's charge to U.S. agencies writing EIS's? Why wouldn't NRC analyze transportation actions to determine what safety conditions are rather than "to verify this conclusion." i.e. to prove or demonstrate anything?

AB-1 5. Because of the above deficiencies, NUREG-0404 does not provide a legal or a scientific basis for a GEIS under NEPA.

Response AB-1:

The intent of NEPA is that potentially significant environmental impacts be assessed. It does not require, and there is no justification for, the expenditure of the effort required for excessive assessments of insignificant potential environmental impacts. Considering the potentially very small environment impact of interim spent fuel storage (both normal operations and accidents), the level of detail in the assessment made is adequate. Transportation specifically has been adequately covered in the referenced documents, e.g., WASH 1248. Interim storage of spent fuel presents no new or additional considerations in this area.

VIRGINIA ELECTRIC AND POWER COMPANY

Comment AC-1.1:

In general, we believe several of the assumptions utilized in preparing this report are overly conservative (e.g., no increase in the size of spent fuel pools built between now and the year 2000); however, as such they do tend to strengthen the conclusions reached by the staff which were based upon information derived from those assumptions. We also believe it would be appropriate for the NRC to update the Statement to reflect the Federal Government's present spent nuclear fuel disposition policies (i.e., throwaway vs. reprocessing, and the construction and operation of an initial spent fuel repository during the time period 1988-1993).

Specific Comments

Pg. 1-2, Section 1.2; Spent Fuel Storage Requirements and Alternatives

The statement is made that "The disposition of spent nuclear fuel has not been determined". This is inconsistent with the present Federal Government policy which requires spent nuclear fuel to be stored indefinitely or disposed of as waste as a result of the indefinite deferral of the reprocessing of spent nuclear fuel

Response AC-1.1:

The Federal Government's present spent fuel disposition policy has been discussed and updated in the Summary and in the Executive Summary of the statement. At present, it is still uncertain as to whether spent fuel will eventually be declared to be entirely waste and provisions made for its disposal or whether it will be reprocessed and the unused fuel recycled. (See "Draft Environmental Impact Statement on Storage of U.S. Spent Power Reactor Fuel," U.S. Dept. of Energy, DOE/EIS-0015-D, August 1978.)

Comment AC-1.2:

Pg. 3-9, Table 3.4; Appendix E; and Appendix F

The data utilized in preparing this table and the two appendices are incorrect with regard to Vepco's reactors and the information provided in the attached tables should allow the staff to regenerate the correct information for inclusion in the final Statement.

Response AC-1.2:

The staff appreciates the information provided by Virginia Electric and Power Company. This has been considered with other new information to update the final statement.

ARIZONA STATE CLEARINGHOUSE

Comment AD-1:

The concern of the Solid Waste Section, Bureau of Sanitation is whether or not the low level radioactive on-site waste storage will require a hazardous waste permit under our proposed regulations.

The low level waste is the result of water being used in the moderation of the nuclear process and also in cooling and handling procedures of the spent fuel storage.

Waste water from these processes is ponded on-site. The solids accumulated after evaporation are containerized and shipped to approved nuclear wastes disposal sites.

In the near future the Environmental Protection Agency will publish criteria on the handling and disposal of hazardous wastes. Low level radioactive waste may be considered a hazardous waste and, as such, final disposal would be required to be in a Class I landfill. The criteria may also require that the evaporation ponds be under permit as a hazardous waste disposal facility or as a solid waste disposal facility if they provide more than 90 days storage time.

The report identifies the two approved high level radioactive disposal sites, but does not identify the five approved sites for low radioactive waste disposal.

The report also does not address the resulting level of radioactivity of the concentrated solids, (after evaporation).

The (almost only!) clear communication of this document is "without significant effect on public health and safety." I cannot imagine that such language can be in any document dealing with nuclear reactor matters.

I suggest that such references/language be minimized to the point of non-use in an environmental impact statement.

I suggest that the actual communication quality of such documents be improved.

Response AD-1:

As noted in the draft statement, the water used in a spent fuel storage pool will be treated to maintain a general level of 5×10^{-4} μCi/mL. Any effluents released from an ISFSI will meet 10 CFR 20 and ALARA requirements. EPA criteria on handling and disposal of hazardous wastes will also be required to be met.

The comment on approved high-level radioactive disposal sites as applied to NFS West Valley and GE Morris spent fuel storage pools is incorrect since this fuel is not classified as waste and is not being disposed of at these pools. Only the interim storage of the spent fuel at these pools is licensed.

The comment on radioactivity of concentrated waste is noted, and more detail is provided in the final statement.

The purpose of this statement is to determine if there is a significant environmental impact resulting from additional interim storage of spent fuel; the staff finding is that there is not.

COMMONWEALTH OF MASSACHUSETTS, ENERGY FACILITIES SITING COUNCIL

Comment AE-1:

We are concerned, however, that our continued reliance upon nuclear power is threatened by the chronic failure to address and resolve safety and fuel cycle issues. Regrettably, the Generic Environmental Impact Statement (GEIS) continues a 25 year practice of pursuing one "interim" solution after another, all the while failing to develop and implement a long term spent fuel program which is politically acceptable and technically functional. Like earlier Atomic Energy Commission reviews of the fuel cycle, it fails to acknowledge the simple reality that there can be no interim solution when there is no acceptabl program for long term spent fuel storage or reprocessi: See generally NRDC v. NRC, ___ U.S. ___, 46 L.W. 4301 (3 April 1978).

The GEIS assumes the development of long term storage and reprocessing facilities and thus proposes expansion of onsite reactor storage of spent fuel as a practical, environmentally acceptable, interim device. This assumption cannot be fairly or reasonably made because it ignores the fact that a long term spent fuel program has not been developed, funded, tested, or implemented. There simply is no basis from which to assume a resolution of long term fuel cycle issues in the mid-1980's when there was no basis in 1960 or 1970. It is self deception for us to continue to describe and analyze onsite storage as an eight to ten year interim solution when it has been the only "solution" for 25 years and when it remains as the only device for spent fuel management in the absence of a practical long term program. For 25 years, the commercial nuclear power program has summarily assumed

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that the fuel cycle will be resolved. Nevertheless, it is indisputed fact that there has been no resolution; approaches ranging from reprocessing to long term storage have failed politically and technically. In the face of this, the GEIS asks for one more leap of faith with a promise of fuel cycle resolution before 1990. What are we to do in 1990 when more than 100 commercial reactors will have exhausted the expanded onsite storage facilities which were urged in 1978?

Uncritical acceptance of the GEIS assumption may well lead to the conclusion that short term onsite storage of spent fuel will be environmentally acceptable and economic. This conclusion is meaningless, however, because short term, onsite storage has not been and is not the issue; the issue is indefinite storage of increasing volumes of toxic nuclear waste at an ever increasing number of commercial reactor sites. Without a demonstrated solution to the fuel cycle which will provide for offsite storage or reprocessing, the issue cannot be framed otherwise. Consequently, the GEIS should have considered the environmental impact and cost of indefinite onsite storage. And in this context, it cannot be said that onsite storage is technically functional, safe, or economic.

We urge the Nuclear Regulatory Commission to openly recognize the dilemma which this nation faces with a nuclear power program that has failed to resolve the fuel cycle. We cannot continue with a program which generates thousands of tons of the most toxic waste known to this earth if we fail to develop and implement a long term program of storage or reprocessing. The GEIS failure to address this issue renders it useless to the continuation of commercial nuclear power in the United States.

Response AE-1:

The scope of this statement is concerned with the interim storage of spent fuel. Ultimate disposition of spent fuel is beyond the scope of this statement. The NRC is aware of the existing situation concerning the ultimate disposition of spent fuel. However, action to resolve this issue is the responsibility of the Department of Energy. Pursuant to its regulatory responsibility, the NRC is preparing a proposed rule, 10 CFR Part 60, which will govern disposal of high-level waste, and a supporting environmental impact statement.

TENNESSEE VALLEY AUTHORITY

Comment AF-1:

TVA supports the basic conclusions of the document contained in Chapter 8.0, "Findings," except with respect to portions of number 7. That finding concludes that nuclear-generated power plants could be replaced with coal-fired plants, albeit at high economic and environmental costs. The evaluation which supports this opinion is incomplete, because the capital cost of a coal-fired replacement plant is understated. The cost of the plant should include the equipment or design options necessary to meet today's stringent air quality criteria. This would bring the cost per kilowatt up to about \$665-\$676 (see Tennessee Valley Authority, Final Environmental Statement, Yellow Creek Nuclear Plant, Units 1 and 2, Volume 2, Table 9-1). The cost of replacement power during plant construction is also not included in the benefit cost analysis.

Response AF-1:

The staff agrees with the thrust of the comment. However, no conclusions of the statement would change if the basis for the estimates were changed accordingly.

Comment AF-2:

Moreover, TVA does not believe that such replacement power would be available. The original Federal Register notice for the preparation of this statement contemplated a discussion of the socio-economic impact of the unavailability of replacement power. We would like to see such a discussion. Proper discussion of these aspects would reveal that replacement is not a viable, reasonable option to consider.

Response AF-2:

See response to comment K-3.

ALLIED-GENERAL NUCLEAR SERVICES

Comment AG-1:

(1) Page ES-3, Section 2.1 - Assumed capacity factor of 60% seems too conservative when compared to recent utility operating records.

(2) Page ES-3, Table ES-1 - ERDA 77-25 report showed totals of 7700 MTU for 1980 and 22,170 for 1985, as compared with 7200 and 18,000 MTHM, respectively.

Response AG-1:

Based on the record of nuclear plant operating experience as reported in the NRC "Gray Books" (NUREG-0020), the current capacity factor for all licensed reactor plants is about 59%. The staff believes that the value of 60% used in this statement is reasonable.

The projection of spent fuel discharges indicated in Table ES-1 is taken from Table 2.1 in Section 2.2.2 of the draft statement. The basis for the projections is discussed in that section and references are cited. The staff believes that the projections were reasonable at the time the draft statement was written. They, of course, have been updated in the present document to reflect more recent information.

POOR ORIGINAL

Comment AG-2:

(3) Page ES-5, Section 3.2 - The first paragraph of this section comments as to limited potential fuel storage spaces at the Barnwell Plant, which is stated to have capacity for about 400 metric tons. It should be pointed out, however, that this limited storage corresponds to an operational mode in which fuel would be marshalled at the Plant immediately prior to reprocessing. With commercial reprocessing indefinitely deferred, it would be technically possible to expand the Barnwell Plant's capacity for storage only. Allied-General Nuclear Services has provided the DOE with a report on the technical feasibility of such expansion (Report No. AGNS/DOE-01-PTR 1.4-78/1).

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Response AG-2:

The report covering the potential expansion of Barnwell spent fuel storage capacity was issued subsequent to the publication of the draft of this statement. While the report on the Barnwell facility is of interest, licensing actions to date are based on the present configuration of the Barnwell pool.

In considering AFR facilities for storing spent fuel, the staff believes that the increased capacity proposed for the Barnwell Plant most likely would be utilized by the utilities if the Barnwell Spent Fuel Storage Station were licensed. However, in projecting the need for future storage capacity for purposes of this generic impact statement, the staff has limited its considerations to firm capacity available at this time.

Comment AG-3.1:

> (4) Page ES-12, 1st Paragraph - Because the "serious slippage in the start-up date" for the geological repository has now been documented in DOE/ER-004/D, we suggest that the paragraph be revised to emphasize the number of storage pools required. In this context it would also be appropriate to delete the first sentence, which states that the amount of spent fuel requiring away-from-reactor storage is not great.
>
> (8) Page 1-3, Table 1.1 - The 41,000 total seems too low when compared to other estimates. Also, some adjustment should be made for the possibility of intervention success (see comment 5 above).

Response AG-3.1:

The analyses were carried out to the year 2000. The slippage noted does not affect these values. However, to reflect later data, this section has been revised in the final statement.

Comment AG-3.2:

> (9) Page 3-3 - ERDA 77-25 shows higher cumulated discharge values than those set forth in Table 3.1. For example, the 1986 value from ERDA is 26,500 MTU as opposed to 20,000 MTHM.

Response AG-3.2:

Spent fuel discharges indicated in Table 3.1 are taken from Table 2.1 in Section 2.2.2, where the basis for the projections is discussed. (See also the response to comment AG-1.)

Comment AG-3.3:

> (10) Page 3-8, Paragraph 2 - BWR fuel elements contain more nearly one half the fuel of a PWR rather than one third. (Avg. PWR - 450 kg; Avg. BWR - 200 kg = 0.44.)

Response AG-3.3:

The correction has been made in the text.

Comment AG-4.1:

> (5) Page S-2, Section 2.0, Subsections 1 and 2 - The "Findings" regarding modifications of at-reactor spent fuel storage pools and the licensing of these modifications appear to be valid, but do not consider the possibility of intervention and the resulting complications. Intervention against Portland General Electric on its spent fuel storage expansion plans has created a potentially very severe situation for them. Other similar problems may be forthcoming.

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Response AG-4.1:

Complications resulting from intervention on proposed actions are always possible, whether the action involves a spent fuel pool (SFP) modification or any other action. All SFP modification proposals are pre-noticed. The pre-notice offers the public an opportunity for a hearing before the staff takes action on the proposal. This procedure is general knowledge; licensees recognize this, and many have proposed modifications well in advance of their actual needs to allow for delays due to intervention. Such intervention can, and does on occasion, cause substantial delays in completion of proposed SFP modifications.

Comment AG-4.2:

> (6) Page 1-1, Section 1.1 - First sentence of second paragraph should continue along the lines, "due to a change in policy by the present Administration".

Response AG-4.2:

The comment is conclusory. A full discussion of the status of reprocessing and the factors affecting it in the United States is beyond the scope of this statement.

Comment AG-5:

> (7) Page 1-2, 2nd Paragraph of Section 1.2 - Based upon utility response to the DOE's December 20, 1977 request for expressions of interest, it is apparent that power plant owners do (not "may") consider the maintenance of full core reserve capacity desirable.

Response AG-5:

See response to comment X-9.

Comment AG-6:

> (11) Page 3-15, Section 3.1.4.2.1, Paragraph 1 - In the last sentence, it would be desirable to quantify the time of "several months". Note that in the previous sentence a heat generation rate of 5 kw per canister is given.

Response AG-6:

The time required for a BWR fuel assembly to cool down to a heat generation rate of about five kilowatts may be determined from Appendix G, Figure G.4. A typical BWR fuel assembly contains 0.2 MT of uranium (see Sec. 2.1.1). From the above figure it can be determined that a cooling time of just over three months is required for a heat production rate of five kilowatts.

Comment AG-7:

> (12) Page 3-36, Section 3.3.3, first paragraph - The 0.59 capacity factor for nuclear facilities seems low (and the 0.67 for coal fired generating facilities seems high) when compared to recent plant operating history. The reference noted here is a 1976 publication and would not consider 1976 and 1977 operating history. According to the AIF's annual utility survey, the net capacity factors for these two years for nuclear plants were 0.62 and 0.66, respectively; for coal units, the corresponding net capacity factors were 0.59 and 0.57 (Atomic Industrial Forum "INFO" 117).

Response AG-7:

The final statement has been modified to use the same capacity factors for coal and nuclear. It is now indicated that coal capacity to replace nuclear capacity would have to be one-for-one (i.e., megawatt for megawatt).*

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*R. G. Easterling, "Statistical Analysis of Power Plant Capacity Factors," U.S. Nuclear Regulatory Commission, NUREG/CR-0382, p. vi, February 1979.

Comment AG-8:

(13) Page 4-2, 1st paragraph - The rationale of why an AFR storage facility requires 600 acres of land is not discussed; if this is a correct assumption, it would be appropriate that justification be included.

(14) Page 4-13, Section 4.2.1.3, Paragraph 1 - The restriction of large independent spent fuel storage facilities to multiple units of 500 tonnes each seems unnecessary. We understand that Regulatory Guide 3.24 is being rev'sed to remove this restriction.

Response AG-8:

The value of 600 acres of land required for an AFR storage facility should be regarded as a reference value only. Future environmental statements that address site-specific facilities would d .cribe and justify the actual areas required. The staff believes, however, that given the requirements for a controlled area around the facility for safeguards purposes and to ensure the health and safety of the public, 600 acres is a reasonable value. The value of 500 tonnes unit size is also taken as a reference size only.

Comment AG-9:

(15) Pages 4-20 and 4-21, Sections 4.2.3.5 and 4.2.3.6 - Activity levels are given in mCi/ml as opposed to either μCi/ml or mCi/liter. As a consequence, the stated values are three orders of magnitude too high.

(16) Page 7-6, Section 7.4.1.2 - The first part of the third sentence ("The failure of the reprocessing industry to develop as expected ...") is misleading. We suggest that it be replaced by "The current Administration's decision to defer indefinitely commercial reprocessing ...".

(17) Page B-37, Section 1.5.2.2 - Under NLI 10/24 it is stated that, "No casks have been delivered yet, ...". This should now be revised to reflect the recent delivery of the first of these casks for testing.

(18) Page D-13, Section 1.3.5 - This section does n t appear to add anything of substance to the report. We suggest that it be deleted.

(19) Page D-13, Section 1.3.6 - Under "Other practices", item A refers to movement of racks or material over stored fuel. We note that Safety Guide 13 does not address "material", and suggest that "material" either be deleted or defined.

(20) Page G-15, Table G.8 - The half life of ^{237}Np should be 2.16 x 10^6 y rather than 4.1 x 10^5 Y. The half life of ^{242m}Am is 152 y. The specific activity for ^{242m}Am also appears to be in error by several orders of magnitude. Other actinide half lives are shown to be slightly different. We suggest that all the numbers in this table be rechecked, and if used for calculating dosages, than all other t oles, such as G-9 and G-10, be recalculated.

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Response AG-9:

The staff appreciates the detailed comments that suggest corrections and revisions. These have been taken into account in the final statement.

KAMAN SCIENCES CORPORATION

Comment AH-1.1:

> **Radon-222 effects (Table 4.2) are quoted as 0.023 excess deaths per 0.8 GWy(e). The radon effect has recently been challenged (reported in Nucleonics Week) as being 80,000 times too low because the effect is calculated per year instead of per 80,000 years. I do not have a copy of the reference (NUREG-0332), so I can't tell how the figure here was derived, but you will undoubtedly run into the same challenge.**

Response AH-1.1:

The radon-222 health effect estimates shown in Table 4.2 (taken from NUREG-0332) have been revised to include long-term impacts of Rn-222 releases from uranium mines, mills and mill tailings piles, and C-14 releases from reactors and reprocessing plants. The ranges shown in the revised table for disease among the general public represent estimated impacts for releases during 100- and 1000-year periods.

The staff believes that the estimates for 1000 years are very conservative and, while subject to large uncertainties, as a result probably include more realistic releases for thousands of years into a very uncertain future.

Comment AH-1.2

> **2. Page 4-14, last paragraph. Iodine-129 is casually dismissed with the comment "it is physically impossible to absorb enough to give a dose that is more than a small fraction of that from natural radionuclides". If this is true, why is EPA sufficiently concerned that they propose a limit (40 CFR 190) of 5 mCi/GWy(e) for release? Also the use of a reference (ER from NFS) which is not easily available and old implies the absence of a thorough literature search. There must be better references on this subject. A recent report by J. W. Poston at Georgia Tech (Y/OWI/SUB-7298/1) should provide some good information.**

Response AH-1.2:

See response to comment T-3.2.

The EPA limit (40 CFR Part 190) of 5 mCi/GWy(e) for release of I-129 is presumably based on concern with its being a "long-lived radionuclide," expressed in their announcement of adoption of 40 CFR Part 190 (42 FR 2858-2861).

Comment AH-1.3:

> **3. Page 4-15, 4.2.2.2. The discussion of ^{85}Kr seems a bit too casual. Reg. Guide 1.25 requires the assumption that 30% is released. Again, EPA is sufficiently concerned to propose a release limit.**

Response AH-1.3:

The staff does not consider the treatment of Kr-85 release to be casual. It is discussed not only in Section 4.2.2.2 as cited, but also in Sections 4.2.3.1 and 4.2.3.2. The conservative projection of Regulatory Guide 1.25 is appropriate to a safety review, while realistic assessment is proper in an environmental review.

Comment AH-1.4:

> 4. Page 4-16, 4.2.2.4. References and quantitative data are needed. Why not reference and discuss Johnson's report (BNWL-2556)? He is given a footnote, but relative to a different subject in 4.2.2.5.

Response AH-1.4:

Additional reference to BNWL-2556 ("Behavior of Spent Nuclear Fuel in Water Pool Storage") is now made in the final statement.

Comment AH-1.5:

> 5. Page 4-17, 4.2.2.7, third sentence. Just how large can the total inventory be in the ion exchange Unit? I could have used this information, but didn't find it.

Response AH-1.5:

In the NFS Safety Analysis Report (Vol. I, p. IV-2-4), the NFS Fuel Receipt and Storage Treatment System is stated to have a 100-gpm ion exchanger and a 500-gpm filter with replaceable media. Spent media and/or spent resin are conducted on a slurry to a waste settling tank. In Volume III of the Safety Analysis Report (p. V-7-8), it is stated that the decanted solution is received by the Intermediate-Level Waste Facility at the rate of 1100 liters/day with a concentration of 2.6 μCi/mL of Cs-137, Cs-134 and activation products.

Comment AH-1.6:

> 6. Page 4-1[illegible] .2.3.2. If the release fractions are 10% for ^{85}Kr and 1% for ^{129}I, why does Reg. Guide 1.25 specify 30% and 10%, respectively? Also the pool decontamination factor of 100 for iodine applies to depths of 23 feet or more. A storage pool might well be designed with less depth for shielding due to the longer decay and lower activity.

Response AH-1.6:

Regulatory Guide 1.25 provides a conservative estimate for safety review. Realistic estimates were used in this statement. Proposals for the use of pools shallower than 23 feet would be evaluated on their merits if such designs were submitted. However, fuel handling could prove difficult if an adequate depth of water did not remain over assemblies to be moved.

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Comment AH-1.7:

> 7. **Page 4-20, 4.2.3.3. This ignores fires in waste cleanup systems and consequence limiting systems. Although material in ion exchange units is wetted, a fire could volatilize some of the material. Fires in the air filters or control system wiring could disable this equipment. Also wiring fires tend to cause "failure shorted" before "failure open". Thus a fuel assembly might be lifted too high with no operator control.**

Response AH-1.7:

Serious fires are precluded by use of noncombustible materials and by design considerations. Proposed 10 CFR Part 72 specifically addresses in §72.71 General Design Criteria:

> Protection against fires and explosions. Structures, systems, and components important to safety shall be designed and located so as to continue to perform their safety functions effectively under fire and explosion exposure conditions. Noncombustible and heat-resistant materials shall be used wherever practical throughout the installation, particularly in locations vital to the control of radioactive materials, and to the maintenance of safety control functions. Explosion and fire detection, alarm, and suppression systems shall be designed and provided with sufficient capacity and capability to minimize the adverse effects of fires and explosions on structures, systems, and components important to safety. The design of the facility shall include provisions to protect against adverse effects which might result from either the operation or the failure of the fire suppression system.

Comment AH-1.8:

> 8. **Page 4-19, 4.2.3.2. Aircraft impact might be a better choice than tornado, since the frequency tends to be the same or a little higher (heavily site-dependent), the aircraft or an engine could be larger than a utility pole, the velocity could be higher, and the aircraft could contain a large source of fuel to produce a major fire.**

Response AH-1.8:

Siting of ISFSI near airports or along major flight paths is not considered appropriate precisely because of the accident potential cited in the comment.

Comment AH-1.9:

> 9. **Page 4-20, 4.2.3.4. The problem with criticality is not the low-power operations, but the initial bursts which could fracture cladding in several assemblies and release fission gases. Also the heat generated might cause large steam bubbles and reduce iodine retention.**

Response AH-1.9:

A criticality analysis from the safety evaluation report for the spent fuel storage pool in the Fuel Receiving and Storage Station at Barnwell, S.C.,* resulted in the assessment that: ". . .a criticality [accident] involving fuel elements in a deep, well-shielded pool of this sort. . ." would produce no more activity than that from "the short-term operation of a low-power, swimming-pool type of nuclear reactor."

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*"Safety Evaluation Report Related to Operation of Barnwell Fuel Receiving and Storage Station," U.S. Nuclear Regulatory Commission, Docket No. 70-1729, NUREG-0009, January 1976.

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Comment AH-1.10:

10 **Page 4-21. I don't understand the first line.**

Response AH-1.10:

The first sentence of page 4-21 has typographical errors:

"...N 10 times..." should read "... $\sim$10 times..." and "N $5x10^{-2}$ μCi/ml..." should read "$\sim 5x10^{-2}$ μCi/ml..."

Comment AH-1.11:

11 **Page 4-22, paragraph 5. "loss of water should not result in fuel failure due to high temperatures". A conclusion of this importance deserves a reference or a detailed discussion. I have asked this question of a few experts who were unable to confirm this conclusion. Can you provide a reference to me?**

Response AH-1.11:

The reference concerning loss of pool water and spent fuel is "Spent Fuel Heatup Following Loss of Water During Storage" (NUREG/CR-0649), by A. S. Benjamin et al., March 1979. The final statement has been revised to cite this reference.

Comment AH-1.12:

12 **Receipt of "early" or off-spec fuel could be considered as a result of errors at the shipping point. Fuel with only 1 or 2 months decay would require more consideration of other halides as well as potential fuel melt. Off-spec fuel (research or test reactor) might change thermal or criticality considerations.**

Response AH-1.12:

It is very improbable that spent fuel of only one or two months decay would be placed in casks for shipment since present cask design is for spent fuel that has decayed for longer periods, and monitoring procedures should preclude such shipments. However, in the event of receipt of "early or off-spec fuel," cask monitoring and shipping receipt would detect any problems before the spent fuel was accepted and removed from its shipping cask.

Comment AH-1.13:

13 These are some formal studies in risk assessment which could be applied (at least in part) and referenced. These include EPA--520/3-75-003, RHO-C-4, and WASH-1400.

Response AH-1.13:

Comment noted.

Comment AH-2:

14 The study leans heavily on experience at Morris and West Valley, instead of on the much more extensive experience at Savannah River, Idaho Falls, and Hanford. Perhaps this is due to the emphasis on commercial storage, but the extensive Government experience and data should be considered.

Response AH-2:

Although the experience at government plants provided a technical base for the design and operation of the commercial spent fuel storage installations (NFS West Valley and GE Morris), the experience at these two installations is considered more applicable to commercial storage practice. Furthermore, the commercial installations have been reviewed and licensed by NRC, while government facilities have not been subject to the NRC licensing process.

ATOMIC INDUSTRIAL FORUM, INC.

Comment AI-1:

(1) We suggest that reprocessing be listed as a possible alternative to alleviating the spent fuel storage problem. While the scenario of no reprocessing as stated in the GEIS does indeed place an upper bound on the magnitude of the spent fuel storage problem, it does not address the effects which reprocessing might have on the storage of spent fuel. If reprocessing of commercial spent fuel is allowed to begin in the future, it could serve as a means of not only recovering valuable energy resources, but also substantially reducing spent fuel storage concerns.

Response AI-1:

The scope of this statement is limited to the interim storage of spent fuel through the year 2000. Disposition of spent fuel either by reprocessing or disposal is beyond the scope of this statement.

Comment AI-2:

(2) While stating that there is indeed a need for AFR storage and that it is not desirable to force shutdowns of nuclear plants, the GEIS does not emphasize the need for timely completion of these AFR facilities. If an AFR facility is to be on line by 1983, as indicated to be necessary by the responses to the DOE questionnaire of December 20, 1977, prompt action must be taken to avoid unnecessary and significant losses in nuclear generating capacity.

15. Page H-12, Paragraph 1.7

States that about five years will be required for completion of an AFR facility, assuming a one year NRC review. It is our hope that this type of project could be completed in 3 1/2 to 4 years.

Response AI-2:

There is clearly need for AFR storage about the early 1980s, becoming increasingly acute with time.

Comment AI-3:

(3) There seems to be a marked discrepancy between the GEIS' reference case requirements for AFR storage and the responses the utilities recently made to the DOE. It is our concern that the GEIS may be significantly underestimating the need for AFR storage (e.g. DOE response of 1700 MTHM versus the GEIS value of 980 MTHM in the year 1983).

5. Page S-2, Paragraph 2.0

Finding number 3 states that the requirements for AFR storage with compact storage and the FCR option is 1970 MTHM in the year 1985 and 5800 MTHM in the year 1990. However, the responses the utilities made to the DOE letter of December 20, 1977, indicated a need to store 3,000 MTHM in the year 1985 and 14,000 MTHM in the year 1990.

9. Page 2-5, Table 2.1

There appears to be some inconsistencies regarding plant factors used for various tables in the GEIS. A footnote to Table 2.1 states that a plant factor of 0.6 was used for the period 1976-1985 and 0.7 for 1986-2000. Yet, the note for column 5 and column 6 on Page F-4 indicates 0.6 was used for RB* reactors only and 0.7 for those reactors starting up after 1985. Furthermore, Section 3.2.2 states that spent fuel discharges were based on historical information where possible, and for other reactors a 0.6 plant factor was used.

*"Rainbow Books"

Response AI-3:

The projections of future spent fuel discharges were made by the staff using the best information available at the time the draft statement was prepared. The bases for the projections are described in Section 2.2.2 of the draft statement.

The staff believes that plant capacity factors used for the various tables in the draft statement are not inconsistent. Historical information from operating plants as reported in the NRC "Gray Books" (NUREG-0020) for 1976 and 1977 indicated average capacity factors of 59.6% and 59.5%, respectively, for all operating plants. This is consistent with the value of 60% used by the staff for the current generation plants through 1985 (Rainbow Book reactors) where no operating experience was available. Since it was expected that plant capacity factors should increase through operating experience, an average value of 70% was used after 1985.

It should be noted, however, that in the present statement, capacity factor is not a consideration. Rather, current annual discharge experience and schedules proposed by the utilities are used as bases for the projection of spent fuel discharges.

Comment AI-4:

(4) The GEIS appears to use very conservative capacity and efficiency factors for nuclear power plants and very optimistic capacity and efficiency factors for coal fired power plants. The result, although conservative from an analysis point of view, gives this document a negative cast with respect to nuclear power.

14. Page 3-37, Paragraph 3.3.3

Section 3.3.3 indicates that coal fired generating facilities operate closer to their nameplate capacity than do their nuclear counterparts and that the replacement of retired nuclear capacity with coal fired capacity could result in a 13% increase in delivered electric power. This is contrary to recent experience when comparing large size coal and nuclear generating units.

16. Page 4-5, Paragraph 4.1.2.2.2

This section uses values of thermal efficiency for nuclear and coal fired power plants which represent extremes.

Response AI-4:

The final statement has been modified to use the same capacity factors for coal and nuclear. It is now indicated that coal capacity to replace nuclear capacity would have to be one-for-one (i.e., megawatt for megawatt).*

The values of thermal efficiencies used do not alter the basic conclusion that the nuclear fuel cycle results in a lesser environmental impact than the coal fuel cycle. (See also response to comment Y-3.2.)

*R. G. Easterling, "Statistical Analysis of Power Plant Capacity Factors," U.S. Nuclear Regulatory Commission, NUREG/CR-0382, p. vi, February 1979.

Comment AI-5.1:

1. Page ES-5, Paragraph 3.1

Reference is made to increased at-reactor spent fuel storage involving only aged fuel. The meaning of this statement is unclear since each year freshly discharged fuel is placed in the spent fuel pool.

Response AI-5.1:

The statement refers to the fact that were at-reactor spent fuel capacity not increased, the earliest spent fuel generated at the reactor in the pool, which continues to age as its period of storage lengthens, would have been removed to some other facility for disposition.

Comment AI-5.2:

19. Page 6.2, Table 6.1

In table 6.1 and the accompanying text, it is not clear why the modification cost for a BWR under construction is greater than that of an operating BWR. Intuitively, it would seem likely that since an operating plant would have to:

(1) perform extensive fuel movements in order to install new racks,

(2) have to install the racks underwater, and

(3) have to decontaminate and dispose of old racks

that this modification cost would be more for operating plants than for plants under construction.

Response AI-5.2:

The costs shown in Table 6.1 of the draft statement are: (1) in Case B (BWR operating), for a capacity of 1650 storage spaces after modification, $1,989,000 and (2) in Case D (BWR under construction), for a capacity of 1680 storage spaces after modification, $1,984,000. As noted in the comment, there is no significant difference between costs in these two cases. A factor in reducing costs in Case B (BWR operating) is the two-step reracking procedure employed (see Appendix D of the draft statement, pp. D-22 through D-28). Twelve 20-space standard racks increase storage capacity from 740 to 980 spaces. New high-density racks (replacing the original racks with a capacity of 740 spaces) supply 1410 spaces for a total of 1650 spaces. However, in Case D (BWR under construction), while high-density racks are also used to increase capacity, they account for ultimately 1650 of the total 1680 spaces. (See Appendix D of the draft statement, pp. D-36 through D-42.)

Comment AI-5.3:

20. Page 6-3, Figure 6.1

This figure indicates that the NRC will require only six months for approval of a request to modify an existing spent fuel storage pool from the time discussions are begun between the utility and the NRC. This appears to be a very optimistic schedule and requires additional definition of the contents of the application if it is to be met.

Response AI-5.3:

The schedule for NRC approval assumes a well-prepared application.

Comment AI-6:

2. Page ES-7, Paragraph 3.5

The first sentence of this paragraph states, "The replacement of nuclear power generating capacity by coal fired plants because of reactor plant storage pools is technically feasible". What is meant by "technically feasible"?

21. Page 6-9, Paragraph 6.2

This paragraph indicates that the national average fuel price for coal is 8.1 mills per KWhr. We feel the price for coal is as much as 50% higher per KWhr. This difference significantly affects the cost calculations in this section.

Response AI-6:

See response to comment 0-4.

The staff can only reply that it knows of no better sources than those used (Federal Power Commission, Edison Electric Institute).

Comment AI-7.1:

3. Page ES-11, Paragraph 8.1

It should also be pointed out that some older plants were built with excess capacity which could also be used on a limited basis to provide temporary relief for plants with spent fuel storage problems.

Response AI-7.1:

The staff agrees that some of the older plants built with excess capacity, as well as the unused fuel storage capacity at newer power plants, could be used on a limited basis to provide temporary storage. However, this would not provide a solution to the fuel storage problems over the period of time considered in this statement. Transshipment as a stand-alone solution was considered in the draft statement Transshipment Alternative; the alternative has been reevaluated for the final statement in conjunction with compact storage at reactors and at reactor-site ISFSI.

Comment AI-7.2:

4. Page ES-12, Paragraph 8.2

The fourth finding should also mention that there are some plants which utilize stainless steel clad fuel.

Response AI-7.2:

Very few plants use stainless-steel-clad fuel. The staff knows of no plans to use such material in future plants.

Comment AI-7.3:

12. Page F-9, Table F.1

The storage capacity listed in Table F.1 is not consistent with that given in Table 3.4 under the heading "Pool Size". Also, the discharge schedule used in Table F.1 is not consistent with that used in Table E.2 for at least one reactor (Millstone Unit 2).

Response AI-7.3:

The final statement has been updated and revised.

Comment AI-8:

6. Page S-3, Paragraph 2.0, Item 4

This item states that there will be no discharge of radioactive liquid effluent from a spent fuel storage operation. This may be possible, but to prohibit any discharge is unrealistic and should not be required.

22. Page 8-2, Item 4

This item indicates that there will be no need for any discharge of radioactive liquid effluents from a spent fuel storage operation. This statement should be modified to indicate a minimal discharge requirement.

Response AI-8:

The proposed 10 CFR Part 72 §72.71 criterion (19) stipulates: "Radioactive waste treatment facilities shall be provided. These facilities shall be designed to concentrate all site-generated wastes and convert them into a form suitable for interim storage and ultimate final disposal."

Comment AI-9:

7. Page 1-1, Paragraph 1.1

This section states that the reprocessing part of the fuel cycle has not reached successful commercial development. This subcommittee believes that reprocessing has reached successful development as demonstrated by the operation of Nuclear Fuel Services, Inc.'s facilities and various government reprocessing facilities. The restriction to the continued operation of Nuclear Fuel Services was initially a lack of available spent fuel to be reprocessed and subsequently a prohibitively costly retrofit requirement imposed by NRC to meet newly evolving seismic design criteria. This problem is unrelated to basic reprocessing technology.

Response AI-9:

The commenter is correct in his statement that basic reprocessing technology exists. Nevertheless, reprocessing has not reached successful commercial development in the United States.

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Comment AI-10:

8. Page 2-3, Paragraph 2.1.3

This section indicates that G. E. has proposed to increase the capacity of its Morris facility to 1850 MT. This proposed expansion request has been withdrawn.

Response AI-10:

Proceedings on the G.E. Morris Operation proposed storage capacity expansion have been suspended indefinitely as the result of the Department of Energy Spent Fuel Policy Announcement of October 18, 1977.

Comment AI-11:

10. Page 3-8, Paragraph 3.1.1.1

The last sentence of the second paragraph on Page 3-8 should also mention boron carbide plates as a neutron absorbing material.

11. Page 3-9, Table 3.4

This table should be updated to reflect more recent applications for pool modifications, or alternatively place a reference date on the table.

13. Page 3-35, Paragraph 3.3.2

The first sentence should contain a range of specific powers to cover older plants, 19 MWth/MTU for the BWR and 28 MWth/MTU for the PWR.

Response AI-11:

The final statement has been changed accordingly.

Comment AI-12:

12. Page 3-27, Paragraph 3.2

It is not clear in Section 3.2 when the proposed transhipment process is to occur. Does a utility "tranship" when one of its plants has a full pool, a full pool less one core, or during the reload before either of the preceeding options? Also, in regard to spent fuel transhipment, it is felt that the case of compact and no compact storage should be considered.

7. Page E-21, Table E.4

This table, along with Table E.5 should also indicate which units are receiving the transferred fuel. In cases where there are more than two units on the same site, it is not clear which unit was receiving the fuel indicated to be transferred.

8. Page E-21, Table E.4

Table E.4 indicates that Millstone Unit 1's pool will become full under the transhipment option in 1982, without any transfers indicated. Table E.3 indicated Millstone Unit 1's pool would be full in 1981, in the no transhipment case.

This is inconsistent.

Response AI-12:

The transshipment model has been updated.

POOR ORIGINAL

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Comment AI-13:

15. Page 4-2, Paragraph 4.1.1.2

This section discusses the impact of cooling towers on the environment. While a cooling tower may be used for an AFR facility it is not the only means of cooling. This section should indicate that the facility is not restricted to using cooling towers. A discussion of cooling towers is presented in several other sections of this report and this applies to these sections also.

13. Page H-4, Paragraph 1.3

This section discusses the use of cooling towers. As previously mentioned, cooling towers are not the only method of cooling and this section should indicate that this is only one method of providing cooling.

14. Page H-5, Paragraph 1.3

This section discusses design details of the AFR cooling water and air systems. If this facility were incorporated with an operating plant, somo of these systems might not be required. This report should indicate that the detailed system designs mentioned are only examples and not the only ways of meeting the requirements.

Response AI-13:

It was assumed that for a large ISFSI, a small exaporative cooling tower would be used. However, the comment is correct in that other cooling systems have been designed for such use, e.g., the finned tube coolers used at the GE Morris Operation.

Comment AI-14:

17. Page 4-21, Paragraph 4.2.3.7

A 30' depth for a spent fuel pool is too shallow for most pools.

Response AI-14:

Spent fuel pools at nuclear power plants are nominally about 39 feet deep, but for ISFSI, 30 feet is adequate. For example, the GE Morris Operation pool depth is 29 feet.

Comment AI-15:

18. Page 4-27, Paragraph 4.3.2.1

This section states that the labor force in a nuclear plant is about one-fourth the labor force of a coal fired plant. Utility's experience with multiple units of nuclear and coal fired plants is that nuclear plants employ either the same number or up to twice as many personnel as multiple unit coal fired plants.

Response AI-15:

The section has been changed accordingly.

Comment AI-16.1:

1. Page B-8, Paragraph 1.2.4.b

This section indicates that the design of the storage racks is such that a fuel assembly cannot be inserted anywhere other than in a design location. There are designs which will allow a fuel assembly to be located in other than a permanent storage location and these conditions have been analyzed to prove that they do not affect the safety margins in these analyses.

Response AI-16.1:

The statement in question refers to the permanent location of the fuel assembly and to the fact that the rack designs will be such that the assembly cannot be inserted into its storage position in a manner which would violate the principles of safe geometry storage.

Comment AI-16.2:

2. Page B-12, Paragraph 1.3.1

This section states that 3.3% enriched fuel is representative of the fuel used in the Zion reactor. Fuel enriched to 3.1% is considered to be the maximum which could be used in the Zion plant on an equilibrium fuel cycle basis.

Response AI-16.2:

The correction has been made in the final statement.

Comment AI-16.3:

3. Page B-15, Paragraph 1.3.2

This section states that rack designs require bracing from walls or anchors in the floor. This appears to rule out free standing rack designs which are currently being used and will be used in the future.

Response AI-16.3:

The description of existing BWR and PWR rack designs is not meant to exclude free-standing rack designs.

Comment AI-16.4:

4. Page B-19, Paragraph 1.3.5

When discussing the storage of non-fuel items, this section should be expanded to include items such as fuel handling tools which may be stored in the pool.

Response AI-16.4:

The discussion of non-fuel equipment storage in the pool is illustrative rather than all-inclusive.

Comment AI-16.5:

5. Page E-3, Table E.1

The title of this table should be changed to "Remaining Spent Fuel Storage Capacity".

Response AI-16.5:

Appendix E is revised in the final statement.

Comment AI-16.6:

16. Page H-22, Paragraph 3.1.2

Indicates that the use of boral is unacceptable in spent fuel pools for PWRs. Boral is currently used in PWR pools and this is noted on page D-12 where it states that the NRC accepted a high density fuel storage design for Maine Yankee incorporating Boral. Another utility intends to use Boral in its high density absorber racks for its nuclear plant.

Response AI-16.6:

The statement has been deleted.

Comment AI-17:

6. Page E-9, Table E.2

Table E-2 does not agree in several cases with know plant discharge schedules. The basis for the table would explain the discrepancies and, therefore, should be stated.

9. Page E-16, Table E.3

The Millstone Unit 1 spent fuel pool is indicated to be filled in 1981. Based on the licensed spent fuel pool capacity of 2184 assemblies, current projections indicate that the pool will not be filled without fuel transfers until the refueling in 1992.

10. Page E-18, Table E.3

The Connecticut Yankee spent fuel pool is indicated to be filled in 1977. Based on the licensed spent fuel pool capacity of 1172 assemblies, current projections indicate that the pool will not be filled without fuel transfers until the refueling of 1999.

11. Page E-19, Table E.3

The Millstone Unit 2 spent fuel pool is indicated to be filled in 1986. Based on the installed capacity of 667 assemblies, current projections indicate that the pool will not be filled without fuel transfers until the refueling in 1989.

Response AI-17:

The staff has revised plant discharge schedules using the best information available as reported in the NRC "Gray Books" (NUREG-0020).

GEORGIA POWER

Comment AJ-1:

Enclosed are the corrected Plant Hatch spent fuel storage data in Appendices E and F from the NRC's "Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0404)". Please incorporate these changes into the Final Environmental Statement along with our other comments submitted to you through the Utility Waste Management Group.

Response AJ-1:

The staff has revised plant discharge schedules using the best information available as reported in the NRC "Gray Books" (NUREG-0020).

NATURAL RESOURCES DEFENSE COUNCIL, INC.

Comment AK-1.1:

page ES-7.

Section 3.5 here implies that the only approach to replacing nuclear power is to order a suspension in the generation of spent fuel and the replacement of nuclear power by coal fired central power stations. As we have stated above and will discuss below, this alternative is not justified in the DEIS and, we propose, can not be justified by a full and candid discussion of the various alternatives in the FEIS.

page 1-4.

The reference case (Alternative 1) should be increased storage at reactor pools and the construction of additional storage capacity on-site. Such additional storage could either be integral to existing pools or a separate facility.

a) A separate on-site storage facility would be preferable to transshipment (Alternative 2) to another reactor site or shipment to an AFR (Alternative 1)

The termination case (Alternative 3) is a totally inadequate treatment of the options related to the termination of the use of nuclear power plants. The FEIS must consider:

1. Increasing the AR storage for the lifetime fuel use of existing reactors and those under construction.
2. Limiting nuclear power production to existing reactors and those under construction (except as a last resort). Future power needs would be met by alternative energy sources such as coal, geothermal and solar.

page 3-1 to 3-2.

Here it is stated:

> Also, solely for purposes of conservatism, the largest magnitude of the storage problem over the period 1976-2000 is projected, that is, no reprocessing and no permanent disposal of spent fuel are assumed th-ugh year 2000.

The purpose of this DEIS is to examine the alternatives to the spent fuel storage problem. Maximizing the storage problem represents only one of the alternatives - the least desirable at that. We have commented above on the alternatives discussed on these pages and have pointed out that there are alternatives that can substantially reduce the number of reactors and hence the storage problem. Table 3-1 must be revised to reflect these alternatives. The FEIS will be totally inadequate unless it fully and candidly discusses these alternatives. (See our discussion below relative to page 3-36.)

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pages 6-1 to 7-11.

The cost comparisons in this section do not include the expansion of on-site storage (either separate or contiguous) as an alternative. At the same time, the comparison base is an independent 1,000 MTHM storage facility. Such a facility could well be an independent on-site storage unit. An on-site facility would have significantly lower transportation requirement, would most likely involve less land resources and would have lower environmental consequences. Moreover, since the various licensing parameters of reactor sites have been determined, including those for spent fuel storage, the licensing of on-site facilities should be expeditious. It is difficult to see how AFR storage could be preferable to AR storage. This EIS must discuss this AR storage option in detail unless it is to be judged totally inadequate.

Response AK-1.1:

The NRC staff has prepared at the direction of the Commission a statement on the impact of interim storage of spent fuel. The staff has examined bounding alternatives. Among these is the cessation of generation of spent fuel. The findings of the staff are that interim storage of spent fuel does not present a significant environmental problem. A reduced projection of nuclear power generation capacity would not affect this finding. The justification of nuclear power generation, as such, and a detailed examination of all potential power generation alternatives is beyond the limited scope of this statement.

The reference case includes both at-reactor site and away-from-reactor site storage methods. No significant environmental impact was found for those methods considered likely to be employed in the period under consideration (to the year 2000). Increased storage at reactor pools was considered. Additional storage structures could be constructed either at-reactor or away-from a reactor site (assuming general acceptability of a site). Thus, an ISFSI could be constructed on a reactor site or on a separate site. However, such an ISFSI, whether on the site of a nuclear power plant, on the site of other nuclear facilities, or at a separate site, will most likely provide storage capacity for a number of reactors. This is because it is unlikely that an ISFSI serving a single reactor would be cost effective.

In summary, the draft statement is limited to examining the impact of interim storage of spent fuel. The staff has examined bounding conditions for the alternatives available, including termination of generation of spent fuel. The impact of interim storage, whether at a reactor site or away from it, has not been found to be significant, and such storage is cost effective. Although the impacts of construction of an ISFSI at a reactor site would fall within the bounds of the impacts of storage methods already considered explicitly in the draft statement, such construction is, nevertheless, specifically addressed in the final statement.

Comment AK-1.2:

page 3-36.

This page contains the abysmally brief and erroneous discussion of replacement power for LWR-produced electricity. It is stated here that the replacement would be coal-fired plants because there are no alternate energy sources. All this of course is predicated upon the "super low" growth scenario of GESMO and it is stated that conservation will not affect this projection. It is implied incorrectly here that this approach was taken by the Ford Energy Policy Study. We propose that these statements and assumptions are neither accurate nor current.

Alternative 3 of this DEIS implies that the termination of the nuclear option must occur as the sole result of a

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shortage of spent fuel storage capability. We have already stated that the DEIS is inadequate in that it did not consider the complete storage of the lifetime spent fuel at the reactor sites. But even setting this aside, the DEIS fails to consider the orderly transition to a non-nuclear future. A transition that is preferred for a variety of reasons. This is where the DEIS misrepresents the Ford Foundation's Energy Policy Study. We are including as an integral part of our comments Chapters 3 and 4 of that study, "A Time to Choose - America's Energy Future." The chapters deal with the "Technical Fix" and "Zero Energy Growth" scenarios. Both chapters discuss an orderly transition to a non-nuclear future - a transition that is motivated by environmental concerns, not the shortage of spent fuel storage facilities. It is essential that the FEIS discuss these scenarios fully and candidly.

The Ford Foundation Energy Policy Study submitted above also discusses the role of energy conservation. It is essential that the NRC Staff discuss this matter fully and candidly in the FEIS. As additional material on conservation that should be considered, we are attaching, as an integral part of our comments, the testimony submitted in the GESMO proceedings by Frank von Hippel and Robert H. Williams. Without considering other alternatives and only "moderate" conservation methods, they demonstrated that the nuclear projections in the DEIS could be cut in half.

The Ford Energy Policy Study was published in 1974. The von Hippel - Williams testimony updates the energy conservation considerations in the Ford Study. Beside conservation, there exist the geothermal and solar energy alternatives. With respect to geothermal energy, GESMO (NUREG-0002, pp. III-22 and III-23) indicates a potential capacity of 100 Gwe by the year 2000. The DEIS fails to indicate how this capacity is factored into its projections of needed nuclear capacity. The FEIS must present and justify fully the basis for its energy projections and the technology utilized to meet these projections. In this respect, it must justify its allocation of solar technology to meeting these projections.

With respect to solar energy we are attaching as an integral part of our comments, the CEQ publication, "Solar Energy: Progress and Promises." This report suggests that by the year 2000 some 20-30 quads ($\sim$ 250 GWe) of energy could be realized from solar energy. Among other things this report discusses the potential of utilizing small-scale hydropower and of upgrading existing hydropower facilities. The FEIS must fully and candidly discuss these alternatives.

We propose that a full and candid examination of these alternatives will demonstrate (as the Ford Energy Policy Study demonstrated) that the U.S. can make a safe and orderly transition to a non-nuclear future. This would substantially reduce

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the spent-fuel storage problem and alter the conclusions of this DEIS. Unless the appropriate analysis of alternatives is undertaken, the FEIS will be totally inadequate.

Response AK-1.2:

The comment on page 3-36 of the draft statement with regard to the Ford Energy Policy Study has been corrected in the final statement. See also the response to comment AQ-7.

Comment AK-2:

page 3-5.

The significance of maintaining a full core reserve in AR storage should be discussed in more detail. In particular, the value of FCR in reducing occupational exposure during various repair and maintenance operations should be evaluated. Also a detailed discussion should be presented of the value of a FCR in "facilitating" reactor vessel inspection. In other words, the discussion here should evaluate whether Option 3 is really an acceptable option.

Response AK-2:

See response to comment X-9.

Comment AK-3:

page 3-12.

The discussion here of volume expansion at existing reactor pools is ridiculous. For example, it is stated:

> Transfer between the two storage pools would be accomplished by a transfer cask. The add-on facility is not a practical consideration where the existing pool is elevated in a building or the building arrangement does not provide reasonable access between the existing facility and the available space for a new facility.

This statement would seem to imply that if the existing pool is elevated, it is better to remove the fuel from the elevated pool and ship it a hundred or more miles to an AFR if one desires to have reasonable access. If the fuel can be shipped off-site, it is eminently reasonable to suggest that it can be more easily transferred on-site.

Moreover, transshipment between pools on the same or different reactor sites is considered as an alternative in this DEIS. Clearly, a separate AR storage facility could be made as accessible (even more so) as pools of other on- or off-site reactors.

As we stated relative to page 1-4, it is essential that this EIS consider additional (separate or otherwise) on-site storage as the reference case.

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Response AK-3:

It is not the staff's intention to preclude the construction of additional storage facilities at a reactor site. An ISFSI can be built on a reactor site to serve that plant as well as neighboring nuclear power plants. However, construction of structures integrated directly with existing reactor basins is not considered generally feasible. The reference case encompasses both at-reactor and away-from-reactor storage, and the potential for construction of ISFSI on a reactor site is specifically mentioned in the final statement as a possible storage method.

Comment AK-4:

pages 3-25 to 3-33.

These pages discuss, albeit superficially, the transportation requirements for spent fuel storage. But regardless of the superficiality, no discussion is presented wherein expanded storage, separate or contiguous, at reactor sites represents the reference case. Transshipment is recognized to require distance up to 150 miles and AFR shipments must involve larger distances. On-site transfer must represent the lowest transportation and cask requirements. Again, it is essential that this EIS consider on-site storage as the reference case.

Response AK-4:

The transshipment model has been updated in the final statement. See also the response to comment AK-5.

Comment AK-5:

pages 3-28 and 3-29.

The comments above demonstrate that the treatment of on-site fuel transfer given here is totally inadequate.

Response AK-5:

Construction of an ISFSI on a reactor site is considered possible by the staff and is specifically addressed in the final statement.

Comment AK-6:

pages 4-7 and 4-8.

The treatment of coal cycle wastes and of uranium cycle wastes in this DEIS is prejudicial. The message of the DEIS is that the government will take charge of uranium cycle wastes while the coal cycle wastes are left to nature or to private interests. The pertinent analogy and comparison should be relative to the same degree of governmental and private participation and responsibility. Moreover, the treatment of mine and mill tailings must consider the entire environmental lifetime of the precursors of Ra-222.

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page 4-10.

The entries in Table 4.2 are substantial underestimates of the effects of the nuclear fuel cycle. We are appending, as an integral part of these comments, NRDC's testimony in the GESMO proceedings relative to Chapter IV of NUREG-0002. This testimony treats the problem of Ra-222 that was discussed above.

Response AK-6:

It is the staff's opinion that there is nothing wrong or inconsistent about the government's handling nuclear wastes while the wastes from coal are "left to nature or to private interests" as long as the costs of the government handling are fully borne by the industry that generates the waste, and that is the announced plan. Areas in which the government takes responsibility are largely determined by political and public pressures. There is no reason to believe that the effects of wastes from burning of coal would be appreciably reduced by increased government participation. See also the staff's response to comment AH-1.1.

YANKEE ATOMIC ELECTRIC COMPANY [UWMG]

Comment AL-1:

We concur that "the storage of LWR spent fuels in water pools has an insignificant impact on the environment, whether at AR or AFR sites". It should be emphasized that this impact is insignificant in both an absolute sense and relative to other sectors of the nuclear fuel cycle. Furthermore, since many readers of the final GEIS may focus only on the findings, section 8 of the final GEIS and the Executive Summary should make clear that, as found in section 5, the incremental environmental impact of spent fuel transportation associated with AFR storage is also insignificant and that, as found in section 7, the potential risk to the public health and safety due to accidents or acts of sabotage during storage or transportation is extremely small.

Response AL-1:

These considerations have been taken into account in the final statement.

Comment AL-2:

We also recognize the need for a more definitive regulatory basis for the licensing of future "storage-only" facilities. The UWMG urges the NRC to expedite the publication and establishment of proposed rule 10 CFR Part 72 and supporting regulatory guides. This regulatory framework is needed now so that both the Federal government and private industry can better plan for new spent fuel storage space.

Response AL-2:

The NRC recognizes the need for a more definitive regulatory basis for licensing of spent fuel storage in an ISFSI. The proposed 10 CFR Part 72 was published for comment on October 6, 1978. The development of its supporting regulatory guides, as well as national standards, is receiving high priority.

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Comment AL-3:

The UWMG agrees that "curtailment of the generation of spent fuel by ceasing the operation of existing nuclear power plants when their spent fuel pools become filled" is "undesirable." While we agree that measures to increase spent fuel storage space are economically and environmentally preferable to replacing nuclear-generated power with coal-fired power plants, the UWMG does not believe that the case for increasing storage should rest solely on a coal versus nuclear comparison. In addition, the final GEIS should reflect that increasing storage results in virtually negligible environmental and economic impact while an enormous negative economic impact would result from premature termination of nuclear generation because of a lack of storage capability. Furthermore, we suggest that this finding should reflect that "prohibition of construction of new nuclear plants" on the basis of spent fuel storage considerations is not only "not necessary" but also "undesirable." The GEIS clearly shows that the insignificant environmental or economic impacts of the storage of spent fuel cannot be the determining factor in the selection among various alternative methods for adding to electricity generation capacity.

Page 6-8: If a nuclear power plant was forced to shut down by a lack of storage space, there would be a significant additional cost to the electricity consumer which is not included in the termination case. This extra cost would be the increase in the price of electricity needed to recover the nuclear plant capital cost over a shorter amortization period than originally planned.

Response AL-3:

None of the recommendations made in the comment appears inconsistent with the draft statement; rather they call for stronger wording than appeared in the document. The staff does not feel such changes are needed with regard to the desirability of new nuclear generating capacity. This is examined in individual licensing actions and is beyond the scope of this statement.

Comment AL-4:

Page 1-2: In section 1.2 it is stated that " . . . power plant owners may consider the maintenance of full core reserve capacity desirable for operational flexibility". The word "may" should be changed to "do". All utilities subscribe to the operational policy (for purposes of flexibility in operation, not safety-related reasons) of maintaining at least a full core reserve (FCR) capacity. Some utilities have been forced to maintain less than FCR capability due to a lack of storage space; however, this has only been done reluctantly because of a lack of other immediately available storage alternatives.

Response AL-4:

See the response to comment X-9.

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Comment AL-5:

> Page 3-7: Section 3.1 discusses options for increasing spent fuel storage capacity in existing pools. Several options are listed here. However, no mention is made of the possibility of double-stacking of the fuel in a two tier rack. Although such a storage scheme has not yet been attempted, it has been previously proposed and should be considered briefly in the final GEIS.

Response AL-5:

Double stacking of fuel in a two-tier rack is discussed in the final statement. See also the response to comment AN-3.

Comment AL-6:

> Page 3-36: The discussion of replacement power is too cursory. The final GEIS should clearly state why nuclear plants cannot be replaced with oil or natural gas fueled plants and why exotic alternative energy systems will not be available. More discussion on the inability of conservation to significantly alter projected needs should also be included.

Response AL-6:

The exclusion of gas- and oil-fueled replacement plants follows from the Power Plant and Industrial Fuel Use Act of 1978, which prohibits the use of natural gas or petroleum as the primary energy source in new power plants. The staff does not believe that the statement would be made more useful by discussion of "exotic" energy system alternatives for which technical and economic feasibility are at present highly speculative. Detailed discussions of such alternatives and conservation extend beyond the limited scope of this statement, which addresses the impact of additional interim spent fuel storage. Additional discussion of conservation is given in the response to comment X-6.

Comment AL-7:

> Page 4-27: The estimate of the labor force required for a nuclear plant is probably low. New requirements for security staffing have increased on-site staff. Often utilities which own nuclear plants have a separate engineering support staff located away from the actual site but dedicated solely to supporting operation of the nuclear units. The employment estimates in NUREG-0404 also ignore the necessary supplementary fuel cycle employment.

Response AL-7:

The section has been changed accordingly.

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Comment AL-8.1:

Page 6-6: The estimated capital costs for independent storage facilities appear to be too low. This is probably due in part to the use of estimates made prior to 1976. It may also be due to the use of unescalated costs. Because of the long lead time for the design, licensing, and construction of an independent facility, cost estimates should reflect escalation.

Page 6-6,-7: The costs for dry storage concepts could be better documented. The information on dry storage missing from Table 6.2 should be included in the final GEIS.

Response AL-8.1:

The estimates of capital costs of AFR storage have been reviewed in the light of such additional information as is available and have been updated in the final statement. As noted in the response to comment AL-9, the staff believes that "real" costs (dollars of a fixed time) are preferable to escalating of costs for the purpose of this statement.

Comment AL-8.2:

Page 7-7: It should be made clear under the Reference Case description that "perpetual storage" at away-from reactor storage facilities is conservatively assumed for cost-analysis purposes only. (See Table 2.3 on page 2-10). The text should make clear that no such perpetual storage at AFR's is planned.

Response AL-8.2:

The description referred to has been changed to state unambiguously that the assumption is introduced only as a basis for cost estimates, without implication for the long-term choice between reprocessing and storage.

Comment AL-9:

Page 7-9: The capital cost listed in Table 7.1 for a 1000 MWe coal-fired power plant is low since it is based on a plant at the mid-point of construction in 1976. The coal plants which are postulated in the termination case to replace nuclear plants are not yet under construction and will be more expensive due to inflation.

Response AL-9:

The comment is correct in terms of nominal or "current" dollars; however, the entire treatment within Section 7.4.2 is in terms of "real" (inflation-adjusted) dollars in order to circumvent the impossible task of predicting future inflation and interest rates, as explained in the first two paragraphs of the section.

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Comment AL-10:

Page B-3: It should be made clear that the assembly data and storage capacities in Table B.1 are only approximations.

Response AL-10:

Table B.1 is intended to characterize the fuel storage requirements for a range of reactor sizes and types. The actual requirements and the storage capacity installed are indicated for each power plant in Appendices E and F.

Comment AL-11:

Page D-47: The statement that "modification for both the NFS and Barnwell pools are projected which would result in increased storage capability" should be deleted or substantially altered to reflect the fact that such modification is no longer planned at either facility.

Response AL-11:

The status of the proposals to modify the NFS and Barnwell pools has been updated in the final statement.

Comment AL-12:

Page H-21: The section on cladding stability during storage should be expanded to include a summary of the work done by A. B. Johnson of BNWL and reported in BNWL-2256, "Behavior of Spent Nuclear Fuel in Water Pool Storage".

Response AL-12:

The work by Johnson in BNWL-2256 is referenced in the final statement.

U.S. Department of Energy

Comment AM-1.1:

The Department of Energy (DOE) analyses indicate that larger independent spent fuel storage installations (ISFSI) may be required (5,000 to 10,000 MTHM) and, therefore, a brief discussion and analysis of environmental impacts related to this size of ISFSI's may be appropriate.

Response AM-1.1:

Any ISFSI which may be licensed and constructed will have impacts proportional to its size. Attempting to project a series of sizes is speculative.

Comment AM-1.2:

> The treatment of reactor storage basin capacity is appropriate for generic environmental impact statements. It should be recognized, however, that actual storage capacity for individual reactors will be determined on a case-by-case basis.

Response AM-1.2:

The situation noted in the comment has been clearly recognized in the statement (for example, see Finding 2 in Sec. 8.2 of the Executive Summary).

Comment AM-2:

> The reference to an operational geologic repository for high level nuclear wastes by 1985 (page ES-12) is currently recognized to be too optimistic. The earliest date for an operating permanent repository is now estimated to be 1988.

Response AM-2:

The draft statement conservatively assumes no reprocessing or repository operation before the year 2000.

Comment AM-3:

> It is suggested that the statement does not address the subject of, nor the responsibility for, decontamination and decommissioning the Away-From-Reactor (AFR) storage basins after the spent fuel has been shipped from the AFR for either reprocessing or for terminal disposal.

Response AM-3:

The conservative costing of Chapter 7 of the draft statement simply continued indefinitely the cost of spent fuel storage (see Table 7.4 "Estimated Annual Increment Costs for AFR Storage" and page 7-11 of the draft statement). The NRC recently has issued for comment 10 CFR Part 72, "Storage of Spent Fuel in an Independent Spent Fuel Storage Installation (ISFSI), Proposed Licensing Requirements," which requires a decommissioning plan in §72.18 "Decommissioning Plan, Including its Financing." This statement supports 10 CFR Part 72.

Comment AM-4:

> Page ES-3
> The quantities of spent fuel projected (Table ES-1) are substantially higher than those used in DOE/ER-0004/D, Draft Waste Management Task Force Report (February 1978).

Response AM-4:

The quantity of spent fuel projected in the draft statement was based on the staff's best estimate and was lower than the projections by others, such as reported in DOE/EIS-0015-D, August 1978. The projections in the final statement reflect recent information on operating plant discharge experience, as well as changes that have occurred in projections of nuclear plant capacity through the year 2000.

Comment AM-5.1:

Page ES-5, paragraph 2
How much additional storage capacity does this provide?

Response AM-5.1:

The additional storage capacity that may be provided by the expansion of existing storage pool capacity is indicated in Table 3.4 of the draft statement.

Comment AM-5.2:

Page 3-1, paragraph 1, line 4
Suggest inserting "interim" prior to "storage" to clarify why geologic disposal is not shown as being under consideration.

Page 3-15, Section 3.1.4.2.1, line 1
Suggest replacing "has" with "had previously" to indicate this is not a newly developed concept.

Page 4-4, Section 4.1.2.2, next to last sentence
Suggest including a reference to Appendix C (termination case impacts).

Response AM-5.2:

The suggested text changes have been implemented.

Comment AM-6.1:

Section 7.1
Inclusion of a summary of the excess mortality data (presented in tables 4.2 and 4.12) in the evaluation section would seem appropriate.

Page 7-2, Section 7.1.3
Suggest that a Summary Statement regarding the radiological impact of coal fired replacement plants (discussed on pages 4-5 and 4-7) be included.

Response AM-6.1:

Although the suggested additions would provide useful information, they would not significantly affect the benefit-cost balance and therefore are not essential to the evaluation.

Comment AM-6.2:

Table 4.2
This estimate of health effects seems narrow in scope and at the low end of the range of estimates used in the literature. This is especially true in the light of the lung cancer data for uranium miners.

Response AM-6.2:

Table 4.2 has been revised. See also the response to comment AH-1.

Comment AM-6.3:

Table 4.3
It looks like there is possibly a reversal of two columns in this table. Does the Occupational Dose Total Body Person-Rem really match the Population Dose-Skin-Person-Rem for foreign countries?

Response AM-6.3:

The match between the values cited in Table 4.3 is fortuitous.

Comment AM-6.4:

Is information available on the operation of reactors that would give real numbers of person-rem/unit of electricity produced that could replace those in the current models? It requires a certain level of human exposure to operate equipment which handle levels of activity such as 10^6 curies/metric ton. These known values should be utilized.

Response AM-6.4:

For occupational workers, where person-rem data were known, real dose data were used, although extrapolated to new facilities with technological modifications designed to reduce such doses. There are no real data [person-rem/GWy(e)] for U.S. or world populations, only calculated estimates for expected releases.

POWER AUTHORITY OF THE STATE OF NEW YORK

Comment AN-1:

Further definition of transshipment licensing requirements are needed.

Response AN-1:

Shipment of spent fuel is pursuant to NRC Regulation 10 CFR Part 71 "Packaging of Radioactive Material for Transport and Transportation of Radioactive Material Under Certain Conditions" and to Department of Transportation Regulations 49 CFR 170-189.

Comment AN-2.1:

The latest D.O.E. "maximum achieveable" estimate for installed nuclear capacity is 380 GWe by the year 2000.

Response AN-2.1:

The staff's estimate of nuclear capacity discharging fuel in the year 2000 is shown as 383 GWE in Table 2.1 of the draft statement, essentially the same as DOE's value.

Projected nuclear power generation capacity in the year 2000 has been reduced in some estimates. This does not affect the finding of the statement that the environmental impact of increased interim storage of spent fuel is not significant.

Comment AN-2.2:

> Although in the past, utilities did provide spent fuel storage capacity for about 1.5 cores, the basis for this practice (i.e. a viable spent fuel reprocessing segment of the nuclear industry) no longer exists.
>
> Due to the questionable status of spent fuel reprocessing and an absence of adequate storage away from the reactors, present designs call for spent fuel storage capacities significantly higher than the 1.5 core storage capacity assumed in Table 2.2. To insure that a reasonable analysis of alternatives available for storage of spent fuel is performed, the use of 1.5 core storage capacities for reactors coming on line from 1986 to 2000 should be re-examined.

Response AN-2.2:

The use of a 1.5-core storage capacity for reactors coming on line during the period 1986-2000 was assumed in part because of lack of specific information and in part in an effort to project a conservative baseline storage capacity from which to gauge the increase in interim capacity required as a result of the delays in ultimate disposition of spent fuel. Recent applications for reactor licenses indicate reactors of this period are unlikely to be constructed with basins of such low capacity. In the final statement the staff has addressed this subject based on current information.

Comment AN-2.3:

> It is not clear how D.O.E. storage scheduled for 1987 to 1993 startup will impact on the storage requirements.

Response AN-2.3:

In the draft statement, the staff conservatively bounded the issue of ultimate disposition of spent fuel by assuming there would be no relief from interim storage until the year 2000. Recent slippage in DOE estimates of a startup date for a respository consequently have had no effect on this statement.

Comment AN-3:

> Storage capacity estimates may be conservative as substantial use of "stacked-storage" is possible within the industry.

Response AN-3:

The storage basin capacity data presented in Table 2.2 are conservative. The same data are presented in Table 3.1, and it is noted that the capacity value does not include consideration of any increase in storage capacity above that originally provided, namely 1-1/3 to 1-1/2 cores. Actually, most licensees have increased or have submitted proposals to the Nuclear Regulatory Commission to increase the onsite storage capacity. The requested median increase is greater than 2.5 (ratio of modified storage capacity to original storage capacity). This increase has, in all but two cases, involved installation of more or new racks on the bottom of the spent fuel storage pool. In two cases (at the Yankee Rowe and the LaCrosse plants), licensees have proposed "stacked storage;" the stacked storage concept resulted in an increased storage ratio greater than 4.0. This concept and others yet to be proposed by licensees have made the factor of 2.5 conservative, and an average factor of 3.0 is used in the final statement.

964150

"Stacked storage" at more than a few facilities is a complicated engineering problem, as explained below; and, therefore, the staff does not expect widespread use of such storage methods. The configuration of the fuel storage pools is essentially the same for all nuclear power plants. The pools are rectangular in the horizontal cross section and about 40 feet deep. Fuel assemblies are placed in storage racks at the bottom of the pool and insertion and removal of fuel assemblies is accomplished vertically from above the racks. These fuel assemblies must remain submerged during fuel removal from and insertion into the racks; thus, for this reason alone, the water must be at least 28-30 feet deep, which is about two fuel assembly lengths. (Fuel used in the reactor where stacked storage is proposed is short, less than 10 feet; thus, the corresponding depth of fuel storage and handling is about 20 feet.) In addition, shielding equivalent to about ten feet of water depth is needed for high burnup fuel assemblies just removed from the reactor. The total depth of most pools, thus, must be about 40 feet. Those reactors without a deep enough pool to permit underwater fuel handling over the top of two layers of fuel would require some modification to increase pool depth or provide other shielding techniques.

YANKEE ATOMIC ELECTRIC COMPANY

Comment AO-1:

In addition to endorsing the UWMG comments, we wish to suggest several specific corrections with regard to the nuclear units in New England for which we are responsible. These follow:

Page 3-9: In Table 3.4 the data for Yankee Rowe should be corrected. The core size is 76 assemblies, not 74. The pool size is 176, not 172. The planned and authorized increases are both 215, not 219. The percentage increase is 122% not 130%. And the compact storage factor is 2.22, not 2.30.

Page 3-29: The two units under construction for Public Service Company of New Hampshire at Seabrook are misring from Table 3.5. These units are scheduled to operate before 1986.

Appendix E: (1) In Table E.1 the spent fuel storage capacities for our reactors in 1976 should be:

Vermont Yankee	88
Maine Yankee	94
Yankee-1	104

(2) In Table E.2 the discharge data for our reactors are very low by historical standards. This is undoubtedly due to the assumption in NUREG-0404 of a very low capacity factor. The capacity factor assumed and used to calculate Table E.2 should be clearly identified in the appendix and on the table.

(3) The calculated storage situations in Tables E.3, E.4 and E.5 should be corrected to reflec' those changes in storage capacity outlined above in (1).

Appendix F: (1) On page F-3 it should be pointed out that the assumed compact storage is with a compaction factor of 2.5.

(2) On page F-12 the storage capacity for Yankee-1 should be 176 instead of 216.

(3) On page F-16 the storage capacity for Yankee-1 should be 100 instead of 140.

(4) On page F-20 the storage capacity for Yankee-1 should be 440 instead of 540.

(5) On page F-24 the storage capacity for Yankee-1 should be 364 instead of 464.

(6) The changes specified in (2)-(5) will affect subsequent tables in Appendix F. In particular Tables F.10, F.11, F.12 and F.13 will be changed.

Response AO-1:

The best available information was used in listing the data for various reactor plants in the draft statement. Data in the final statement have been revised to reflect the information now being provided to the NRC as reported in the "Gray Books" (NUREG-0020).

COMMONWEALTH EDISON

Comment AP-1:

> We also agree with the conclusion reached by NUREG 0404 that the storage of spent fuel in away-from-reactor facilities is economically, environmentally and technically acceptable. However, we believe that NUREG 0404 does not sufficiently emphasize its most important conclusion: that both expansion of at-reactor storage facilities and the construction of AFR facilities will be needed. A strong statement of this finding can make a significant contribution in helping to avoid unnecessary delays in the planning, expansion and construction of spent fuel storage facilities.

Response AP-1:

It is stated in Finding No. 5 on page 8-2 of the draft statement that ". . . assuming the power reactor industry continues to increase at-reactor spent fuel storage capacity, there is continuing need for away-from-reactor spent fuel storage through the mid-1980's." Without such increases as shown in Chapter 3, Table 3.1, larger amounts of AFR storage capacity would be required.

Comment AP-2:

> In addition, NUREG 0404 should be accompanied by a statement describing how it will be used. While NUREG 0404 could provide the basis for a rulemaking, which would make its findings legally binding in subsequent licensing proceedings, no such proceeding is required to make the statement useful. NUREG 0404 should immediately be employed to prevent redundant NEPA reviews in individual licensing proceedings. For example, NUREG 0404 will provide the basis for a negative declaration with respect to the environmental impact of a proposal to increase spent fuel capacity at a particular reactor. No supplemental environmental impact statement is necessary for a particular action when all of the environmental analysis required has been conducted in the programmatic statement. Natural Resources Defense Council v. Administrator Energy Research and Administration (Slip opinion, D.C. Civ. Action No. 76-1691, May 8, 1978). In addition, NUREG 0404 should form the framework for the staff's position in any contested proceeding with respect to the licensing of new spent fuel storage facilities.
>
> We believe that clarification of these points is important to reduce the likelihood of unnecessary duplication of NEPA reviews and to ensure that the licensing of spent fuel facilities is to proceed in a timely manner.

Response AP-2:

The final statement supports proposed 10 CFR Part 72, "Storage of Spent Fuel in an Independent Spent Fuel Storage Installation" (ISFSI). Any use of the statement beyond this rulemaking action is subject to decisions by the Commission.

Comment AP-3:

> **Page 3-36/37 and Appendix C**
>
> This section discusses the potential for replacement power from coal-fired stations in the so called "termination case." There is no compelling evidence to use a significantly different capacity factor for nuclear units and coal-fired units. The 1977 data for nuclear units show an average capacity factor of 62.5% for licensed nuclear plants in the U.S. The 10-year average capacity factor for coal-fired plants larger than 400 megawatts is 60%. Accordingly, we recommend that all reference to different capacity factor projections be deleted from the report and that a single capacity factor or range of construction permit be chosen and used for both types of units. Several specific criticisms dealing with Appendix C follow:
>
> 1. Coal units do not run closer to their nameplace capacity than do their nuclear counterparts.

36152

Response AP-3:

The final statement has been modified to use the same capacity factors for coal and nuclear. It is now indicated that coal capacity to replace nuclear capacity would have to be one-for-one (i.e., megawatt for megawatt).*

*R. G. Easterling, "Statistical Analysis of Power Plant Capacity Factors," U.S. Nuclear Regulatory Commission, NUREG/CR-0382, p. vi, February 1979.

Comment AP-4:

2. The EIS should be updated to reflect recent amendments to the Clean Air Act that may require use of scrubbers on plants burning low sulfur coal.

Page C-1, Section 1.1

Cyclone furnaces probably cannot meet emission standards.

Page C-1, Section 1.1

Fourth sentence should read 60-70% ash content, rather than 80%.

Page C2-6

This curve should be clarified and updated. It is not clear to us where the ash content figures for Wyoming and Illinois coal came from.

Page C-8

The 17% figure for auxiliary power is too high.

Page C-9, Section 3.0

2.5% moisture content is too low. It should be 12 to 15% for high sulfur coal and 15 to 20% for low sulfur coal. Also, 15,000 BTU/lb heating value is too high; experience indicates that it is more like 9,500 to 10,500 BTU/lb.

Page C-11, Section 5.1.1, Third Paragraph

Maintenance on electrostatic precipitators is not "relatively low."

Page C-12, Section 5.1.1, Last Paragraph, Last Sentence

Cold precipitators and SO_2 burners are used more frequently.

Response AP-4:

The information presented in the statement was obtained from a number of sources believed to be reliable, although the staff agrees that other sources might disagree in detail. In any case, any revisions that would be made to Appendix C would not change the conclusions reached in Section 4.1.2.

Comment AP-5:

Page 4.2, Section 4.1.1.2, and H-4, Section 1.3

This section discusses the impact of cooling towers on the environment. While a cooling tower may be used for an AFR facility, it is not the only means of cooling. This section should indicate that the facility is not restricted to using cooling towers. The cooling requirements are small and have little environmental impact.

The discussion of cooling towers is presented in several other sections of this report and this comment applies to these sections also.

Page H-2, Section 1.1

This section indicates that an AFR will have an interim location for storage in the pool. Commonwealth Edison is reviewing AFR designs and does not comtemplate necessarily using an interim storage location. There is no technical or safety reason why spent fuel could not be transferred directly from its shipping cask to its permanent storage location in the pool. This section should be expanded to indicate that the interim fuel storage location may be a convenience, but is not a requirement.

Page H-5, Section 1.3

This section discusses design details of the AFR cooling water and air systems. If this facility were incorporated with an operating plant, some of these systems might not be required. This report should indicate that the detail system designs mentioned are only an example and not the only way of meeting the requirements.

Response AP-5:

See the response to comment AI-13.

The first sentence of Appendix H states: "This section will treat a 1500-MTU pool as a model facility for discussion purposes only." Other designs are not excluded.

Comment AP-6:

Page 4-27, Section 4.3.2.1

This section states that the number of employees in a nuclear plant vs. a coal-fired plant is significantly different and indicates that the coal-fired plant requires about four times the number of personnel of a nuclear plant.

For a multiple unit plant, Commonwealth Edison requires approximately the same number of personnel for the plant regardless of whether it is nuclear or coal-fired, with one exception: nuclear plant security now calls for a larger number of personnel.

Response AP-6:

The section has been changed accordingly.

Comment AP-7:

Page 6-3, Figure 6.1

This section indicates that the NRC will require only six months for approval of a request to modify an existing spent fuel storage pool from the time discussions are begun between the utility and the NRC. While experience to date has not supported this statement, proper reliance on NUREG 0404 and an efficient review process should result in meeting the objection.

964154

Response AP-7:

Comment noted.

Comment AP-8:

Page 6-9, Section 6.2

This section indicates that the national average fuel price for coal in 1976 was 8.1 mills per kilowatthour. In 1977, Commonwealth Edison found that the price for coal was 11.5 mills per kilowatthour. This difference is primarily due to the use by Commonwealth Edison of higher-priced low-sulfur coal to meet emission standards. The use of the 8.1 mill figure is an underestimate which significantly affects the cost calculations in this section. These figures should be updated.

Response AP-8:

The staff agrees, and 1977 estimates now appear.

Comment AP-9:

Page B-8, Section 1.2.4.b

This section indicates that current design criteria for storage racks require that a fuel assembly cannot be inserted anywhere other than a design location. However, the Commonwealth Edison designs make provision for the unlikely event that a fuel assembly may be misplaced in other than a permanent storage location. Such occurrences have been analyzed to determine that they do not affect the safety margins in the analyses.

Page B-15, Section 1.3.2

This section states that rack designs require bracing from walls or anchors in the floor. Free standing racks are currently being used by several plants and are being included in Commonwealth Edison designs. Because such racks can be moved more easily within the pools, they provide useful flexibility in the handling and storage of spent fuel. There is no reason to rule out the use of free standing racks where analyses show that such racks can withstand design-basis seismic events. This discussion should be modified accordingly.

Page B-19, Section 1.3.5

When discussing the storage of nonfuel items, this section should be expanded to include items such as fuel handling tools which may be stored in the pool.

Page H-22, Section 3.1.2

This section indicates that the use of BORAL is unacceptable in spent fuel pools for PWRs due to the possibility of galvanic corrosion. This statement is too broad. BORAL is presently being used in PWR pools, as is noted on page D-12 where it states that the NRC has accepted a high density fuel storage design for Maine Yankee incorporating BORAL. Commonwealth Edison intends to use BORAL in its high density absorber racks for Zion Station with stainless steel cladding which precludes the possibility of galvanic corrosion.

Response AP-9:

See the responses to comments AI-16.1, AI-16.3, AI-16.4, and AI-16.6.

Comment AP-10:

Page B-12, Section 1.3.1

This section states that 3.3% enriched fuel is representative of the fuel used in the Zion reactor. 3.1%

enriched fuel is considered to be the maximum enrichment which would be used in the Zion plant on an annual fuel cycle basis.

Response AP-10:

The correction has been made in the final statement.

STATE OF ILLINOIS, ATTORNEY GENERAL

Comment AQ-1:

GENERAL COMMENTS

The development of the Generic Environmental Impact Statement on spent fuel by the Nuclear Regulatory Commission has been done in a way which effectively circumvents the entire NEPA process. Under NEPA the environmental consequences of a proposed action must be considered prior to undertaking such a procedure. The GEIS attempts to avoid such a choice by casting the alternative to continued generation of spent fuel as being limited to shutting down existing nuclear plants and instead building coal fired plants. This approach not only incorrectly ignores viable alternatives such as conservation, alternative energy sources, and precluding additional nuclear plants from coming on line but considers the environmental consequences of the handling of spent fuel only after major federal actions having a significant impact on the environment have taken place.

Comment AQ-2:

The Draft Generic Environmental Impact Statement (hereinafter "DGEIS") presents many questions in a rule making proceeding which are adjudicatory in nature. There is today only one facility which accepts spent fuel, GE Morris, and NUREG 0404 attempts to resolve many site specific, adjudicable issues regarding the impact of this facility on the health and safety of the people of that area in a rule make proceeding.

Response AQ-1, AQ-2:

The NEPA process has been adhered to by the NRC. In its ruling of September 16, 1975 (40 FR 42801), the Commission allowed continued expansion of spent fuel storage capacity on a case-by-case basis. The G.E. Morris Operation has been considered on such basis. See also response to comment AQ-21.2.

The staff did consider the effects of conservation in Chapter 7, Section 7.4.1.2 "Courses of Action." It concluded that spent fuel would continue to be generated. The scope of this statement is limited to consideration of the environmental impacts of additional spent fuel storage.

964156

The extent that conservation or alternative sources of energy production reduce the need for projected nuclear power or coal power will be reflected in a proportional decrease in the environmental impacts shown for them. It should be noted, however, that some of the proposed alternative power sources may have significant impacts.*

None of this, however, affects the finding that additional spent fuel storage is environmentally acceptable.

*H. Inhaber, "Risk of Energy Production," Atomic Energy Control Board, AECB 1119, Ottawa, Ontario, March 1978.

Comment AQ-3:

The Draft Generic Environmental Impact Statement does not address the development of an interim storage policy which would avoid the creation of independent spent fuel storage installations (hereinafter "ISFSI's")*, through the use of compacted storage, interim transshipment, conservation and increased reliance upon alternative energy sources. The avoidance of ISFSI's reduces transportation risk, avoids the environmental and safety harms from the creation of additional facilities containing radioactive material, helps to minimize the significant and potentially escalating cost of decommissioning and decontamination of nuclear facilities, and avoids the risk of turning facilities designed for interim or independent storage into long-term storage facilities.

*Sometimes referred to an an "AFR".

Response AQ-3:

The statement does address compacted storage and interim transshipment. Conservation and increased reliance on alternative energy sources, as such, are beyond the scope of this statement, which is concerned with the environmental impact of interim spent fuel storage through the year 2000. The quantity of spent fuel to be stored is proportional to the projected installed nuclear generating capability over this period. The impact of such storage has been found to be negligible.

Comment AQ-4:

The DGEIS fails to explore and figure into its fuel storage analysis all credible options for compacted at-reactor storage (hereinafter "AR Storage"), including 2-tiered stacking, fuel disassembly and storage of rods and other more compact configurations.

2-6. Table 2.2. Storage Capacity is misleading, it presents available basin storage capacity without compact storage. As indicated in other sections of the DGEIS (specifically Table 3.4 on page 3-9) compact storage is a fact at many reactors and will change the storage capacity listed in Table 2.2 significantly. It is not realistic to assume that only 1.5 cores of storage capacity will be provided for reactors coming on line after 1985. The storage capacity will probably be much larger.

3-1 and 2. (See previous comments on limited alternatives assessed). The remaining spent fuel capacity at each individual facility should be listed and analyzed on a geographic basis. Alternative 1 does not examine the option of even more compacted storage at reactor sites. Testimony presented at hearings held at the California Energy Commission in March, 1977 (Rubinstein of Nuclear Services Corporation) indicated that at-reactor storage compaction is probably feasible by more dense racking and on double-deck racking so that interim storage of a reactor's 40 year discharge of spent fuel might be feasible in existing AR pools. Volume 2 of the generic environmental impact statement indicates (page D-43) that two-tiered stacking of fuel racks is a possible method at reprocessing plants. While these alternatives present certain problems they do not appear to have been considered by the DGEIS at all for reactor storage pools. Another alternative for more compact storage is a possibility of fuel bundle disassembly and storage of rods in more compact configurations.

3-3. Table 1-1 should also include analysis for listing additional full capacity with compact storage. Such a change together with the use of transshipment could reduce or eliminate any need for AFR storage until after the year 2000.

3-7. Paragraph 3.1.1.1. Double deck racking is also an option for compacted storage.

3-8. The third paragraph indicates that PWR can increase at-reactor storage capacity by a factor of 3 through the use of compact storage. Table 3.4 on page 3-9 however, indicates that one reactor, Three Mile Island Number 1 has achieved a compact storage factor of 4.36.

Response AQ-4:

Existing techniques for compact storage of spent fuel at reactor pools has been examined in the draft statement. This is not meant to preclude other measures for such compact storage. See the responses to comments AL-5 and AN-3. Transshipment is reexamined in the final statement.

Comment AQ-5:

The DGEIS does not deal with the problems associated with the possible conversion of an ISFSI into a long-term spent fuel disposal facility.

964158

There is no analysis of the possibility that an ISFSI might become de facto a long-term disposal facility. In view of the limited experience of the nuclear industry with wet storage of spent fuel and certain questions raised by all sides about hazards associated with long-term fuel storage (for example, concerns about the integrity of zircaloy cladding) there is more than a remote chance that once spent fuels are stored for a certain number of years they may not be capable of being moved without significant environmental harm. If that possibility is not deemed likely the DGEIS must at least develop procedures for insuring such facilities do not become long term disposal facilities.

Section 4.1.4. If a subsequent determination is made that movement of spent fuel from an ISFSI for environmental reasons would create significant harm such a facility could become a de facto long-term disposal facility. This would have the effect of limiting future options.

Further, a geologic repository seems out of the question by the mid-1980's. The recent DOE Task Force Report indicates that a basic waste management policy is just now beginning to be formulated and that 1989 would be the earliest such a facility could be established.

1-4. The scope of the assessment is indicated to consider the impact of storage of spent fuel through the end of the century. Consideration should be given to the possibility that safeguarded storage of spent fuel may develop into a "perpetual" requirement.

Additionally, the statement fails to analyze the possibility that no method of dealing with the spent fuel storage problem may be found which is superior to wet pool storage and therefore ISFSI's could become de facto long-term storage facilities.

Response AQ-5:

A decommissioning plan for the G. E. Morris Operation, which is licensed as an ISFSI pursuant to existing 10 CFR Part 70, has been required by NRC and submitted by the licensee (Docket No. 17-1308).

The storage of spent fuel in ISFSI is licensed only for an interim period. Proposed 10 CFR Part 72, "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuel Storage Installation" (ISFSI), which NUREG-0404 supports, was issued for comment October 6, 1978. Under Subpart A-General Provisions, 872.1 Purpose it is specifically stated that: "Such licenses are limited to the temporary storage only of spent fuel; no license under this part will be granted for the later permanent storage or disposal of spent fuel."

In addition, in 872.18 "Decommissioning Plan, Including its Financing," paragraph (a), it is stated that,

> Each application under this part shall include a decommissioning plan which shall contain information on proposed procedures for the disposal of radioactive material, decontamination of the site and other procedures, sufficient to provide reasonable assurance that the dismantling and disposal of the ISFSI at the end of its useful life will not be inimical to the common defense and security or to the health and safety of the public. This plan shall include

an evaluation of the ISFSI design features which have been selected to facilitate to the maximum degree reasonable its decontamination and decommissioning at the end of its useful life. This plan shall include provisions for minimizing the amount of solid, airborne and liquid wastes generated during decommissioning.

Spent fuel that has decayed for as little as 120 days presently is shipped safely in casks. The heat and radioactivity of spent fuel aged by years of storage will be orders of magnitude lower.

This statement conservatively assumed no relief for the storage of spent fuel from reprocessing or ultimate disposal in a geological repository until after the year 2000.

The scope of this statement is limited to the interim storage of spent fuel. Its ultimate disposition by either reprocessing or disposal is beyond the scope of this statement.

Comment AQ-6:

The DGEIS does not analyze the costs, and environmental harm associated with the decommissioning and the decontamination of ISFSI's.

There is no analysis of the significant costs and potential dangers associated with the decontamination and the decommissioning of independent spent fuel storage installations and of at-reactor storage pools.

Chapter 4. Chapter 4 fails to discuss the environmental effects on decommissioning and decontaminating additional nuclear facilities, dry storage, centralized v. proliferated storage, and the degree of transshipment of spent fuel.

6-5. Paragraphs 6.1.1.6, 6.1.3. The DGEIS has failed to figure in comparative decommissioning and decontamination costs in its analysis.

7-10. The method of discounting the cost of perpetual AFR storage after 25 years is a questionable accounting technique in view of the large degree of uncertainty on inflation, not to mention possible societal changes in periods that far in the future.

Response AQ-6:

Decontamination and decommissioning of an ISFSI is a relatively trivial and cheap operation. (See response to comment AU-4.) Decommissioning of at-reactor spent fuel storage pools is also a trivial problem and is little affected by expansion of storage capacity.

In the tables on page 7-10 of the draft statement, figures are presented for various "real annual return on capital." The inclusion of the word "real" takes into account inflation and societal changes.

Comment AQ-7.1:

961150

The DGEIS does not seriously consider energy conservation as a means of reducing the quantity of spent fuel. Further, it has not considered the impact a spent fuel policy which relies upon stringent conservation measures would have upon the development of a national energy conservation policy.

There is the unwarranted assumption that conservation or alternative energy systems are not viable.

Response AQ-7.1:

The staff did consider the effects of conservation in Chapter 7, Section 7.4.1.2 "Courses of Action." It concluded that spent fuel would continue to be generated. The scope of this statement is limited to consideration of the environmental impacts of additional spent fuel storage. National energy conservation policy is beyond the scope of this statement.

The intent of this statement was to examine bounding alternatives. The impact of additional spent fuel storage was not found to be significant.

Comment AQ-7.2:

3-36. Paragraph 3.33. The three sentence consideration of alternative energy sources and conservation made on page 3.33 hardly seems consistent with the Commission directive in the Federal Register, September 16, 1975 (40 FR 42801) that alternatives to the present system be examined. Further, the references cited in support are somewhat questionable. The staff cites a Ford Foundation study (Ford Foundation, "A Time to Choose America's Energy Future," Energy Policy Project, Ballinger Publishing Co., Cambridge, 1974) as evidence that conservation will not have a material impact on the need for electricity. However, that study estimates that the growth in electrical needs could be cut by more than 50 percent through increased conservation. Further, the Commission's statement that conservation will not be a reasonable alternative contradicts principle number 6 of the National Energy Policy which states that conservation is essential to an energy program in the United States.

Response AQ-7.2:

The first paragraph in Section 3.3.3 has been changed.

Comment AQ-7.3:

The conclusion of the DGEIS that conservation and alternative energy sources are not viable fails to take into account conclusions as these made by other federal government agencies such as the Council on Environmental Quality. The CEQ predicted in a recent study that current energy consumption can be reduced 20 to 40 per cent through conservation and that if conservation measures were taken by the year 2000 solar technology could meet 25% of our energy needs and 50% of our energy needs by the year 2020. Solar Energy: Progress and Promise, Council on Environmental Quality, April, 1978.

Response AQ-7.3:

The extent that conservation or utilization of alternative sources of energy production reduce the need for projected nuclear power or coal power would result in a proportional decrease in the environmental impacts of nuclear and coal power fuel cycles. It should be noted, however, that some of the proposed alternative power sources may have significant impacts. Also, the extent to which they would be feasible (as in the case of solar energy conversion, which is projected to contribute no more than about 1% to electrical energy production by the year 2000*) is speculative.

None of this, however, affects the finding that additional spent fuel storage is environmentally acceptable.

*"Principal Conclusion of The American Physical Society Study Group on Solar Photovoltaic Energy Conversion," H. Ehrenreich, Chairman, published by The American Physical Society, New York, NY, p. 2, January 1979.

Comment AQ-8:

The DGEIS does not seriously consider alternative energy sources other than coal. It dismisses the potential of alternative fuel sources in one sentence, referencing several previous NRC reports of questionable sufficiency. The referenced NRC Reports underestimate the potential of solar, hydro-electric, oil, coal gasification, wind, and geothermal power. Further, there is no analysis of the impact a spent nuclear fuel policy which relies upon alternative energy sources would have on the development of such alternative energy sources.

1-3. Alternative 3. The option of halting new plant construction rather than closing down existing plants is an option that should be considered. Further, there is no justification for assuming that coal is the only replacement energy source.

Alternative 3. Coal is listed here as an "example" of an alternative energy source, but on page 1-3 and elsewhere in the text it is listed as the alternative energy source.

4-3. In the last paragraph on the page, alternative coal utilization technologies are dismissed due to the uncertainties involved with projection into the future. Several technologies such as onsite gasification or liquification appear to show promise and their potential should be seriously analyzed.

Response AQ-8:

The staff does not agree that necessarily speculative analysis of technologies now undergoing research and development would make the statement more useful. For generation of electric power, the principal effect to be expected from successful development and commercialization of the subject technologies would be reduction of the emissions from coal-based plants. Such an improvement would be desirable but would not affect the conclusions reached in this statement. See also the responses to comments X-4, AL-6, and AQ-7.3.

Comment AQ-9:

The DGEIS assumes that dry storage is a viable alternative but provides no analysis to support this statement.

There is no analysis of the possibility that an ISFSI might become de facto a long-term disposal facility. In view of the limited experience of the nuclear industry with wet storage of spent fuel and certain questions raised by all sides about hazards associated with long-term fuel storage (for example, concerns about the integrity of zircaloy cladding) there is more than a remote chance that once spent fuels are stored for a certain number of years they may not be capable of being moved without significant environmental harm. If that possibility is not deemed likely the DGEIS must at least develop procedures for insuring such facilities do not become long term disposal facilities.

Response AQ-9:

Dry storage is not analyzed in detail because it is not under strong consideration. However, there is some evidence for its adequacy from the INEL experience cited on page 4-2 of the draft statement. Dry storage is covered under proposed 10 CFR Part 72 and would have to meet the requirements of that regulation before any such installation would be licensed by NRC.

Comment AQ-10.1:

There is no analysis of the use of transshipment and compacted storage as interim solutions to provide short-term relief from the fuel storage problem until the creation of a viable national policy on long-term storage. It is not sufficient to dismiss transshipment as merely a means for postponing the problem since all spent fuel storage techniques discussed are merely interim solutions.

ES-6.7. The alternatives of transshipment of fuel from one reactor to another and of a reduction in nuclear power generation are dismissed on the bases that transshipment provides only temporary relief and nuclear power generation restriction requires full replacement by coal fired power plants. It does not appear that these alternatives or combinations thereof have been given a real evaluation, especially if AR and AFR spent fuel storage is regarded only an an interim solution. For example, alternatives such as transshipment could provide essential short term relief from the fuel storage problem until the formulation of long-term policy so as to avoid the creation of additional facilities which are merely "interim". The alternatives to continued nuclear power generation of combinations of conservation, load management, plant conservation, alternative energy sources, etc., appear not to have been addressed at all.

Response AQ-10.1:

The transshipment model has been updated.

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Comment AQ-10.2:

ES-9. In Paragraph 5.0 no analysis is referenced in the text to support the statement that increased spent fuel transportation will have an insignificant impact on the environment. There is significant evidence that the creation of ISFSI's will create increased environmental harm through increased transportation risk. Spent fuel will have to be transported over long distances in the transportation of unirradiated fuel. Also spent fuel transportation is not subject to the same safety standards in transportation as unirradiated fuel because it is exempted by 10 CFR 73 sec. 73.6(b) from the safety requirements of 73.30-73-36 and 73.72.

Response AQ-10.2:

The statement that increased spent fuel transportation will have an insignificant impact on the environment is based on recent NRC environmental statements.* If significant evidence exists that increased risk actually harms the environment, then that evidence should be brought to the NRC's attention. The exemption in 10 CFR Part 73 has to do with physical security requirements (guards, communications, etc.), not safety standards, which are set forth in 10 CFR Part 71. Both spent fuel casks and fresh fuel packages are subject to rigorous safety standards.

*"Final Environmental Statement on Transportation of Radioactive Material by Air and Other Modes," U.S. Nuclear Regulatory Commission, NUREG-0170, December 1977.

Comment AQ-10.3:

3-27 through 34. This description on transshipment possibilities is difficult to follow and adds little to the DGEIS. Transshipment could be used a interim solution to spent fuel storage capacity problems and could also be used to resolve full core discharge capability problems that might arise at special plant situations. Further, the analysis fails to consider the possibility of increased storage capacity making transshipment viable and the fact that those reactors which are on line after 1986 will have additional storage capacity. Therefore spent fuel pools for reactors other than those listed in Table 3.5 will be available for transshipment. There is no analysis of the increased transportation risks and other harms associated with transshipment.

Response AQ-10.3:

The transshipment model has been updated for this final statement. Transportation accidents are discussed in Section 4.2.4. The document WASH-1238, "Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants," also contains an analysis of routine exposure due to transportation of radioactive materials. Both analyses are essentially updated and improved by the document NUREG-0170, "Final Environmental Statement on the Transportation of Radioactive Materials by Air and Other Modes," and the conclusion of the NRC staff is that transportation risks are very small. In Reference 19 of Chapter 4, p. 4-30 of the draft

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statement, the reference to NUREG-0034 has been replaced for this final statement with NUREG-0170 (the final version of NUREG-0034), which was issued in December 1977.

Comment AQ-10.4:

Volume 2-Appendices. Page B-34. If, in fact, (as indicated in the last paragraph) 2 round trips of 177 KM each were made in four hours with a truck shipping cask, conditions must have been so ideal (i.e., nothing in cask or nonradioactive material) that any generalization based on this example is unrealistic.

Response AQ-10.4:

This example (0.01 hr/km) does represent high efficiency. In Reference 20 from which this example was taken, the statement is made that some 200 shipments had been successfully completed to date for this transportation distance. The first shipment required 12 hours turnaround time, but with experience the turnaround time was decreased to about four hours. One cask would be turned around in the morning and a second one in the afternoon. Similar turnarounds at the reprocessing plant (at that time) combined with the short transportation distance enabled this cycle to be repeated daily. The example given on p. B-34 of the draft represents the best effort in this cycle. However, just before this example on p. B-34, the estimate of three to four days being necessary for a 3200-km round trip was given (0.02 hr/km - 0.03 hr/km). In the computation of turnaround times in Table E.6, p. E-32, the assumptions given on p. E-2 were used: six hours for each loading and unloading operation and a speed which corresponds to about 0.02 hr/km. Thus, the first example was not used as a basis for generalization.

Comment AQ-11:

The options of continuing to operate existing reactors but of not permitting reactors under construction from coming on line or of not granting additional construction permits have not been considered.

Table 1.1. Table 1.1 does not consider the option of preventing new plants from coming on line or of not granting any additional construction permits.

2-2. Paragraph 2.2. If no reactors were permitted to come on line after 1985 this would have an impact on the generation of spent fuel through 2000. (See comments about ES-3 regarding growth projection).

Response AQ-11:

The scope of this statement is to evaluate whether additional spent fuel storage is environmentally acceptable. Consequently, the addition of such storage capacity, whether at existing or new reactor storage pools or at ISFSI, is part of this generic evaluation. The issue of spent fuel storage, *per se*, provides no basis for a moratorium on new, as opposed to existing, reactors. Since additional storage is found to be acceptable, neither shutdown of existing reactors nor prohibition of new reactors is necessary as a result of the impact of such spent fuel storage.

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Comment AQ-12:

There is no comparative analysis under the "Safeguards Considerations Section", Chapter 5, of the relative vulnerability of AFR storage, no discussion of the environmental consequence of sabotage attempts and no economic analysis of the impact of physical protection measures on storage cost. Further, discussion of the environmental impact of safeguard failure should be analyzed.

> "The analysis fails to adequately deal with consequences of terrorist attacks. The Rand Corporation states that if a terrorist attack would occur it is a prudent estimate that such an attack would consist of seven to ten well armed and trained terrorists. The Office of Technology Assessment in a 1977 report, Nuclear Proliferation Safeguards considered as creditable the use of missles and anti-tank weapons by terrorists. KENNYETAL., in the report of the Ford Foundation, Nuclear Power Issues and Choices (1977) acknowledges the possibility of the use of anti-aircraft weapons and rockets in a terrorist attack.

ES-7. The statement is made that physical security measures would be expected to be essentially the same at both at-reactor and away from reactor sites. While the same regulations apply, it is questionable whether the security at a small ISFSI at a remote location would be as effective as might be found at a large nuclear power generating facility. In addition, each ISFSI creates yet another potential nuclear target for terrorists. Comparatively, construction of an ISFSI will have a greater impact on the need for security and thereby be more costly than will expansion of an existing facility.

Chapter 5. The Safeguards Consideration section is short and should be expanded. For example, no comparison of varying safeguards requirements for such alternative considered has been done. Further, there has been no analysis of whether security hazards are greater at centralized or decentralized nuclear facilities nor is there any analysis of the adequacy of these security requirements.

Physical protection of spent fuel at spent fuel storage sites is implied to be the same as for physical protection at reactor sites. The regulations are not clear but the physical security requirements for reactors (10 CFR 50.34) probably would not be applied to AFR's. In view of the probable remote location of an AFR, consideration should be given to additional security requirements. For example, is it desirable to require a "hardened" facility to insure that off-site assistance response time is adequate? In addition, with the common pooling of fuel from many different licensees, accountability should also be reevaluated.

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Response AQ-12:

See the response to comment X-5.

Comment AQ-13:

The DGEIS economics analysis does not address relative costs of significant conservation techniques sufficient to reduce energy demand to a level to which the spent fuel which is created can be stored in AFR storage facilities v. the costs for generating nuclear waste at levels projected in the DGEIS.Costs to store fuel and decommissioning and decontamination under each alternative should also be analyzed.

The economic feasibility of each alternative must be examined. The DGEIS does not analyze the issues surrounding the choice between centralized and decentralized storage technologies.

Section 4.1.2. The economic calculations in this paragraph do not consider other energy systems and conservation. They assume that the only real option is to close nuclear power plants down.

4-28. The bald statement that the replacement of nuclear energy with coal will result in higher utility bills lacks substantiation.

Response AQ-13:

The sentence on page 4-28 of the draft statement was intended to apply specifically to the termination alternative for which replacement, rather than "coal vs. nuclear", would be the dominant cost element. It has been replaced to clarify the meaning.

Regarding the first part of the comment, assuming that "AFR" is a unintentional slip and that "at-reactor" was meant, the proposed alternative appears to be the reduction of electrical energy consumption by "significant conservation techniques" to the level such that existing (or new under construction) generating plants (of all types) could meet demand without any new provision for storage of spent fuel from nuclear plants. As discussed in greater detail in the response to comment X-6, it appears very unlikely that consumption could be reduced to the proposed extent during the next decade by any "reasonable" approach to conservation. To illustrate, total U.S. consumption of electrical energy in 1977 was 14.5% greater than in 1973, in the face of widespread and substantial price increases and in spite of considerable governmental effort (Federal and many states) to promote conservation.

Comment AQ-14.1:

ES-3. A growth projection of 414 GWe by the year 2000 may not be a realistic figure in view of the postponement or delay of many nuclear plants. The GESMO 1 proceeding raised many questions about the validity of this "super low" growth projection.

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Response AQ-14.1:

The nuclear power generating capacity projection has been revised in the final statement.

Comment AQ-14.2:

> The Exxon licensing proceeding has been terminated. This has not been explicitly stated.

Response AQ-14.2:

The Exxon facility has been deleted in the final statement.

Comment AQ-14.3:

> 3-13. The characterization of Morris and West Valley as ISFSI's alone is misleading.

Response AQ-14.3:

The statement on p. 3-13 of the draft is: "Presently, there are several fuel storage pools functioning as ISFSIs, though their original purpose may have been different. The pool at the GE Morris facility is one example." [This storage of spent fuel is licensed at Morris as an operating ISFSI pursuant to 10 CFR Part 70.] The staff does not find the statement misleading. See also the response to comment AQ-21.2.

Comment AQ-15.1:

> ES-4. The statement is made that full core discharge capability is "not a safety matter." The basis for this statement is not substanciated in the text. Has a detailed fault tree analysis or similar failure mode analytical technique been utilized to verify this position? Given the current conditions of storage space and shipping cask availability, how long might it take to recover from a refueling-out-age-type accident that might require unloading the core and complete draining of the reactor vessel before corrective action could take place? Apart from the fact that full core discharge capabilities do not appear to have been fully addressed as a safety issue, it is desirable that a utility operator have FCD capability from an operational flexibility standpoint. Therefore, it should not be dismissed as a requirement so casually. Also full core discharge may be required for routine repair, maintenance, and inspection which might otherwise be discouraged.
>
> 1-2. As previously indicated, there is a serious question of whether operation of a reactor without FCR is desirable.

Response AQ-15.1:

Neither a detailed fault tree analysis nor a similar failure mode analytical technique was performed to support the statement that a full core discharge capability is not a safety matter. The rationale for the staff's position is discussed in the response to comment X-9. The staff did not estimate the time required to obtain an FCR by shipping a full core of fuel offsite; however, we believe that the time required to obtain an FCR could range from a few days to many months.

Comment AQ-15.2:

> Table ES-2 does not explicitly state the basis upon which it makes its compact storage analysis.

Response AQ-15.2:

Table ES-2 is a summarization of Table 3.1. The final statement has been corrected to clarify the basis of the former.

Comment AQ-16.1:

> ES-5. The NRC's conclusion that at-reactor storage capacity expansion can take place "without significant effect on health and safety"prejudges the conclusions of its generic environmental impact statement on that question and the importance of individual licensing proceedings in assessing whether a particular expansion can be done without harm to health or safety.

Response AQ-16.1:

The NRC licensing actions with respect to increased at-reactor spent fuel storage capacities have been conducted in accordance with NEPA. All licensing actions completed have resulted in negative declarations with regard to significant environmental impact. Nevertheless, the Commission did state in its September 16, 1975, announcement of intent to prepare this generic statement that,

> "While the Commission believes, as earlier indicated, that the matter of spent fuel storage capacity can adequately be addressed on a case-by-case basis within the context of individual licensing reviews, it also believes that, from the standpoint of longer range policy, this matter can profitably be examined in a broader context. It views the preparation of a generic environmental impact statement as a suitable vehicle for such an examination."

While the finding of this environmental statement is that storage capacity can be increased, this is not a prejudgment of the environment and safety considerations of individual applications, each of which will continue to be evaluated on the basis of its own technical merits.

Comment AQ-16.2:

> ES-6. The statement is made that General Electric's operation of the processing plant at Morris as an independent spent fuel storage facility has demonstrated that an ISFSI can be operated with adequate protection of the health and safety of the public. The statement is misleading. The Morris operation has operated on an extremely small scale (handling only several hundred tons of fuel) for a short time period in terms of probable storage times of spent fuel. It should be recognized that neither Morris nor NFS West Valley were designed to be ISFSI's nor is it reasonable to assume that an ISFSI would be constructed or operated in a way similar to these facilities. Additionally, significant questions have been raised in In The Matter of The General Electric Company (Docket No. 70-1308) regarding the health and safety aspects of the Morris facility.

Response AQ-16.2:

The GE Morris Operation is licensed under 10 CFR Part 70 "Domestic Licensing of Special Nuclear Material" for the storage of spent fuel as an ISFSI. Questions have been raised by the Attorney General of the State of Illinois concerning public health and safety aspects of the Morris Operation, but the Atomic Safety and Licensing Board (ASLB) appointed to rule on the significance of those questions has not yet had the opportunity to do so. Whether or not those questions will be admitted as contentions and the disposition of such contentions, if any, remain for the ASLB to determine. See also the response to comment AQ-21.2.

Comment AQ-17:

> To say that the environmental impact of independent facilities is about the same as that of at-reactor storage assumes that these facilities will not become long-term disposal sites. It also assumes that the same requirements of geologic, seismic and hydrologic integrity will apply to ISFSI's as currently applies to reactor sites.

Response AQ-17:

The NRC position on the interim storage of spent fuel in an ISFSI is further delineated in proposed 10 CFR Part 72, §72.1, last sentence:

> "Such licensees are limited to the temporary storage of spent fuel; no license under this part will be granted for the later permanent storage or disposal of spent fuel."

Also, the geological, seismic, and hydrologic integrity siting requirements for an ISFSI are expected to provide protection to the public at least equal those for reactor sites.

Comment AQ-18:

> ES-8. Table ES-3 provides a comparision of potential excess mortality of nuclear v. coal power generation. Presentation of the mortality statistics for nuclear to three decimal

places implies a great deal more certainty than can be statistically justified. In contrast, presentation of coal mortality figures for power generation as a range of 3-100 deaths per .86WY(e) is more realistic. Major accident cases appear to be omitted from the nuclear column. Nuclear mortality appears to be underplayed and coal mortality over-stated. For example, the impact of radon release from mining operations is understated.

Finding 7. The key finding seems to be that the costs and the excess mortality rates and environmental impacts of coal-fired power generation are much higher than those for nuclear power. This may be true providing the scenarios evaluated are in fact the only scenarios viable and providing that major nuclear power accidents can be successfully avoided, and that additional serious problems do not develop, (such as non-linear low level radiation effects, substantial changes to the occupational radiation limits, etc.). Some indication that uncertainty exists and that continuing evaluation is necessary should be made.

4-4 through 27. This section describing severe environmental impacts of coal fired power plants is exceedingly lengthy and out of proportion to the amount of space allocated to the description of major nuclear plant accidents. It describes the worst of coal and the best of nuclear. If the worst coal accidents are to be described, the catastrophic nuclear accidents should also be considered.

Response AQ-18:

The comparison between nuclear and coal is discussed in the response to comment E-2. The radon factor is discussed in the response to comment AK-6. All scenarios are included, and there is no assumption that accidents are avoided.

Uncertainties about the effects of radiation, which determines the impacts of nuclear power on health, are far less than the uncertainties about the effects of air pollution, which determines the impacts of coal-fired power. Moreover, effects of radiation are constantly being evaluated by prestigious national and international scientific bodies, and they have uniformly expressed the opinion that their evaluations are conservative, i.e., much more likely to overestimate than to underestimate the actual effects. For air pollution, on the other hand, the basic scientific problem is much more difficult, there has been much less research, there are no prestigious scientific groups sitting in judgment, and there has been no effort to be conservative in making estimates. Thus, the uncertainty factor strongly favors nuclear over coal.

The relative amount of space on pages 4-4 to 4-27 allocated to coal and to nuclear impacts was was not considered important in preparation of this document, but by any objective criterion (e.g., number of printed lines) far more space is devoted to nuclear. The worst coal experiences, in which thousands of lives have been lost, are not described, let alone the worst possible things that might happen with very small probability in the future.

Comment AQ-19:

Section 4.1.3. There is no analysis of the committment of resources for all viable options including alternative energy sources other than coal, conservation, and centralized v. decentralized spent fuel storage.

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7-4. Paragraph 7.2.4. This section fails to state anything. The section ignores the potentially vast irresponsible commitment of resources to the nuclear waste problem over thousands of years if a safe alternative is not developed.

Response AQ-19:

In this statement the staff has considered bounding alternatives to additional spent fuel storage within the time frame of reference.

In Section 7.2.4 it is noted that neither power generation by nuclear or coal-fired means through the year 2000 forecloses future options except to the limit that each alternative results in consumption of resources.

The scope of this statement is limited to interim additional storage of spent fuel. The nuclear waste problem is beyond the scope of this statement.

Comment AQ-20:

Section 4.1.5. Statements regarding the importance of a nuclear power energy base are unsubstantiated.

4-1. There is no analysis of the statement that energy demand will continue to increase at the rate projected.

Response AQ-20:

The subject assumption is supported by analysis in Section 7.4.1.2, and the second paragraph of Section 4.1 has been changed to indicate this.

Comment AQ-21.1:

ES-9. The need for more definitive regulations for new "storage only" facilities is indicated. The planned regulations 10 CFR 72 and associated regulatory guides should be expedited if, in fact, early commitment to AFR facilities is to be made. The findings of this environmental impact statement should be made conditional upon the early issuance of such regulations.

Response AQ-21.1:

Proposed 10 CFR Part 72 has been issued for comment. An associated regulatory guide, Regulatory Guide 3.44, concerning the format and content of the safety analysis report to be submitted with an application has also been issued for comment. Additional guides are being prepared.

The Commission has directed that the issuance of this final statement and 10 CFR Part 72 be coordinated.

Comment AQ-21.2:

Finding 6. Finding 6 indicates that Morris and West Valley are licensed under 10 CFR 70. Part 70 regulations address

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> the requirements for record keeping of special nuclear materials and to license such nuclear waste facility under such a procedure is a manipulation of those regulations.

Response AQ-21.2:

The NFS West Valley Plant is licensed pursuant to 10 CFR Part 50, as stated in finding number 6 of Section 8 of the draft statement. The GE Morris Operation is licensed to store spent fuel as an independent spent fuel storage installation pursuant to 10 CFR Part 70. The authority of the NRC to grant this license was affirmed by the U.S. Court of Appeals for the Seventh Circuit on January 10, 1979.

Comment AQ-22:

> Consideration was given to modifications that might be required to 10 CFR 51, including the S-3 table. The DGEIS indicates no modifications are necessary, including no changes to the S-3 table. Since the adequacy of the S-3 is currently in question, and proceedings are underway which will probably result in changes, this fact should be noted.
>
> Finding 8. This finding should state that the sufficiency of the S-3 table is currently being challenged and consequently 10 CFR 51 may have to be changed.

Response AQ-22:

Finding number 8 of Section 8 of the draft statement is that no changes in the S-3 Table are required because of additional spent fuel storage. Changes due to other factors are not within the scope of this statement.

Comment AQ-23:

> Section 8.1. The introductory paragraph states that dry storage technology assumptions are based on the existence of aged spent fuel. This assumption is not clear in the text. Further, the introductory paragraph states that storage of spent fuel and water pools is a well established technology. On the contrary, the nuclear industry's experience with storage of spent fuel on water pools is limited and only about 25 years old. We do not know what the long-term consequences of such storage are.

Response AQ-23:

It is assumed that before spent fuel would be placed in dry storage, it would have been stored for five years or more in water. After that time, decay heat generation would be low (see Sec. 3.1.4).

Although experience with water pool storage of spent fuel is limited to less than 25 years, it is a well-established technology. Experience has been gained with the storage of spent fuel with cladding defects that indicates there should be no substantial problems. The case histories of such experience have been documented (see A. B. Johnson, Jr., "Behavior of Spent Nuclear Fuel in Water Pool Storage," Battelle-Pacific Northwest Laboratory, BNWL-2556, Richland, WA, September 1977).

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In view of the much lower temperatures, radiation fields, and thermal fluxes, the water environment during storage is considered benign with respect to that in the reactor during operation. Any defects in the fuel cladding would have permitted the release of fission gases before the fuel had been removed from the reactor. If the defects were to develop during storage, controlled ventilation systems would contain any gaseous releases. Exposed uranium oxide pellets are quite inert in pool water and have degraded very little in pool exposures where defects have existed.

The storage of spent fuel addressed in this statement is considered to be an interim action, not a final solution. Nevertheless, the staff believes that the consequences of storing spent fuel, even considerably beyond the year 2000, would not present any health or safety hazard to the public.

Comment AQ-24:

> ES-11. One of the key assumptions on which the findings are based is that spent fuel storage situation is "manageable" provided that "the planning for AFR storages is initiated in a timely fashion." How unmanageable does the situation become if AFR initiation does not occur in a "timely fashion?" What is the definition of "timely fashion?"

Response AQ-24:

If action is not taken in a timely fashion to provide required spent fuel storage capacity, there is the potential for interruption of power generation by the individual nuclear power plants involved. "Timely fashion" means that action is taken before a plant is required to cease power generation.

Comment AQ-25:

> ES-12. The storage of spent fuel in water pools is stated to have an insignificant environmental impact, primarily because of the high resistance to corrosion attributed to zircaloy. This finding avoids addressing the uncertainties expressed in one of the key reference reports, BNWL 2256, "Behavior of Spent Nuclear Fuel in Water Pool Storage." While this report does find that "prospects are favorable to extend storage of spent nuclear fuel in water pools" it also indicates that "detailed systematic examinations of fuel bundle materials have not been conducted specifically to define storage behavior, because of the expectation that the fuel be reprocessed after relatively short residence." It goes on to state that "however, it is not how clear how long pool storage of spent fuel may be extended. If storage times of this spent fuel inventory are expected to extend into the 20 to 100 year frame, there is an increasing incentive to determine whether any slow degradation mechanisms are operative." This technical uncertainty has not been addressed by the DGEIS.
>
> S-3. Finding 4. As previously indicated, the long term corrosion resistance of zircaloy has not been adequately tested. Also since KR 85 can be released from defective fuel elements, and since the length of time of the interim storage has not been

defined the desirability of (a) encapsulating all fuel elements or (b) developing sensitive monitoring techniques to identify leakers and encapsulate all leaking fuel elements where potential leakers should be analyzed.

3-14. Paragraph 3.1.3.3. The paragraph in the middle of the page points out that "in general, the safe storage of irradiated fuel depends on maintaining the integrity of the fuel cladding as the primary barrier to the release of radionuclides." This statement emphasizes the necessity to conduct complete and thorough testing of the long-term corrosion resistance of fuel clad materials commented on previously.

Response AQ-25:

The period considered in this statement extends only through the year 2000. Consequently, longer-term uncertainties considered by the author are not of concern because corrective action can be taken. Surveillance of spent fuel in storage is being mandated in proposed 10 CFR Part 72 "Licensing Requirements for the Storage of Spent Fuel in Independent Spent Fuel Storage Installations" (ISFSI), which this statement supports. Paragraph (3) of §72.3 "License Conditions" states,

"(3) Surveillance requirements. Surveillance requirements are requirements relating to tests, calibrations, and inspections to assure that the necessary integrity of required systems, components and the fuel in storage is maintained, that operation of the installation will be within the required safety limits, and that the limiting conditions required for safe storage will be met."

As Johnson concludes on page 4 of "Behavior of Spent Nuclear Fuel in Water Pool Storage":

Based on current experience and on an assessment of the relevant literature, prospects are favorable to extend storage of spent nuclear fuel in water pools, recognizing the following considerations:

- Zircaloy-clad fuel has been stored satisfactorily in pools up to 18 years; stainless-clad fuel has been stored up to 12 years.
- Low temperatures and favorable water chemistries are not likely to promote cladding degradation.
- There are no obvious degradation mechanisms which operate the cladding under pool storage conditions at rates which are likely to cause failures in the time frame of probable storage."

He further notes on pages 18-19:

"Two aspects of the defective fuel account for its favorable storage characteristics. First, when a fuel rod perforates in-reactor, the radioactive gas inventory is released to the reactor primary coolant.

"Therefore, upon discharge, little additional gas release occurs. Only if the failure occurs by mechanical damage in the basin are radioactive gases released in detectable amounts, and this type of damage is extremely rare (see Table 5). The second favorable aspect is the inert character of the uranium oxide pellets in contact with water. This has been demonstrated in laboratory studies[12] and also by casual observations of pellet behavior when broken rods are stored in pools."

Consequently, encapsulation of all fuel elements is not considered to be required. However, the requirements of proposed 10 CFR Part 72, including paragraph (3) of §72.3 cited above, are designed to ensure protection of the public.

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Comment AQ-26:

> S-2. It is now obvious that the "national objective of an operational and geologic depository for high level nuclear waste and possible disposal of spent fuel by 1985" will not be attained. The recent DOE Task Force Report has indicated that 1989 will be the earliest date such a depository could be established. Therefore, the amount of spent fuel which would be placed in AFR storages will likely be increased.

Response AQ-26:

In its use of bounding conditions, the findings of this statement are still true even if the proposed repository is delayed until the year 2000.

Comment AQ-27:

> 2-4. In the description of demand for storage capacity, an assumption of the 70% capacity factor from the period of 1986 through 2000 is stated and an annual discharge of fuel by the reactors was estimated to be 22.4 MT per GWe. (On page 2-3 the annual discharge of fuel by the reac[illegible]s is estimated to be 30 MT per GWe). The capacity factor assumed is probably conservative in the calculation but the discharge quantity is nonconservative, particularly if design exposures are not achieved for reason of unanticipated fuel failure mechanism, etc. The recent DOE Task Force Report assumed a discharge figure of 26 MT per GWe. However, uncertainty of the total installed capacity by the year 2000 is probably a larger factor.
>
> 6-4. The case examples express results in percentage increase in storage capacity and costs. These comparisons are meaningless since they cannot be related directly to the total light water reactor problem. They should be expressed in tons of fuel or a percentage of spent fuel on an annualized GWe basis.

Response AQ-27:

The staff believes that the value given in the draft statement of 30 MT per year discharge for a 1000-MWe reactor operating at 100% plant factor is reasonable for planning purposes. With a plant factor of about 75%, this discharge rate becomes about 22.4 MT per GWe of installed capacity. This is the value used to determine the spent fuel discharges in the draft statement. In the final statement, a more detailed model was developed. This model has a discharge rate that is 20-30% higher (in MT per GWe of installed capacity) than that used in the draft statement. This model was developed by examining updated information on trends in spent fuel discharges.

Comment AQ-28:

> 3-10. The use of boral as a neutron absorber for more compact storage is described. Has boral been subject to long-term

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qualification testing under the conditions of open-pool spent fuel storage (high oxygen content)? Where is such a qualification testing documented? Boron carbon is subject to swelling. Problems of swelling have been experienced at Connecticut Yankee with swelling of the boron carbide walls of the spent fuel storage racks. These difficulties should be examined.

Response AQ-28:

The use of neutron absorbers such as Boral is reviewed by the NRC and subject to its approval in the licensing of a nuclear power station. Any application for amendment to the license for compact storage modification would alsc be subject to a safety review. Such reviews take into account the factors questioned in the comment.

The staff is aware of the swelling problem described in the comment. Corrective action was taken in this case and no further swelling is expected. Swelling *per se* is not regarded as a safety problem. It might cause operational difficulties, however, but these would not be expected to have any environmentally detrimental impacts.

Comment AQ-29:

4-2. Paragraph 4.1.1.2. The health and environmental aspects of a loss of cooling water accident should be analyzed. (See section 4.2.3.8).

Response AQ-29:

Since an ISFSI is required to have a reliable makeup water supply, the loss-of-cooling accident at an ISFSI would have no significant health or environmental impacts.

Comment AQ-30:

4-26 through 27. The socio - economic analysis is inadequate and lacks a data base. For example, there is no analysis that socio-economically a community would find an ISFSI to be as acceptable as a power plant.

Response AQ-30:

As stated in the statement, the staff believes that a community near which a spent fuel storage facility might be located would undergo social problems (and benefits) similar to those associated with siting of other nuclear facilities. The magnitude would be less, however, in view of the smaller number of people that would be engaged in the construction and operation of the storage facility.

Assessment of the socioeconomic impacts of specific proposed spent fuel storage facilities would be done on a site-specific basis and is not within the scope of this statement.

Comment AQ-31:

7-3. The basis for assessing the impact of spent fuel storage only through the year 2000 is not clear.

Response AQ-31:

In its September 16, 1975, Federal Register notice of Intent to Prepare a Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel, the Commission envisioned a statement addressing the period extending through the mid-1980s. In the absence of reprocessing as a means of disposition of stored spent fuel, the year 2000 was subsequently set as a bounding condition. Even with delays, DOE development of a geologic repository by the mid-1990s is realistic for disposal of spent fuel or high level waste if reprocessing should resume.

STATE OF NEW YORK, DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Comment AR-1:

Although this DGEIS is directed toward an interim solution extending only to the year 2000, the status of the studies which are directed toward a final solution should be mentioned. The transfer of wastes from reactor spent fuel storage pools to interim storage facilities and finally to ultimate (geological) disposal areas adds a transportation step to the waste disposal process which increases the possibility of environmental impact. This emphasizes the need for identifying the ultimate disposal areas to allow spent fuel to be shipped from the reactor site directly to the final repository.

1. General Comments - This GEIS should summarize the status of research into final (long-term) repositories.

Specific Comments

8. P. ES-1 - Executive Summary - Scope - The last paragraph should be more emphatic about "not a final solution." It should be made clear that interim storage does not reduce the need for a secure geological formation for the ultimate disposal of high level wastes. Further, if the Federal Government has any other policy for the disposal of spent fuel other than in a secure geological formation, it should be described.

Response AR-1:

The question of ultimate disposition of spent fuel is beyond the limited scope of this statement.

Comment AR-2:

2. General Comment - This environmental impact statement is limited to spent light water power reactor fuel. Spent fuel storage from research, test and training reactors is probably a smaller problem. However, this should be discussed or referenced in NUREG-0404.

Response AR-2:

There are approximately 70 licensed research and test reactors and critical facilities. Their total licensed power is slightly more than 100 MWt, which is only a small fraction of the licensed thermal power of one of today's large, modern power reactors. In addition, these non-power reactors do not operate for extended periods of time at the licensed power level; therefore, the spent fuel generated by these reactors is an even smaller fraction of that generated by one power reactor. Spent fuel in storage from such facilities amounts to less than 12 MTU.

Comment AR-3.1:

3. General Comment - When reviewing power generating facilities, the major concerns in air pollution control are the pollutants associated with fossil fuel burning facilities. Considering only these pollutants, the utilization of at reactor storage and away from reactor storage will have much less of an impact on the environment than the termination case of replacing nuclear plants with coal plants. However, Congress has mandated under the 1977 Clean Air Act Amendments that EPA review all available relevant information and determine whether or not emissions of radioactive pollutants into the ambient air will cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health. If EPA determines that the above is true, regulations will be promulgated to control such emissions. In light of this determination, this draft GEIS might have to be reevaluated.

Response AR-3.1:

Emissions of radioactive pollutants into ambient air from nuclear plants are being carefully controlled.

Comment AR-3.2:

16. P. 4-5, Section 4.1.2.2.2 - Operational Impacts - The reference used to compare radiological impacts for nuclear and coal generation (Martin et al) compared a hypothetical 1000 MWe coal plant with two existing 462 MWe and 200 MWe nuclear plants. This seems to be a case of comparing apples and oranges because of the size difference of the plants. In addition, reference should be made to the variability of radioactivity between various coal fields.

Response AR-3.2:

Comparisons between radioactive emissions from nuclear and coal plants are discussed in the response to comment T-3.

Comment AR-3.3:

17. P. 4-5, Section 4.1.2.2.2 - Operational Impacts - More discussion of the effects of CO_2 production should be given than saying it is "beyond the scope of this impact statement." The 1977 National Academy of Sciences report Energy and Climate can be used as a reference.

18. P. 4-7, Section 4.1.2.2.2 - Operational Impacts - The effects of burning of coal on crops, real estate, fish and animals should be discussed further and compared to nuclear.

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Response AR-3.3:

The staff believes that the climatic effects of CO_2 production may be the primary longer-term limiting factor on energy production from fossil fuels; however, the staff also believes the matter to be speculative at this time and not a subject that may be treated objectively in this statement.

The effects of airborne pollutants from coal-burning plants on human health, crops, real estate, and animals are discussed in detail in Reference 8 cited in Section 4.1.2.2.2 of the draft statement. If effluents from such plants are limited by the use of best available control technology to meet the national air quality standards, there should be no or little measurable effects of such pollutants.

Comment AR-3.4:

24. P. C-13, Appendix C, Section 5.2.5 - Intermittent Control Systems - The statement should be made that EPA does not consider Intermittent Control Systems a viable alternative for controlling emissions.

25. P. C-16, Appendix C, Section 6.2 - Sulfur Emissions - The assumption that coal fired power plants which emit SO_2 below 1.2 lb/million BTU will not be required to install SO_2 scrubbers is likely incorrect. The proposed New Source Performance Standards will require some degree of scrubbing for emissions of SO_2 greater than 0.2 lb/million BTU.

Response AR-3.4:

Section 5.2.5 has been revised in the final statement.

The value of 1.2 pounds per million BTU was used as a reference value only. It is clear that to meet the ambient air quality standards promulgated by EPA as mandated by the Clean Air Act Amendments of 1977, a lower limit for SO_2 may be required. For the purpose of comparing the environmental effects of nuclear and coal-burning plants, however, the value of 1.2 is weighted towards coal as a conservative measure.

Comment AR-4:

4. General Comment - In discussions of the various types of storage facilities, repeated reference is made to accidental contamination cleanup, and normal maintenance contamination. It is stated that low level contaminated materials (spilled pool water, cleanup materials, etc.) will be disposed of off-site in low level disposal facilities. A statement should be made in regard to the anticipated increase in generation of low level wastes created by the transportation and storage of spent reactor fuels. This should include an estimate of the number of additional low level burial sites that will be required to dispose of these wastes and the anticipated environmental impacts of these sites.

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Response AR-4:

Cleanup materials from storage pool spills and accidents would represent a trivial addition to the quantities of wastes generated in other ways. Some 35 MTHM of spent fuel in pool storage would result in 0.021 m^3 of waste per year from waste resins,* while from recent (1977) experience at the GE Morris Operations it would appear that less than 1 m^3 of dry solid waste per MTHM is generated in the receiving and handling of spent fuel.** This is to be contrasted with about 813 m^3 of solid waste generated per 35 MTHM per year for the nuclear fuel cycle with no spent fuel recycle.†

*"Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle," U.S. Nuclear Regulatory Commission, NUREG-0116, p. 3-9, October 1976.
**"Operating Experience Irradiated Fuel Storage," NEDO-20969B, p. 3-21, May 1978.
†Op Cit., NUREG-0116, p. 3-15.

Comment AR-5.1:

5. General Comment - Off-site doses for the fuel storage accidents analyzed are stated as being a fraction of the annual radiation background dose. This indicates that elaborate State and local emergency response plans to protect the off-site population is not warranted. This should be discussed and verified in the GEIS.

Response AR-5.1:

Emergency plans are "intended to minimize the impact of a radiological emergency on the health and safety of the public, employees and others onsite, and to minimize damage to stored fuel and the faciliites"* at a spent fuel storage installation. Response plans are designed to meet potential emergencies associated with spent fuel storage.

*"Radiological Emergency Plans for Morris Operation," NEDE-21894, p. 3-1, June 1978.

Comment AR-5.2:

6. General Comment - The transportation accident calculations are based on "normal distributions of weather and population densities." This analysis should be expanded to include transportation through highly urbanized areas (New York City metropolitan area, for example) and possible unique transportation problems associated with the Long Island area.

Response AR-5.2:

A generic environmental statement on transportation of radioactive material, which includes consideration of impacts in urban areas, has been issued.* This study finds the risk to public health and safety from transportation of radioactive material to be very small. A sequel study now underway examines unique aspects of urban environs with respect to transportation of radioactive materials that may generate environmental impacts and that may have escaped earlier attention.**

*"Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes," U.S. Nuclear Regulatory Commission, NUREG-0170, December 1977. In Reference 19 of Chapter 4 of NUREG-0404, the reference to NUREG-0034 has been updated to indicate the final statement (NUREG-0170).

**"Transport of Radionuclides in Urban Environs: Working Draft Assessment," Sandia Laboratories, SAND 77-1927, May 1978.

Comment AR-5.3:

19. P. 4-15, Table 4.4 - Radioactivity Present in Spent Fuel - It would be helpful if the external dose rate for typical spent fuel could also be given with time. It might be given for both shielded and unshielded conditions such as for a typical shipping cask.

Response AR-5.3:

Each spent fuel cask must have sufficient shielding to limit the radiation field under accident conditions to 1000 mrem/hr at three feet from the external surface of the cask (10 CFR 71.36). That this requirement is satisfied for authorized cask designs is verified in the Safety Evaluation Report for each Certificate of Compliance issued by the NRC, available in the NRC Public Document Room. Sufficient shielding must also be available to meet standards set by the Department of Transportation for external dose rates in normal transportation [49 CFR 173.393 (i,j)]. Note the discussion on p. B-32 ff. While dose rates decrease with time, the decrease is not significant during transportation.

Comment AR-5.4:

20. P. 4-15, Section 4.2.2.1 - Composition of Spent Fuel - There should be a discussion of the reduction of potentially volatile nuclides such as cesium-134 and ruthenium-106 by extended storage at the reactor. Any effect on the transportation accident where fire might be involved should be addressed.

Response AR-5.4:

Isotopic compositions of spent fuel are obtainable as functions of time by means of the ORIGEN computer code. Appropriate calculations are reported in "Siting of Fuel Reprocessing Plants and Waste Management Facilities" (ORNL-4451, Oak Ridge National Laboratory, July 1971) for example. Environmental effects of all transportation accidents, including those involving fire, have been addressed in WASH-1238 and in NUREG-0170. The source documents for the chapter on accidents in NUREG-0170 which discuss the fire environment most cogently are the series of reports generally entitled "Severities of Transportation Accidents."* The NRC reviews package designs for Type B quantities of radioactive material and for fissile material, including spent fuel casks, and assures itself that the safety requirements in 10 CFR Part 71 are satisfied before it issues Certificates of Compliance for the designs. These requirements include severe thermal tests in which a package is held at 1475° for 30 minutes.

*"Severities of Transportation Accidents," Sandia Laboratories, SLA-74-0001, July 1976: Volume I - Summary, Volume II - Cargo Aircraft, Volume III - Motor Carriers, Volume IV - Train; "Severities of Transportation Accidents Involving Large Packages (Draft)," SAND 77-0001, November 1977.

Comment AR-5.5:

21. P. 4-22, Section 4.2.3.8 - Loss of Cooling - Additional information should be presented to emphasize that fuel failure will not occur for one year old fuel if cooling water were to be lost. The relationship between temperature, integrity of fuel cladding as a function of decay time for the air convection cooling mode should be given in an Appendix.

Response AR-5.5:

The comment should refer to Section 4.2.3.7 "Lowering of Pool Water Level." Additional information is provided on the topic in the final statement.

Comment AR-6.1:

7. General Comment - The concept of shipping fuel from one place to another seems to be inefficient. Not only are extra personnel required to ship and inspect the waste, additional fuel and equipment, but the probability of a transportation accident increases. A plan which minimizes the movement of the fuel, both from place to place and within the storage facility, is preferable. In particular, AFR storage should be permanent to avoid further shipment.

9. P. ES-5, Section 3.1 - It is stated that increased at-reactor spent fuel storage involves only aged fuel (at least one year since discharge). It is recognized that the longer the spent fuel is stored at the reactor site, the lower the transportation hazard will be because of decay of radioisotopes such as ruthenium-106. A cost benefit study should be considered in order to establish a recommended storage period on site prior to transportation to the ultimate disposal areas.

Response AR-6.1:

The minimum cooling time required for transportation of spent fuel in presently authorized casks is either 120 days or 150 days, depending on the cask design and fuel content. Establishment of a minimum storage time prior to transportation longer than these values is not necessary for protection of public health and safety.

Comment AR-6.2:

26. P. E-32, Appendix - Table E-6 - Cask-Days Required for Spent Fuel Transshipment - There is apparently a minor typographical error. The 63 on/offsite transshipments in 1978 appears to be inconsistent with the balance of the table.

Response AR-6.2:

The number of cask-days involved in on/offsite transshipment in 1978 should be 65, not 63.

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Comment AR-7:

10. P. ES-8 - Table ES-3 - It should be stated whether this table includes the health effects from uranium mill tailing piles and from carbon-14 discharges. If so, the population affected and the period of time for the environmental dose commitment should be stated.

Response AR-7:

The health effects from uranium mill tailing piles (i.e., radon-222 release effects) are not included in Table ES-3; however, an estimate is footnoted in Table 4.2 (from which the nuclear fuel cycle effects of Table ES-3 are summarized). Carbon-14 effects are included in the nuclear fuel cycle in Table ES-3. For the coal fuel cycle the effects of radon-222 and carbon-14 are not included. See also the response to the first part of comment AH-1.

Comment AR-8:

11. P. ES-10, Section 7.0 - Accidents and Safeguards Considerations - The assertion that those who try to disassemble casks will receive lethal doses of radiation should be qualified. It is difficult to imagine that a terrorist or thief who is sophisticated enough to successfully steal spent fuel would not take the necessary safety precautions to insure that his/her objectives are met. Furthermore, those foolish enough to use spent fuel in an anti-social act will probably not be dissuaded by the risk of lethal exposure. It is somewhat specious to argue that the risk of such lethal exposure will either minimize the likelihood of theft or reduce the effectiveness of the ultimate plan of such thieves or terrorists.

Response AR-8:

See response to comment N-3.

Comment AR-9:

12. P. ES-11, Section 8.1 - The statement was made that AFR storage should be initiated "in a timely fashion." This should be explained.

Response AR-9:

The statement on page ES-11 is one item of a summary of findings. A schedule of need for AFR facilities is listed on page S-2. Planning for AFR storage has already been initiated by the Federal Government. Witness the draft environmental impact statements issued by DOE: DOE/EIS-0015-D, August 1978; DOE/EIS-0040-D, December 1978; and DOE/EIS-0041-D.

Comment AR-10:

13. P. 3-23, Fig. 3.9 (Caisson Temperature Distribution...) - This shows a plot of temperature variations away from a Charged Caisson. Although specific ambient air temperature and solar insulation factors

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are shown, there is no indication of the soils minerology (composition), groundwater chemistry, bedding characteristics, moisture contents, relative densities, organic contents, etc., at various depths. It is true that in a generic statement such as this, no one could expect all of these soil "variables" to be indicated. However, the authors should give some indication that they understand and appreciate the complex and highly variable nature of the soil medium, and recognize the fact that the nature of the soil and groundwater surrounding each Caisson will be one of the critical factors in determining whether or not a successful disposal chamber has been established.

It is also readily apparent from this Figure that a "boil zone" will exist for several meters around a Caisson. Within this zone of +212°F. temperature, all soil moisture will be boiled off, and a thermal convection cycle may be set up whereby additional groundwater may be continuously drawn into this zone, boil, pass into the atmosphere as a gas capable of transporting radionuclides, and leave behind any minerals which were held in suspension or solution in the natural groundwater. Thus, over a period of time, a mineralized zone could be created around a Caisson, with a potential for possible accelerated corrosion of the Caisson. I believe this factor needs further discussion in the GEIS.

Response AR-10:

Dry storage of spent fuel has been included in this statement as an example of an alternative to water pool storage. All of the factors that the comment raises would be addressed in the review of any specific proposals for dry fuel storage. Research on and development of dry storage techniques for LWR spent fuel have been initiated by the U.S. Department of Energy at the Nevada Test Site.

Comment AR-11.1:

14. P. 4-2, Section 4.1.1.3 - Dry Storage - The following statement is made: "While a potential for leaching of radioactive materials from these facilities exists, the integrity of the containers, coupled with the sorbtive capacity of most soils for waste containments, provides assurance that groundwater supplies will not be impacted. Thus the facility does not appear to have any ecological impact on the surface or groundwater environment." Such a statement can be made only after the individual soil and groundwater regimes of each potential site are assessed and found to be so.

Response AR-11.1:

Any approval to permit the construction of a facility for the underground storage of spent fuel would be subject to assurance that the local soil and groundwater regimes would not be impacted. Applications for such facilities would be subject to site-specific safety and environmental review.

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Comment AR-11.2:

15. P. 4-3, Section 4.1.1.3 - Dry Storage - The statement is made, in reference to the existing Idaho National Engineering Laboratory (INEL) dry storage facility, "Thus the facility does not appear to have any ecological impact on the surface or groundwater environment." This statement should be supported by environmental

Response AR-11.2:

The statement is based upon information received by the staff on the operating experience of the INEL facility. This has been reported in further detail in a paper given at the June 1979 annual meeting of the American Nuclear Society (see the response to comment Y-7.1).

Comment AR-12:

22. P. 4-27, 28, Section 4.3.2.1 - Employment - The statement "...however, this rise in (coal-fired plant) employment is relatively small," does not correspond with the previous statements in this section - i.e. "The electric power industry is one of the nation's largest employers---A 1000 MWe coal-fired plant requires a labor force of about 600 persons compared with 130 persons for an equivalent nuclear plant." A 4.6/1 ratio of employment for coal/nuclear does not seem "relatively small" if the "electric power industry is one of the nation's largest employers." Total employment comparisons should be given.

Response AR-12:

The final statement has been revised to state that nuclear facilities employ about the same labor force as do coal-fired plants. Therefore, a shift to coal-fired plants would result in no significant difference in employment.

Comment AR-13:

Volume II - Mining

23. P. A-5 - It is stated that the United States will, within a few years, be reliant on imports of uranium. There is not enough U. S. uranium to fuel the plants which are presently scheduled, let alone those which are to be planned. This is one reality of nuclear power which must be considered when comparing coal with nuclear energy, since reliance on imports could eventually place us in a vulnerable position similar to that of the Arab oil embargo.

Response AR-13:

Based on information reported in the "Draft Generic Environmental Impact Statement on Uranium Milling," NUREG-0511, Table 3.5, there is more than sufficient uranium in the form of known reserves and probable resources in the United States for fuel for the lifetime of the nuclear capacity projected for the year 2000. While the statement is not concerned beyond that time, the table indicates that an almost equal quantity in the form of possible and speculative resources exists for additional capacity if required.

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STATE OF CALIFORNIA, OFFICE OF PLANNING AND RESEARCH

Comment AS-1:

> I appreciate the opportunity to comment on the NRC's Generic EIS on the handling and storage of spent light water power reactor fuel. The lack of a comprehensive nuclear waste management system continues to be one of the main roadblocks to public acceptance of nuclear power. Providing adequate interim spent fuel storage is a critical element of that comprehensive system. The NRC, however, has taken a very narrow and simplified approach to the interim storage problem. The relationship between the accumulation of spent fuel and the need for interim storage is not a direct one. The amount of interim storage required cannot be projected without examing how interim storage fits into the larger waste management scheme.
>
> The problems of interim storage and permanent disposal cannot be easily separated. The type, amount, and location of interim storage required over time are sensitive not only to the number of nuclear plants in operation, but also to the implementation of the spent fuel offer as well. For example, the DOE spent fuel offer extends to foreign countries for the purpose of meeting nonproliferation goals. The NRC EIS, however, does not include any projections of the amount of spent fuel from foreign countries delivered to the U.S..

Response AS-1:

The scope of this statement is limited to an evaluation of the environmental impact of additional interim storage of domestic spent fuel. The relationship between the accumulation of spent fuel and interim storage requirements is direct, since no means for the disposition of spent fuel has been implemented to date. As a bounding consideration, this statement assumes no such disposition through the year 2000. DOE has prepared in draft form an environmental impact statement on the subject of foreign fuel receipt ("Draft Environmental Impact Statement, Storage of Foreign Spent Power Reactor Fuel, DOE/EIS-0040-D).

Comment AS-2:

> A complete understanding of the interim storage problem is impossible without including a discussion of the details of the DOE's spent fuel offer, variances in the required cooling period for spent fuel, the operational and design constraints of a geologic repository, the problems of transporting spent fuel, and potential conflicts with other radioactive waste activities.
>
> The DOE spent fuel offer requires that fuel be cooled for a minimum of five years prior to disposal in a geologic repository, although there is a great deal of scientific uncertainty about the thermal loading characteristics of geologic formations selected for disposal. Since spent fuel has a high (and long-lived) heat content, assumptions about the allowable heat loads that the repository can tolerate, become very important in determining the loading rate, the age of the spent fuel, and therefore the amount of interim storage needed.

Response AS-2:

DOE's spent fuel offer, required decay times, and the details of a geologic repository are subjects currently being explored in depth by DOE, and are beyond the scope of this statement. The subject of spent fuel transportation is well covered in the literature and is evaluated in this statement. Potential conflicts with other radioactive waste activities are covered in DOE's on-going assessment of various aspects of waste management alternatives.

Comment AS-3:

> As you are aware, current California law does not allow the siting of nuclear power plants in the State until the California Energy Commission makes a finding confirming the existence of an adequate waste management system. The spent fuel offer is the first step toward achieving this goal. It is therefore unfortunate that the NRC did not address the interim storage problem in relation to the DOE spent fuel offer.
>
> The DOE has recommended in its draft report DOE/ER-0004/D Report of Task Force for Review of Nuclear Waste Management that AFR storage and potential geologic repositories be located near each other to minimize the need for transporation. The DOE report also recommended that additional AFR be set aside once the geologic repository is in operation in case problems develop. The NRC EIS contains no discussion of the best location for AFR storage, or the possibility that contingency AFR storage may be required once a geologic repository is in operation.

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Response AS-3:

This statement is a generic evaluation of the environmental impact of additional interim spent fuel storage through the year 2000. The environmental impact due to such storage will occur regardless of under whose auspices such interim storage is conducted. The final disposition of spent fuel is not within the scope of this statement.

Comment AS-4:

> The NRC staff was directed to "analyze alternatives for the handling and storage of spent light water power reactor fuel with particular emphasis on developing long range policy." The DOE spent fuel offer assumes shipment of spent fuel to interim away-from-reactor (AFR) storage facilities and ultimately retrievable storage in a geologic facility suitable for permanent waste disposal. Yet, the NRC disclaims the existence of a national policy on the final disposition of spent fuel.

Response AS-4:

Authorizing legislation covering the DOE spent fuel offer has not been enacted. Such legislation is a necessary prerequisite to the development of any national policy incorporating the DOE offer.

Comment AS-5:

> The NRC EIS states that, assuming a geologic repository for high-level nuclear wastes and possible disposal of spent fuel is operational by 1985, the amount of spent fuel requiring AFR storage will not be great. A delay in the start-up date for a geologic repository, however, will increase the need for AFR storage. According to the DOE report, the 1985 start-up date for a geologic repository is unrealistic; it estimates that it will take at least until 1988 to put one in operation, and possibly later. DOE calculates that the AFR storage requirement will double for a 3-year delay and triple for a 5-year delay.
>
> The NRC report NUREG-0116 Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle assumes that spent fuel would be retained for 10 years in water basins before packaging and final disposal in bedded salt. Sweden has already adopted a policy requiring a 10-year cooling period prior to reprocessing or storage. Given the uncertainty associated with long-term storage of wastes in geologic formations and the time needed for cooling spent fuel prior to disposal, it would appear that compact storage at the reactor and transshipment are both short-term measures and that the NRC EIS therefore understates both the timing and amount of interim AFR storage required to handle spent fuel.
>
> The termination of nuclear power generation because of a back-up of spent fuel becomes a real alternative only if the other alternatives discussed in the EIS are not pursued in a "timely fashion." The NRC EIS, however, fails to identify when critical decisions need to be made and actions taken for supplying interim storage.
>
> The NRC EIS lacks a realistic perspective on the interim storage problem. The issue is not one of choosing nuclear over coal power generation or of increased at-reactor storage as opposed to AFR storage. The issue is whether or not a combination of compact storage and transshipment will provide enough time to allow sufficient AFR storage to be built. This question remains to be answered.

Response AS-5:

The staff believes there is a real relationship between the discharge of spent fuel, the existing spent fuel storage capacity, and the need for interim additional storage facilities (taking into account the expansion of existing facilities). Questions of the larger waste management scheme and foreign spent fuel are beyond the scope of this impact statement. However, the need for additional spent fuel storage capacity through the year 2000 does not assume that there will be any disposal (as waste) of spent fuel by that time. The storage of foreign spent power reactor fuel is being considered by DOE in its draft environmental statement DOE/EIS-0040-D issued in December 1978.

Comment AS-6:

> The timing and amount of interim AFR storage also depends on the transportation requirements for the spent fuel and the eventual location and start-up date of the geologic repository. Transportation can be equally as limiting a factor as inadequate interim storage. The current commercial cask inventory can transport only about one-third of the spent fuel from reactors. Spent fuel from commercial reactors must compete with high-level defense wastes for available casks and licensed railcars to carry wastes.
>
> The NRC EIS does not mention that there might be potential conflicts with other waste disposal activities, nor does it mention whether or not compact storage will allow a sufficient cask inventory to build up in time to meet the anticipated demand for either transshipment or movement to an AFR storage facility.

Response AS-6:

Cask designs have been authorized by the NRC from which casks can be fabricated on order. The supply of casks is expected to increase when the demand for them does. In addition to economic market incentives, the Department of Energy is undertaking an effort to assure timely production of casks.* See also response to comment Y-5.

*"Report to the President by the Interagency Review Group on Nuclear Waste Management," TID-29442, p. 137, March 1979.

Comment AS-7:

> In general, the NRC EIS offers no comparison of the relative economic, environmental, or safety features of the various interim storage alternatives, nor does it discuss which alternatives provide the greatest flexibility for future options and technical development. The NRC's comparison of the advantages of continued nuclear power generation versus coal-fired power generation is meaningless for this purpose.

Response AS-7:

The staff refers the commenter to Chapters 4, 6, and 7 in particular for comparisons of the various storage means.

STATE OF CALIFORNIA, THE RESOURCES AGENCY OF CALIFORNIA

Comment AT-1:

> The Division of Mines and Geology has reviewed the subject document and finds that it is not site specific in nature and covers mainly the general mechanical handling facilities, including racks and containers, for transport and storage of spent fuel. It does not present any details of geologic/seismologic hazards or considerations for their mitigation, but rather states that facilities are designed to seismic category I or II, as appropriate, and refers the reader to NRC Regulatory Guides and other documents, listed in Appendix Table D. 1 (P.D.-4, D-5), for specifics. Division seismologist Lalliana Mualchin has examined both volumes and finds no consideration of seismology presented.
>
> Because this document lacks necessary information and refers only to separate, unavailable documents said to contain such information, the Division finds the discussion of geologic and seismological hazards inadequate for an Environmental Impact statement.

Response AT-1:

This statement is generic in nature and not site-specific. It assumes that spent fuel storage facilities will be located in accordance with NRC regulations which do address geologic/seismic considerations.

Comment AT-2:

> The Office of Historic Preservation has reviewed the Draft GEIS submitted for the undertaking referenced above.
>
> In compliance with 36 CFR 800 and Section 106 of the National Historic Preservation Act of 1966, properties possessing historical, archeological, architectural, or other cultural values within the project's area of potential envir mental impact (including the areas used for waste disposal), must be ideu. ied for possible inclusion in the National Register of Historic Places. Structures scheduled for demolition, sale, or alteration must be assessed for their architectural, historical or engineering significance.
>
> We look forward to receiving copies of the Cultural Resource Identification and Assessment Reports compiled by qualified professionals of appropriate disciplines.

Response AT-2:

The commenter reminds the Commission of its ob'igation under the National Historic Preservation Act of 1966 to identify properties of historicɩl or other cultural values within a project's area of potential impact. By the nature of a generic environmental impact statement, useful identification of this nature is not possible, but the Commission is scrupulous in complying with the Act for environmental impact statements dealing with specific projects.

NOTE: THE BALANCE OF THE COMMENTS IN THIS GROUP (AT) ARE IDENTICAL TO THOSE IN THE "X" SERIES.

U.S. ENVIRONMENTAL PROTECTION AGENCY

Comment AU-1:

> EPA believes the draft EIS does not consider all of the alternatives that could contribute to the phasing out of nuclear power. The basic assumption is made that coal-fired plants are the only replacement for nuclear plants. We believe that conservation measures and other alternative energy sources (such as solar), with government initiative and support, could be competitive and are far more environmentally acceptable. The potential impact of these energy technologies on reducing the need for spent fuel storage capacity should be analyzed in the EIS.

Response AU-1:

Comments AQ-8, AU-8, AZ-4, AQ-13, AL-6, AU-1, and X-6 have criticized the draft statement for assertedly inadequate treatment of energy alternatives other than coal-fired and nuclear steam-electric generating plants. The staff believes that, in part, these comments were engendered because the nature of the termination alternative and the need for its consideration were treated only briefly in the draft statement. Section 7.4.1.2 has been expanded to provide a fuller discussion of these considerations in the final statement, and references to this discussion have been inserted in other sections in which the termination alternative figures.

However, another kind of misunderstanding may be reflected in the group of comments, namely, that of the purpose and scope of the statement. As noted in the first paragraph of the Executive Summary (p. ES-1) of the draft statement, the statement "examines alternative methods of spent fuel storage as well as the possible restriction or termination of the generation of spent fuel through nuclear power plant shutdown," because implementation of those alternatives would fall within the Commission's regulatory responsibility. The matter of alternative future energy sources, including "conservation" as a virtual source, is germane to the statement only insofar as it might affect present estimates of the environmental and economic consequences to be expected from the "restriction or terminati . . . .through nuclear power plant shutdown" alternative. The staff believes that the position taken (and supported) in the draft statement is inescapable over at least the next decade, namely that permanently shutdown plants would in fact be replaced by coal-fired generating plants. Further in the future, it becomes conceivable that one or another change in lifestyle or technology might eliminate the need for increases in central-station generation of electricity, or even encourage some gradual reduction in central station capactiy. In order to affect the need for replacement of prematurely shutdown plants, such reduction would have to exceed the attrition rate due to 30-50 year-old plants (either fossil or nuclear) reaching the end of useful life for baseload generation. However, it is one thing to admit the possibility of future change and another to predict it quantitatively in some reasonable manner. Absent reasonably credible projections, which the staff believes unachievable at present, the only result of consideration of solar-driven air conditioning or household photovaltaic systems, for example, within the statement would be recognition that present estimates of the consequences of the "termination" alternative might prove to be in error if these technologies should achieve large-scale deployment. Broad recognition of such possibilities has been inserted into Section 7.4.1.2.

Comment AU-2, AU-3:

EPA realizes the scope of the draft EIS is limited to some extent by both the President's policy of non-proliferation and the recent recommendation of the Deutch Task Force to the Department of Energy on long-term disposal of reactor spent fuel. However, since the Department of Energy may use NRC's EIS on spent fuel for their generic EIS's on spent fuel disposition, we believe every effort should be expended to insure that this generic EIS presents a sufficient analysis of all disposal alternatives, including the environmental impacts of those alternatives. Furthermore, NRC's final EIS should discuss the relationship between the spent fuel storage options discussed in the draft EIS and the Department of Energy's options for ultimate disposal of spent fuel.

The draft EIS contains an exhaustive analysis of the spent nuclear fuel situation as it exists for the near-term and up to the year 2000. However, there is no discussion of the relationship of current spent fuel storage facilities to permanent disposal site(s).

In several places in the draft statement, NRC states that a permanent repository for spent fuel will be available by 1985. The recent Deutch Task Force report, however, indicates that it would be 1988 or possibly 1993 before such facilities are available. Since some of the analysis contained in NUREG-0404 is based upon the 1985 date, revisions may be necessary, specifically in the planning of AFR storage requirements.

Response AU-2, AU-3:

This statement is limited to the evaluation of the environmental impact of additional interim spent fuel storage through the year 2000. It specifically does not cover final disposition alternatives for spent fuel.

Comment AU-4:

In addition, the analysis on environmental impacts and consequences of alternative actions does not go beyond the year 2000. Issues such as commercial lifetime and decommissioning of away-from-reactor (AFR) storage facilities should be discussed in the final EIS.

Response AU-4:

Consideration of environmental impacts and alternative actions beyond the year 2000 is not within the scope of this statement. Decommissioning issues for AFR storage facilities would be addressed in the review of any specific proposals for such facilities. However, in view of the minor contamination of storage facilities that is expected, this factor would be of very little consequence in the decontamination of these facilities.*

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*"Decommissioning Plan for Morris Operation, Morris, Illinois," General Electric Company, Nuclear Energy Programs Division, San Jose, CA, U.S. Nuclear Regulatory Commission Docket No. 70-1308, December 1978.

Comment AU-5.1:

Other considerations in the regional planning of AFR storage requirements, such as community bans on the transport of spent fuel, have not been included in this EIS.

Response AU-5.1:

Restrict for the moment consideration of other regional planning requirements to just the question of community bans on spent fuel transportation. The legality of community bans remains open to question, since the regulation of transportation of radioactive material should properly be the province of the Federal Government.

In the Federal regulatory system, protection of public health and safety in transportation of radioactive materials is achieved by setting standards for package integrity, reviewing and approving applicant package designs for satisfaction of these standards, and inspecting and enforcing compliance with the regulations, including any conditions necessary for approval of package designs. It has not been found necessary to establish routing restrictions or other operational controls, such as speed restrictions, to achieve protection of public health and safety in this regulatory scheme.

However, a rulemaking proceeding has been announced by the Department of Transportation [Federal Register 43, 36492 (August 17, 1978)], and one of the results may very well be some form of Federal routing control.

If a Federal routing control were to be established, it hopefully would be done in such a manner as to balance values gained and impacts suffered. The values gained are deemed to be small, but could include such items as saving of population dose from routing transportation inside large cities. Generic environmental studies indicate such population dose is very small,*,** so the savings to either large cities or the country would not be very great. The risk of consequences to public health and safety from transportation accidents would not be changed perceptibly, particularly in the case of spent fuel transportation, since very severe accidents do not normally occur inside cities. An accident on the order of a grade crossing collision between a locomotive and a truck cask at speeds greater than 80 mph is required for a release of radioactive material on the order of a leak through a crack to occur.† However, some of the effects of routing control might include the following: a small increase in the probability of an accident, since vehicles tend to travel farther and faster outside the city environment; a reduction in public health and safety consequences from a very severe transportation accident, since the number of persons likely to be around an accident on a permitted route should be small; an increase in response time for emergency health services, assuming that fire control, ambulance, and radiological protection services are most often located in big cities; and an increase in cleanup time. The risk of consequences to public health and safety from acts of sabotage directed toward deliberate dispersal of radioactive material in the environment is very small to begin with, but existence of routing controls could tend to reduce this risk through both a reduction (though not elimination) in the probability of such an act, since lack of innocent bystanders may reduce a saboteur's motivation, and a reduction in public health and safety consequences from such an act, since the number of nearby persons is likely to be small on a permitted route.

On the other hand, impacts suffered could be significant. Operational impedances caused by Federal routing requirements could entail economic costs, for example by increasing the travel distance and travel time. Both of these effects would generate increases in accident probability and cask unavailability, although such increases are probably not large and could be minimized by effective management. In some cases, switches from land to water transportation modes are forced, which could mean greater transportation costs, depending on vehicle availability. As with the other values and impacts discussed above, this impact is estimated to be small in comparison to the situation without routing controls. For example, NUREG-0170 showed that requiring spent fuel to move by barge where feasible could result in a difference in transportation costs for 1985 ranging from -$27 million (representing a saving) to +$5 million, compared to the base cost of $46 million, and increased cask-leasing costs for 1985 ranging from $67 million to $76 million, compared to the base cost of $43 million. The optimum overall effect is a saving of $3 million compared to the base cost of $89 million.††

Other regional planning considerations that might influence spent fuel transportation might include local routing controls, advance notification requirements, emergency response planning considerations, etc., but these influences would not noticeably change environmental impact assessments of such transportation.

*"Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes," U.S. Nuclear Regulatory Commission, NUREG-0170, December 1977.

**"Transport of Radionuclides in Urban Environs: Working Draft Assessment," Sandia Laboratories, SAND 77-1927, May 1978.

†R. M. Jefferson, "Statement for the Senate Subcommittees on Science, Technology, and Space and Surface Transport," August 16, 1978 (available for review in NRC Public Document Room).

††Reference 1, Section 6.2.7, p. 6-9, of the draft statement.

Comment AU-5.2:

On page 3-34 of the draft EIS, it is stated, "Because transshipment, as a 'stand-alone' alternative represents only a means for postponing the spent fuel storage problem, environmental impacts and financial factors of this alternative were not examined." Even though transshipment is expected to be employed to a small extent, the impact should not be totally ignored because this alternative is a short-term solution to the immediate problem.

In our earlier reviews of the environmental impacts of transportation of radioactive material, EPA agreed with NRC that many aspects of this program could best be treated on a generic basis. A table summarizing the environmental impacts resulting from transport of radioactive material has been added to NRC's regulations (10 CFR Part 51) for assessing individual reactors. A summary table would seem to be appropriate for this final EIS.

ES-13 Paragraph 8 EPA does not agree with this finding as discussed in previous sections. The final EIS should compare the fuel cycle considerations in 10 CFR 51.20(e) to a summary of environmental impacts ensuing from different storage modes, and show by comparison whether the additional impacts of spent fuel storage and transportation are negligible.

Response AU-5.2:

Because of the expected infrequent use of transshipment and the estimated short transportation distance (about 150 miles) for transshipment, the environmental impacts for transshipment are negligible.

Summary Table S-4 10 CFR Part 71 is applicable to transportation in this statement with a simple inclusion of AFR facilities with reactors.

Comment AU-5.3:

ES-9 Paragraph 5.0 The last sentence, "However, the environmental impact increment from this spent fuel transportation is insignificant," does not agree with the statement on p. 4-13 Paragraph 4.2.1.3. Also, see our previous comments on accidents.

Response AU-5.3:

The statement on p. 4-13 of the draft statement, while describing transportation of spent fuel as a major pathway for radiological dose to the environment, does not connote that a significant radiological dose would actually be transmitted through that pathway. The two statements are compatible.

964193

Comment AU-6:

> Also, the EIS does not appear to have considered the additional storage capacity needed in the event the U.S. accommodates foreign spent fuel.

Response AU-6:

Consideration of requirements for storage of foreign spent fuel is beyond the scope of this impact statement. The Department of Energy has announced a spent fuel policy which includes importation of some foreign spent fuel for interim storage. A draft environmental impact statement has been published (DOE/EIS-0040-D). Should Congress authorize this element of the Administration's policy, the NRC will conduct an environmental review of such action in accordance with the National Environmental Policy Act and as specified by Congress in such authorization.

Comment AU-7.1:

> As noted in our cover letter, NRC has already started to implement one of the options to handling and storage of spent fuel by granting amendments to increase storage pools at about 25 nuclear power plant facilities. The reasons for the delay in meeting NEPA requirements for these actions should be addressed, at the very least, to indicate the NRC's intent to fulfill the requirements of NEPA.

Response AU-7.1:

The NRC has not delayed meeting the NEPA requirements for the actions involving increasing the storage capacity of spent fuel storage pools. The NRC has reviewed, evaluated, and granted amendments to increase the spent fuel storage capacity at about 25 nuclear power plants. In each case, the NRC issued an environmental impact appraisal of the environmental impacts resulting from the expansion of the spent fuel storage capacity at that specific plant. The basis for not preparing an environmental impact statement for each pool modification was that having reviewed the proposed facility modification relative to the requirements set forth in 10 CFR Part 51 and the Council of Environmental Quality's Guidelines, 40 CFR 1500.6, and having applied, weighed, and balanced the five factors specified by the Nuclear Regulatory Commission in 40 FR 42801, the staff determined that each proposed license amendment would not significantly affect the quality of the human environment. Therefore, the staff has concluded that an environmental impact statement need not be prepared, and that pursuant to 10 CFR 51.5(c), the issuance of a negative declaration to that effect was appropriate.

On September 16, 1975, the Commission announced (40 FR 42801) its intent to prepare a generic environmental impact statement on handling the storage of spent fuel from light water reactors. In this notice, the Commission also announced its conclusion that it would not be in the public interest to defer all licensing actions intended to ameliorate a possible shortage of spent fuel storage capacity pending completion of the generic environmental impact statement.

The Commission directed that in the consideration of any such proposed licensing action, among other things, the following five specific factors should be applied, balanced, and weighed in the context of the required environmental statement or appraisal:

1. Is it likely that the licensing action here proposed would have a utility that is independent of the utility of other licensing actions designed to ameliorate a possible shortage of spent fuel capacity?

2. Is it likely that the taking of the action here proposed prior to the preparation of the generic statement would constitute a commitment of resources that would tend to significantly foreclose the alternatives available with respect to any other licensing actions designed to ameliorate a possible shortage of spent fuel storage capacity?

3. Can the environmental impacts associated with the licensing action here proposed be adequately addressed within the context of the present application without overlooking any cumulative environmental impacts?

4. Have the technical issues which have arisen during the review of this application been resolved within that context?

364194

5. Would a deferral or severe restriction of this licensing action result in substantial harm to the public interest?

This generic statement itself and the individual environmental impact appraisals issued for each approved expansion of spent fuel capacity at a plant fulfill the requirements of NEPA.

Comment AU-7.2:

> The draft EIS does not discuss whether spent fuel pool equipment for cooling and cleanup will be adequate to handle increased storage at the existing nuclear facilities. Possible design changes in the facilities must have been considered by NRC in the granting of amendments. These possible modifications or any others NRC is requiring should be summarized reactor-by-reactor in the final generic statement.

Response AU-7.2:

Appendix D to the statement does discuss generic aspects of the ability of a plant's spent fuel pool equipment for cooling and cleanup to handle increased storage at nuclear facilities. Generally, changes to these systems have not been needed. To date, only three plants have increased the capacity of their cooling system: Ginna, Oyster Creek, and Point Beach Units 1 and 2. The plants have not been required to upgrade their pool purification. As so few plants have modified their systems, it is not considered necessary to list such changes in the text of the final statement.

Comment AU-8:

> Alternatives
>
> EPA disagrees with the basic assumptions that coal-fired plants are the only replacement for nuclear power plants and that the projected (FEA) national energy need for electricity will not change due to conservation measures. A recent CEQ report* on the prospects of solar energy states that it is possible for solar technology to supply a quarter of all U.S. energy by the year 2000. This change is based on strong government initiative in support of both conservation and solar development. There are significant environmental benefits which may be achieved with the adoption of any of a range of solar technologies (photovoltaics, solar heating and cooling, passive solar design, etc.) and other non-solar energy technologies. While such alternatives may not be generally anticipated by the electric utility industry, their impact on the continued need for large central electric generating stations should be reevaluated (by NRC) for inclusion in the final EIS along with the conventional economic factors now influencing electricity demand.
>
> * Solar Energy: Progress and Promise, April 1978.

Response AU-8:

See the response to comment AU-1.

Comment AU-9.1:

> Potential Accidents
>
> We believe a reassessment of potential accidents is needed specific to fuel handling and heavy drop types of accidents at reactor spent fuel storage pools (AR) and AFR storage. AFR storage of spent fuel will increase the potential for accidents due to additional fuel handling and transportation. A more detailed analysis is needed on the kinds and risks of accidents during fuel handling, cask handling and transportation rather than relying on other references. We recommend that a thorough discussion on these safety issues be included in the final EIS.

964195

We feel the section on transportation accidents is inadequate and needs further clarification. We understand NRC has undertaken a program to resolve some of these safety issues concerning expanding spent fuel storage and accident risks (Resolution of Generic Issues Related to Nuclear Plants -- NUREG-0410). With this in view, we offer the following comments.

Response AU-9.1:

With respect to accidents that may occur during the handling of spent fuel and casks at storage facilities, detailed analyses are included in the environmental statements and licensing bases for each individual facility. With regard to accidents that may occur during transportation, a generic analysis is acceptable and has been supplied. Refer to Section 4.2.4 and Reference 19 of Chapter 4 of the draft statement. (In regards Reference 19, it should be noted that the final environmental statement, NUREG-0170, was issued in December 1977 to replace the draft environmental statement, NUREG-0034.)

Comment AU-9.2:

On page 4-20, the draft EIS indicates that fires and explosions at AFR storage facilities are not considered credible accidents. Therefore, NRC does not analyze the impacts of such accidents. However, the fires that occurred at the TVA Browns Ferry Nuclear Plants in 1975 indicate that this kind of accident can occur. The draft EIS should discuss the possibility of fires or explosions and the effects of such accidents if they were to occur.

Response AU-9.2:

In Section 4.2.3.3, Fires and Explosions, the statement made is: "Serious fires and explosions are not considered credible in an AFR storage facility." Such a facility is limited to passive storage under water of spent fuel and is not an active system such as an operating reactor.

Comment AU-9.3:

3-15 The statement on modes of heat transfer needs to be corrected. "Radiant heat is removed from the assembly by natural convection."

Response AU-9.3:

The correction has been made.

Comment AU-10:

Also in the transportation section, it is not clear why NRC has used the "super low" projections from GESMO as opposed to any other projections.

Response AU-10:

The "super low" growth projections from GESMO were believed by the staff to be more probable and realistic than higher growth rate projections, given the changes in the national picture since GESMO was written. In the final statement, the projections have been revised downward again and assessment made on this basis.

364136

Comment AU-11:

Decommissioning

We believe an orderly decommissioning procedure should be developed by the NRC. A commercial light-water nuclear power plant eventually becomes a form of radioactive waste. This waste possesses characteristics quite different from those generated during operation and represents a considerable volume of the radioactive inventory. Present regulations do not require consideration of decommissioning until near the end of a reactor's life. Considering the size, complexity, and number of commercial power reactors that are or will be licensed, EPA believes it would be prudent to begin planning for decommissioning as early in the design stage as possible. EPA has been advocating that an evaluation of social impacts and resource commitments on present and future generations be considered in EIS's. This is particularly important as the populations presently receiving the benefits of nuclear power are not now assuming the costs of plant retirement.

Response AU-11:

NRC agrees that the decommissioning of nuclear facilities must be considered. To this end, NRC initiated a program in 1975 to develop information on the pertinent technology, safety aspects and estimated costs of decommissioning nuclear facilities. Three reports on this subject have been issued to date:

NUREG/CR-0129, "Technology, Safety and Costs of Decommissioning a Reference Small Mixed Oxide Fuel Fabrication Plant"

NUREG/CR-0130, "Technology, Safety, and Costs of Decommissioning a Reference Fuel Reprocessing Plant"

NUREG/CR-0131, "Decommissioning of Nuclear Facilities - An Annotated Bibliography"

NUREG-0278, "Technology, Safety and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station"

Reports covering the decommissioning of a BWR and other fuel cycle facilities will be completed during the next two years.

The results of these studies are being used as a part of the NRC plans to reevaluate NRC policy on decommissioning of nuclear facilities, NUREG-0436. This plan includes the preparation, already started, of a GEIS and the formulation of a new policy and proposed regulation covering decommissioning.

The proposed regulation, 10 CFR Part 72, covering spent fuel storage in an ISFSI requires the submittal of a decommissioning plan (§72.18) and that an ISFSI be designed for decommissioning (§72.71 Criterion 20).

The decontamination and decommissioning of an away-from-reactor storage-only facility should not pose too serious a problem, as only surface contamination need be removed. There should be no induced activity in structures such as occurs in reactor components.

Comment AU-12:

The design criteria for spent fuel pools should also include provisions for decontamination and decommissioning. Past experience, such as at Turkey Point Units 3 and 4, indicates contamination of the walls and floor as well as the outside environment of the spent fuel pool is possible without precautionary measures.

Response AU-12:

The design criteria for spent fuel pools would be addressed in the review of specific proposals for such facilities. This is not within the scope of this statement. However, the staff believes that contamination of a spent fuel facility will be very small compared to that of a nuclear power station, and its cleanup would present only minor problems.

Comment AU-13.1:

> **Safeguards**
>
> We recommend that serious consideration be given to requiring a hardening of enlarged AR spent pools, as well as AFR storage facilities, as a precaution to possible "subnational" threats involving aircraft. We believe this structural hardening may be needed to protect the health and safety of citizens.
>
> In this case, the costs of spent fuel hardening should be included in the final EIS and compared to the existing costs of safeguard requirements. These costs may significantly affect the major conclusions of the EIS. We note that certain European countries, in particular West Germany, have given consideration to this proposal.

Response AU-13.1:

The potential hazards of underwater storage of aged spent fuel stemming from intentional plane, mortar, or missile attack do not, in themselves, justify additional structural hardening. The potential radiological consequences to the public are limited by the small quantities of radioactive material which might escape the pool in a form dispersable to offsite areas.

Aged spent fuel subjected to a mechanical impact involving 20 MT of material at an AFR location formed the basis for the consequence estimate in Section 4.2.3.2. The calculated doses at the site boundary were found to be quite small. Further, the consequences of several postulated sabotage attacks involving rupture of aged fuel elements by emplacement of explosive charges are analyzed as part of the revised discussion contained in Chapter 5 of the final statement--resulting in insignificant impacts for the range of sabotage attacks that were considered.

In reference to the additional hardening proposed at German facilities, it is the staff's understanding that such hardening against aircraft-related impacts is being considered for enhancing protection of the reactor core and associated critical safety features.

Comment AU-13.2:

> 5-1 It is not clear why the first paragraph of Section 5.2 is important. The LWR spent fuel discussed in the EIS should not contain any highly enriched uranium or separated uranium-233 or plutonium.

Response AU-13.2:

The first sentence of Section 5.2 states,

> "Each person who is licensed or applies for a license to possess or use at any site or contiguous site uranium-235 (contained in uranium enriched to 20 percent or more in the ^{235}U isotope), uranium-233, or plutonium alone in any combination in a quantity of 5,000 grams or more computed by the formula, grams = (grams contained ^{235}U) + 2.5 (grams ^{233}U + grams plutonium) must comply with established physical protection requirements."

This sentence is paraphrased from 10 CFR Part 73.2, paragraph (b). A key word, however, has been omitted. In §73.2(b) reference is made to,

> ". . . uranium-235 (contained in uranium enriched to 20 percent or more in the U-235 isotope), uranium-233, or plutonium alone or in any combination in a quantity of 5.000 grams or more computed by the formula, grams = (grams contained U-235) + 2.5 (grams U-233 + grams plutonium)."

Note that there is an additional "or" where reference is made to "plutonium alone <u>or</u> in any combination..." Consequently, spent fuel which contains plutonium in combination with other material is considered as special nuclear material. The final statement has been revised to correct this error.

964198

Comment AU-14.1:

Population Dose Commitments

We are encouraged that the NRC has adopted the method of calculating annual population dose commitments to the U.S. population (a partial evaluation of the total potential environmental dose commitments (EDC)). (These include H-3, Kr-85, C-14; iodines and "particulates.") EPA has urged this method be adopted for several years and we view this step as progress towards evaluating the total potential EDC. However, NRC should recognize that several of these radionuclides (particularly C-14 and Kr-85) will contribute to long-term population dose impacts on a worldwide basis, rather than just in the U.S. To the extent that the draft statement:

* has limited the EDC to the annual discharge of these radionuclides,
* assumed a population of constant size, and
* has assessed the doses only 50 years following each release, it does not adequately represent the total environmental impact.

Assessment of the total impact would:

* incorporate the projected releases over the lifetime of the facility (rather than just the annual release),
* extend the assessment to several half-lives or 100 years (beyond the period of release),
* consider, at least qualitatively or generically, the worldwide impacts.

We suggest that future assessments discuss these influences on the total environmental impact of the proposed action or activity.

Response AU-14.1:

The staff did include estimates of worldwide population dose in the draft statement, e.g., see p. 4-11. In some instances these values are expressed per 0.8 gigawatt-year electric to facilitate their utility in the document.

The assessments are generally based on the staff's analysis presented in GESMO (NUREG-0002). That assessment considered a constant worldwide population and an environmental dose commitment period of 40 years. Note that the commitment period employed represents four half-lives of Kr-85.

The NRC will continue to work with EPA to resolve assessment methodology differences. As the draft document provided estimates of the environmental dose commitment on both a U.S. and worldwide basis, no changes in the assessment are indicated.

Comment AU-14.2:

ES-5 Paragraph 3.1 Since AR storage of spent fuel is a low hazard potential compared to the working reactor fuel, it might be useful to present a graph illustrating these radiological differences.

Response AU-14.2:

Such a simplified comparison would not note the additional requirements employed at reactor pools to reduce such hazard potential and would be misleading.

Comment AU-14.3:

4-15 The EIS should contain observed quantitative values of krypton-85 releases from spent fuel storage pools to support its contentions that they are small. Detection of environmental levels of Kr-85 is several orders of magnitude more sensitive than the information presented in the EIS.

Response AU-14.3:

Kr-85 activity estimates in the DGEIS are conservatively high. Data from the G.E. Morris Operation spent fuel storage for January through December 1977 showed no measurable Kr-85 release activity at the installation site boundary.*

*"Appendix B-1, Radioactive Waste and Environmental Monitoring, January-December 1977," NEDO-20969B1, pp. B1-8 and B1-28, September 1978, a supplement to Operating Experience, Irradiated Fuel Storage Morris Operation, Morris, Illinois, NEDO-20969B, May 1978, Docket No. 70-1308.

Comment AU-14.4:

The radioisotope tritium, a relatively long-lived (12.3 years) and biologically available isotope, produced as a tertiary fission product (and a contaminant) appears to have been ignored in the consideration of environmental impacts.

Response AU-14.4:

The impact of tritium from aged spent fuel is not considered significant. No measurable impacts from trace releases were found at the General Electric Morris Operation for the measured period January through December 1977.*

* Appendix B-1, Radioactive Waste and Environmental Monitoring, January-December 1977," NEDO-20969B1, September 1978, pp. B1-11, B1-18, B1-30, and B1-37, a supplement to Operating Experience, Irradiated Fuel Storage Morris Operation, Morris, Illinois, NEDO-20969B, May 1978, Docket No. 70-1308.

Comment AU-15:

Fuel Cycle and Long-Term Dose Assessment

The draft EIS presents tables (ES-3 and 4-2) showing excess mortality values due to the nuclear fuel cycle. These values were initially generated for the Reactor Safety Study and have subsequently been used in other NRC analyses. The tables themselves were developed primarily using data from Table S-3 of the proposed 10 CFR 51 and the methodology from the Final Generic Environmental Impact Statement on the Use of Recycle Plutonium in Mixed Oxide Fuel in Light Water Cooled Reactors (GESMO), NUREG-0002. Neither of these rulemaking activities has been completed and as of this date resolution of several significant issues in these actions is still pending. EPA has submitted information for the Table S-3 rulemaking and commented extensively on the GESMO statement. Our previous views and comments apply to this EIS as well. EPA's assessment of source terms and environmental dose commitment lead to higher estimates of health effects than reflected in the tables in this statement.

As stated previously, EPA believes that a total environmental impact should be calculated using the environmental dose commitment concept (the sum of all doses to individuals over the entire time period that the radionuclide is available for interaction with humans). Since neither the Table S-3 or GESMO proceedings have resolved these significant issues, EPA cannot agree with the tables presented in this EIS. However, we will continue to work with the NRC to resolve this issue on a generic basis.

Response AU-15:

Tables ES-3 and 4-2 were initially generated for testimony commencing in 1977 (nearly two years after the Reactor Safety Study). The latent somatic health effects model used in deriving these tables, however, is the same as used in the RSS, but without dose or dose-rate effectiveness factors. These values have been presented in over a dozen reactor licensing hearings; all Hearing Board decisions to date have supported use of the methodology. Although EPA's assessments of source terms, dose commitments, and health effects are higher than those of GESMO, S-3, or this document, the differences at this time are less than an order-of-magnitude and well within the range of uncertainties associated with such assessments.

NRC also believes that the total environmental impact should be calculated using the environmental dose commitment concept, and we are continuously working to improve our models. For example, as noted in our response to comment X-10, we have recently extended the time period of environmental dose commitments for Rn-222 and carbon-14 up to as much as 1000 years. However, such extensions are only attempted when we feel the dose commitment and health effects models yield meaningful results. We do not agree with EPA that it is meaningful to calculate "the sum of all doses to individuals over the entire time period that the radionuclide is available for interaction with humans" for all radionuclides. For example, no one (including EPA) has been able to realistically model the long-term commitment from iodine-129 (half-life - 17,000,000 years). To make such estimates would require scientifically indefensible assumptions regarding the demographic characteristics of populations over time periods which exceed man's recorded history by many orders of magnitude. However, we will continue to work with EPA to resolve this issue on a generic basis.

Comment AU-16:

ES-7 3.5 From the discussions on this page and others (6.266.8), nuclear power production is assumed to terminate abruptly. These discussions (including economic) should be adjusted to reflect a phasing out of nuclear power.

Response AU-16:

Under the Termination Alternative, the staff did assume that the national availability of nuclear generating capacity would decrease gradually as individual plants reached the limit of available spent fuel storage.

Comment AU-17:

ES-8 and 4-3 The discussion comparing nuclear power and coal-fired units neglects the production of low-level radioactive waste by nuclear power plants. The report discusses increased mortality effects from coal and nuclear generation but does not discuss morbidity effects. The radiological effects from natural radioactivity in coal are not considered also.

Response AU-17:

Low-level waste impact on public health is included in reference 16 to Chapter 4 of the draft statement. The public health impacts in reference 16 are based on the staff assessments in NUREG-0116 (Supp. 1 to WASH-1248), "Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle," and in NUREG-0216 (Supp. 2 to WASH-1248), "Public Comments and Task Force Response... to NUREG-0116." The impacts were concluded to be inconsequential compared to other sources of exposure.

The staff agrees that a discussion of morbidity effects would be of value, even though the conclusions would be unchanged. Morbidity effects are presented in reference 16 to Chapter 4.

The staff acknowledges that the radiological effects of the coal fuel cycle are not discussed. Although there is still considerable uncertainty in estimating such effects, it is clear they are small relative to the nonradiological effects (e.g., SO_2, SO_4 and total suspended particulates). The staff currently estimates that the radiological effects of coal combustion (including fly ash, etc.) may result in approximately one mortality per plant year of operation during a 100- to 1000-year period.

Comment AU-18:

ES-13 Paragraph 7, 7-3 Paragraph 7.2.2, and 8-3 Paragraph 7 EPA believes it is premature for NRC to state that the impacts of coal-fired facilities are much greater than for nuclear power plants, since all the effects of both industries have not been presented in this EIS. (See other comments on coal-fired plants).

Response AU-18:

The paragraphs referred to in the comment do not "state that the impacts of coal-fired facilities are much greater than for nuclear power plants," only that the nuclear alternative is preferable in terms of potential health impacts. That conclusion is consistent with every authoritative evaluation the NRC staff has seen.

While the staff admits that no one (including EPA, DOE, and others) has evaluated the long-term potential health and environmental impacts of the coal fuel cycle (e.g., greenhouse effects, acid mine drainage, acid rain, leaching of heavy metals from coal ash and flue gas desulfurization sludge) to the extent done for the nuclear fuel cycle, the staff feels the addition of such health effects to the coal fuel cycle will only tend to worsen the comparison of the coal fuel cycle with the nuclear fuel cycle. Therefore, the staff believes the conclusions, while perhaps premature, are still valid and will continue to be confirmed by others.

Comment AU-19:

6-8 Paragraph 6.2 The capital and operating and maintenance costs for AR and AFR facilities do not consider the effect of schedule slippage. The source of information used to arrive at the higher cost of coal operation & maintenance costs with a scrubber is not cited.

Response AU-19:

Actually, some provision for unexpected difficulty is made as the "contingency" item in virtually all engineering estimates, including those on which Table 6.2 was based. These estimates have been updated for the final statement. The occurrence of substantial unexpected difficulties in construction, including large delays, would increase the cost of any project over that initially estimated, of course; however, there is no reliable way to make quantitative allowance for the unexpected.

In regards the comment concerning scrubber costs, Section 6.2 has been revised on the basis of more recent cost estimates, and scrubber costs no longer appear explicitly.

Comment AU-20:

7-1 Paragraph 7.1.1.1 A discussion on the potential irreversible use of land following decommissioning of nuclear fuel cycle activities would be appropriate in the final EIS.

964282

Response AU-20:

The potential irreversible use of land following decommissioning of nuclear facilities is the subject of a separate study and is beyond the scope of this statement. However, because the decommissioning of an ISFSI is expected to involve only the removal of surface contamination, the construction of an ISFSI is not expected to result in an irreversible use of land.

Comment AU-21:

> Appendix C-11 Section 5.0 This section does not reflect the new Clean Air Act Amendments of 1977 which require a percent reduction in emissions of criteria pollutants, as well as the previously used emission limit of 1.2 pounds of SO_x per 10^6 Btu of coal heat content.

Response AU-21:

The final statement has been updated to reflect the Clean Air Act Amendments of 1977.

Comment AU-22:

> Appendix D Page D-2 The computer codes and methods used to calculate the "criticality" of nuclear reactive systems should be identified and referenced. It also would be helpful if, in the general discussion (VOL. I), these computational techniques were briefly identified and referenced to the Appendix.

Response AU-22:

Many codes and methods are used to calculate the criticality potential of nuclear reactive systems. The NRC does not, in general, require an applicant to use a specific method or code, but reviews results to ensure an applicant's calculations are adequate. Codes used by the NRC staff include KENO IV and PDQ-7.

STATE OF WYOMING

Comment AW-1:

> We have reviewed the "Draft Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fueld" (NUREG-0404). Because of the lack of spent fuel reprocessing facilities, and the undesirability of terminating operation of nuclear power plants, it becomes intuitively obvious that additional spent fuel storage will be required. We concur with the conclusion of the DES that away from reactor storage is a viable interim solution. However, we do take exception to presenting future storage requirements based solely on the GESMO "super low" growth scenario. Although this scenario may appear to be the most reasonable at this time, any projection of future development is fraught with uncertainty. We believe that NRC should estimate required storage capacity based upon a growth scenario which features a level of reactor development which NRC considers realistic if the U.S. were to turn to the light water reactor for an increasing share of its electrical needs.

Response AW-1:

The NRC, as a policy, has insisted on the use of forecasts developed by others who have the need and the expertise required for forecasting such uncertainties as reactor installation rate.

W. BONMIA

Comment AX-1:

This evaluation appears to be unacceptably superficial as the following questions support. If a pool containing tightly packed fuel elements is impacted by such a missile, would not the carnage in the pool be very substantial? If one visualizes bent and mangled fuel racks and fuel receptor tubes, broken and bent fuel elements, dispersed fragments of fuel pellets, and suspended or settled powdered fuel particles within the pool in the aftermath of such and occurrence, how is it to be cleaned up? How would the tangled metal be separated? Could the reactor continue to operate? How would the debris be packaged for future isolation? Where would the debris be disposed of? How would it be transported? Are casks available? What would be the exposure to plant personnel and the pu... restoring order in the pool? How long would it take for cleanup? Do the utilities have an emergency plan and equipment available in case of such an event? How would the fuel particles in the pool be removed?

Can such an accident also result from a plane crashing into a pool as hypothesised by the Europeans (German) or from mortar or missile? Does this suggest that pool designs should be hardened as they are in some other countries?

Response AX-1:

The staff does not agree with the commenter's characterization of the treatment given by the statement as superficial. The damage sustained by a missile impact in a spent fuel storage pool and resulting radiation exposure are described for a compact array of stored spent fuel in Section 4.2.3.2 of the draft statement for a storage-only type facility. Reactor pool structures are designed to preclude such missile penetration. The fuel material from damaged assemblies would be removed, canned, and stored. Other material, such as damaged rack material, would be removed, by cutting torch if necessary, and packaged and disposed of as waste.* The pool water cleanup system and, if needed, vacuuming of the pool bottom would remove the remaining small-particle debris as waste. A storage installation would continue to store undamaged fuel after an initial emergency plan response,** but receipt of additional spent fuel would likely be suspended for several weeks until repairs and NRC inspections were completed.

*"Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle," U.S. Nuclear Regulatory Commission, NUREG-0116, October 1976.

**"Radiological Emergency Plan for Morris Operation," NEDE-21894, June 1978, U.S. Nuclear Regulatory Commission Docket No. 70-1308.

Comment AX-2:

Is it truly acceptable for compacted reactor pools with up to 10 years supply of spent fuel to be scattered over the country in proximity to populated areas? What would be the public reaction in the event of such an incident?

Response AX-2:

Licensing actions for expanding storage capacity at reactor spent fuel storage pools have been approved after safety and safeguards, as well as environmental, reviews in over 30 cases.

Predicting public reactions is speculative.

POOR ORIGINAL

Comment AX-3:

Are the Nuclean Regulat y Commission and the Federal Government glossing over the envi nmental impacts of extended fuel storage in order to avoid the real impact of their failure to come to grips with a viable fuel cycle alternative?

Is the continued licensing of compacted, expanded reactor pools in the public interest?

964204

Response AX-3:

While the staff cannot answer for the entire Federal Government, the NRC is not glossing over the environmental impacts of extended spent fuel storage. The NRC is a regulatory agency and does not determine national policy.

The continued licensing of increased reactor pool storage capacity has been found to be in the public interest in over 30 licensing actions to date and in this generic statement.

DUKE POWER COMPANY

Comment AY-1:

> No mention is made in NUREG-0404 of the pin storage technique for increasing storage capacity. This technique involves disassembly of the fuel elements; in effect, eliminating the spacing between fuel pins. It is then possible to store more fuel pins in one spent fuel pool storage space than were originally contained in one fuel element. This procedure could increase the storage capacity of existing racks and pools by as much as 75%. This technique has been tested and should be considered briefly in the final GEIS for completeness.

Response AY-1:

Comment noted. However, the staff does not consider this technique to be sufficiently developed at this time.

Comment AY-2:

> Corrections:
>
> Page 3-9: Table 3.4 the data for Oconee 3 should be corrected. Modification of the Oconee 3 pool is complete with a storage capacity of 465 assemblies.
>
> Appendix E: (1) In Table E.1 the spent fuel storage capacities for Duke reactors should be:
>
> | | |
> |---|---|
> | Catawba 1 | 1414 |
> | Catawba 2 | 1414 |
> | McGuire 1 | 500 |
> | McGuire 2 | 500 |
> | Oconee 1 | 306 |
> | Oconee 2 | CP |
> | Oconee 3 | 465 |
>
> (2) In Table E.2 the discharge data for Duke reactors are very low by historical standards. This is most likely due to the assumption of a very low capacity factor. Duke expects the McGuire 1 and 2 units and Catawba 1 and 2 units to discharge 64 assemblies every year. Duke is currently discharging approximately 56 assemblies every year from each of its three Oconee units.
>
> (3) The calculated storage situations in Tables E.3, E.4, and E.5 should be corrected to reflect those changes in storage capacity outlined above in (1).
>
> (4) Table E.9
>
> | | |
> |---|---|
> | 1979 Oconee to McGuire | 147 |
> | 1980 Oconee to McGuire | 122 |
> | 1981 Oconee to McGuire | 179 |
> | 1982 Oconee to Catawba | 120 |
> | 1982 McGuire to Catawba | 57 |
> | 1983 Oconee to Catawba | 171 |
> | 1983 McGuire to Catawba | 64 |

Response AY-2:

The staff appreciates the information provided and has considered it in updating the statement.

STATE OF OREGON, DEPARTMENT OF ENERGY AND ENERGY FACILITY SITING COUNCIL

Comment AZ-1.1:

1. By its decision to terminate hearings leading to the licensing of the AGNS reprocessing plant NRC has changed a 20 year policy. If reprocessing will not be utilized in the foreseeable future, NRC should define the parameters of the alternative program, i.e., interim spent fuel storage. Definition is needed to permit timely planning for storage facilities by the federal DOE and the nuclear industry.

Oregon believes that NRC should identify a) the limits in terms of amount and duration of spent fuel storage at reactor sites and b) a realistic date, that provides for unexpected delays, by which the rate of spent fuel generation will equal the rate of disposal. This information is needed to determine the amount and type of interim storage to be provided. It then remains for the federal DOE to announce whether it or the nuclear industry will provide the needed facilities.

3. NRC's generic evaluation of spent fuel storage should identify under what conditions, if any, a site specific environmental impact statement is needed.

Response AZ-1.1:

NRC is a regulatory agency and as such does not define a national policy or a program for its implementation. However, the NRC does have the responsibility for developing pertinent regulations concerning spent fuel storage. To this end, the draft statement has identified the need for a more definitive regulation covering AFR spent fuel storage. In response to this need the NRC has issued for comment proposed regulation 10 CFR Part 72 "Storage of Spent Fuel in an Independent Spent Fuel Storage Installation (ISFSI), Proposed Licensing Requirements."

The quantity of spent fuel that can be safely stored at a reactor site and the duration of such spent fuel storage is site-specific. It is dependent upon the design of the spent storage facility at that site. The ultimate disposition of spent fuel, whether by reprocessing or disposal, is beyond the scope of this statement. However, estimates of the amounts of spent fuel discharged and additional AFR storage capacity required are provided in Tables 2.1 and 3.1, respectively, of the statement.

It has been found in licensing action covering the increase of storage capacity at reactors that a negative declaration is adequate. For AFR ISFSI, the proposed 10 CFR Part 72 (§72.20) stipulates that an environmental report will be submitted by the applicant.

Comment AZ-1.2:

3. NUREG-0404 does not adequately support its finding (ES-13) that additional rules are required in order to license AFR facilities. Because fuel at reactor sites will be fresher, storage of fuel at AFR facilities will be less rigorous (DOE has announced it will accept only fuel that has decayed at least five years, except in special circumstances). Since the service will not be as severe and because successful operation of AFR facilities at NFS and Morris, Illinois it would appear that existing standards are appropriate. It is important for NUREG-0404 to justify its conclusion because any rule-making required by NRC to license AFR facilities will cause further delays in any effort by the federal government to resolve the pending storage shortage of interim storage capacity.

Response AZ-1.2:

The draft statement did not find the existing regulation, 10 CFR Part 70, "Special Nuclear Material," covering licensing of spent fuel storage in an ISFSI, defective. Licensing can continue under 10 CFR Part 70 until 10 CFR Part 72 is adopted as an effective rule. However, the staff recognizes the need for a more definitive regulatory base for such licensing action, which is provided by proposed 10 CFR Part 72. It is not expected that this rulemaking will cause delay in licensing actions.

964266

Comment AZ-1.3:

5. NUREG-0404 erroneously states on page ES-12 that maintenance of activity concentration in pool water requires continuous purification system operation. Neither continuous system operation or pool activity concentration are license requirements. Further, continuous system operation is not required to maintain pool activity levels since release of activity from stored fuel primarily results from crud spalling during fuel transfers. Between fuel transfers little activity release is normally expected.

Response AZ-1.3:

The comment on the continuous operation of the water purification system is correct, and a text correction is included in the final statement.

Comment AZ-1.4:

17. Figure 6-1 does not accurately reflect the experience at the Trojan Nuclear Plant where the license amendment process has already taken 30 months and no decision has been reached at this time.

Response AZ-1.4:

The hearings which have extended the license amendment process for the Trojan Plant are not typical.

Comment AZ-2.1:

2. NUREG-0404 indicates that shutdown of nuclear generating capacity is unavoidable given the projected rates of fuel generation and facility lead times. NRC should take the steps to inform the federal DOE of this situation so that it may be factored into its planning.

Response AZ-2.1:

The unavoidability of shutdown of nuclear generating capacity is not a conclusion of the statement, but of the commenter.

The DOE has received NUREG-0404 and is making an independent appraisal of spent fuel storage needs within the context of their Spent Fuel Policy Announcement of October 1977 [see "Draft Environmental Impact Statement, Storage of U.S. Spent Power Reactor Fuel," (DOE/EIS-DO15-D)].

Comment AZ-2.2:

NRC has also concluded in NUREG-0404 that additional siting rules should be adopted to license away-from-reactor storage facilities.

NRC should take the steps necessary to ensure that this finding does not increase the likelihood of curtailment of reactor operation.

Response AZ-2.2:

The draft statement did not find the existing regulation 10 CFR Part 70 "Special Nuclear Material" covering licensing of spent fuel storage in an ISFSI defective. Licensing can continue under 10 CFR Part 70 until 10 CFR Part 72 is adopted as an effective rule. However, the staff recognizes the need for a more definitive regulatory base for such licensing action, which is provided by proposed 10 CFR Part 72. It is expected that this rulemaking will neither cause delay in licensing actions nor increase the likelihood of curtailment of reactor operation.

Comment AZ-2.3:

Furthermore at reactor and away from reactor storage have not been considered separately.

Response AZ-2.3:

AFR storage requirements are shown separately from at-reactor storage capacity in Table 3.1.

Comment AZ-2.4:

A. One of the purposes of NUREG-0404 is to analyze alternatives for handling and storage of spent fuel with an emphasis on developing long range policies (page S-1) and for decision making (page 1-2). Oregon does not believe that this goal has been accomplished.

Response AZ-2.4:

In its September 16, 1975, announcement of intent to prepare this generic statement the Commission stated:

"While the Commission believes, as earlier indicated, that the matter of spent fuel storage capacity can adequately be addressed on a case-by-case basis within the context of individual licensing reviews, it also believes that, from the standpoint of longer range policy, this matter can profitably be examined in a broader context. It views the preparation of generic environmental impact statement as a suitable vehicle for such an examination."

Thus, the function of this statement is to serve as a source of information to the Commission in its licensing policy development.

Comment AZ-2.5:

The federal Department of Energy has announced it will provide Away-from-Reactor (AFR) storage of spent fuel by 1983 (see Deutch Report). NRC states that it believes the DOE schedule can be met (NUREG-0404, page ES-11). Nevertheless, NUREG-0404 projects spent fuel storage and its impacts through the year 2000 for planning purposes. By asserting its belief that the DOE schedule is valid while performing its analysis through the year 2000 NRC has not provided any policy guidance to reactor owners.

Response AZ-2.5:

It is not stated on p. ES-11 that DOE AFR storage will be available.

Comment AZ-2.6:

Further, NUREG-0404 does not define an upper limit to on-site storage of spent fuel. Oregon believes an upper limit should be established in order to more clearly define when AFR facilities are required. At present, reactor operators may be planning for insufficient on-site storage of spent fuel.

Response AZ-2.6:

The quantity of spent fuel that can be safely stored at a reactor site is site-specific. It is dependent upon the design of the storage facility at that site.

964208

Comment AZ-2.7:

> Reactor plants were proposed by utilities and approved by NRC with the intent that spent fuel would be stored on-site for several months before shipment to a reprocessing plant (page 1-1). The nuclear industry has provided a reprocessing plant; however, the NRC has terminated the proceeding that was required in order to obtain the necessary federal license (page 1-1). Since it was the NRC that created the current need for increased storage for greate periods of time, it is reasonable for the NRC to provide guidance for reactor operator planning.
>
> Oregon believes that by specifying the expected duration of spent fuel storage (at reactor or at AFR facilities) and the maximum acceptable amount of on-site storage of spent fuel the necessary guidance will be provided to facilitate long range planning.

Response AZ-2.7:

The issuance of this statement, with request for public comment, does provide guidance for reactor operator planning.

Comment AZ-2.8:

> B. To be a useful planning document NUREG-0404 must be realistic and reliable. As discussed above, utility planning for on-site storage depends in part on NRC's conclusions. Additionally, DOE planning for AFR storage and industry planning to supply the needed spent fuel shipping casks depends on NRC's conclusions (page ES-1 and 3-26, respectively). Oregon believes that the NRC has not provided realistic or reliable guidance as follows:
>
> 1. NRC states that it believes that "the national objective of an operational geologic repository for . . . spent fuel by 1985" (ES-12) is realistic (ES-11 and 1-2). First the "national objective" was to have a geologic repository constructed by 1985. Several more years would be required to bring it up to operational status; even then only limited amounts of spent fuel may be deposited for demonstration and testing purposes. Second, the DOE has concluded that the 1985 date has slipped three years within the first two years of the national program (see Deutch Report).

Response AZ-2.8:

The sentence quoted reads in full:

> "Assuming that the national objective of an operational geologic repository for high-level nuclear wastes and possible disposal of spent fuel by 1985 is attained, the amount of spent fuel requiring away-from-reactor storage is not great."

While the DOE schedule for a repository has slipped, this statement conservatively bounded the storage problem, allowing no relief to spent fuel storage requirements from either reprocessing or a repository through the year 2000. Consequently, its projections are unaffected by DOE slippage.

Comment AZ-2.9:

> 2. NRC states that "increasing interest in independent spent fuel storage installation is being shown by the nuclear power industry" (ES-6). Plans for interim storage by EXXON have been terminated by NRC's decision on reprocessing (page 1-1). Expansion by General Electric at Morris, Illinois has been terminated by DOE's announcement to take title to spent fuel. Additionally, industry has not responded favorably to DOE's inquiry regarding interest in providing AFR storage. The one expression of industry interest referenced by NRC (page ES-6) is simply an architect-engineer with a design to sell. No one has shown interest in using the design.

Response AZ-2.9:

The statement that "increas ng interest in independent spent fuel storage installations is being shown by the nuclear power industry" is based on the inquiries on this subject to the NRC from industry sources during the last year.

Comment AZ-2.10:

C. If NUREG-0404 is to be believed it seems unavoidable that NRC's decision to defer reprocessing will result in the shutdown of reactor capacity of an undetermined amount. Table ES-2 shows that by 1980 on-site storage will be insufficient and by 1985 the situation will be even more severe absent any AFR storage. Figure 6-7 shows that AFR facilities could not be operational until 1983 even if design work and license application began this year. Even in 1983 it is not clear that the receiving capability of the facility will be sufficient for annual spent fuel generation rates.

Response AZ-2.10:

Regarding the potential shutdown of nuclear power plants, this statement does show that action to provide required spent fuel storage capacity must be taken on a timely basis to prevent this from happening.

Comment AZ-2.11:

Controversy over who should provide AFR capability indicates that the start of these facilities will be delayed for an indefinite period. The Office of Management and Budget believes that industry should provide AFR facilities (Nucleonics Week, April 13, 1978) but industry has been left holding unused facilities due to changes in federal policy and has backed off from AFR facilities because of potential competition from DOE.

NRC assumes a full core reserve will be maintained by utilities. This is reasonable to insure power production reliability and in Oregon's view for prudent safety planning. Maintenance of a full core reserve results in an earlier need for AFR facilities. Since NRC relies on the federal DOE policy announcement of April 18, 1977 it should demonstrate that DOE has taken this factor into account in its planning for AFR facilities.

Response AZ-2.11:

The question of who should provide needed AFR storage capacity and its timing is not within the authority of NRC to direct. NRC is limited strictly to the licensing and regulation of such facilities.

Comment AZ-2.12:

D. NUREG-0404 should note that the nuclear industry could meet its AFR facility requirements through at least 1985, and maintain a full core reserve by extension of storage at AGNS. Table ES-2 shows that under the stated conditions 1900 MTU AFR capacity will be needed through 1985. The AGNS plant is designed for 400 MTU

which could be increased by 2.5 times by use of close packed storage (ES-4). Further storage could be achieved at AGNS by use of poison storage rods and use of the high level waste storage pool. G. E. Morris was increased from 100 to 750 MTU by use of some of these methods (ES-6).

NRC should discuss the cost of this alternative compared to construction of separate AFR facilities.

Response AZ-2.12:

While the AGNS facility was mentioned in Section 2.1.3 of the draft statement, it is not presently licensed. AGNS has prepared for the DOE a report covering the potential spent fuel storage capacity of this facility, modified for ISFSI operation (AGNS-1040-1.4-20, "Studies and Research Concerning BNFP LWR Spent Fuel Storage," August 1978). This reports costs of the storage options presented.

Comment AZ-2.13:

E. An obvious alternative to increased storage of spent fuel is reprocessing. NRC has not evaluated this alternative.

By NRC's analysis, reactor shutdown is unavoidable (see above) and the lost generating capacity will be replaced by coal fired units that, according to NRC, have more severe impacts than nuclear plants (Table ES-3). These conclusions would indicate that reprocessing, which would obviate the need for increased on-site storage and reactor shutdown, would be the preferable option since impacts shown in Table ES-3 would not change if reprocessing was assumed (see NUREG-0116 and -0216).

Response AZ-2.13:

See the response to comment AZ-2.1. Reprocessing as an alternative is beyond the scope of this statement.

Comment AZ-2.14:

F. NRC should conclude whether or not a site specific environmental impact statement is warranted based on the results of NUREG-0404. In any case, an environmental impact appraisal would be important for each separate license amendment either to demonstrate that the site specific case falls within the scope of the generic statement or to ascertain whether a site specific EIS is needed.

Response AZ-2.14:

It has been found in licensing action covering the increase of storage capacity at reactors that a negative declaration is adequate. For AFR ISFSI, the proposed 10 CFR Part 72 (§72.20) stipulates that an environmental report will be submitted by the applicant.

Comment AZ-3:

4. NUREG-0404 has not been written in compliance with the NRC Policy Statement issued on September 16, 1974 and published in 40 FR 42801 in that the following alternatives have not been considered:

a) storage at the Barnwell South Carolina facility,
b) restricted plant operation at reduced capacities

Response AZ-3:

(a) The Barnwell facility is not licensed. As indicated in Section 2.1.3, with its present configuration, it has a potential capacity of 400 MTU.

(b) Operation of nuclear power plants at reduced capacities was considered in Section 3.3.2, "Modification of Fuel Management Practices to Reduce Spent Fuel Generation."

964211

Comment AZ-4:

> ". . . the following alternatives have not been considered:"
>
> c) alternative sources of energy other than coal, such as conservation or curtailment.

Response AZ-4:

The effect of conservation on forecast demand for electrical energy is considered in Section 7.4.1.2, in which it is concluded that even the greatest degree of conservation expected to be induced by "reasonable" measures would not result in the near-zero growth of need for electrical energy such that replacement of hypothetically shutdown nuclear power plants would be unnecessary.

If by "curtailment" is meant the enforced reduction of demand to fit supply, e.g., rationing of electrical energy on a national scale, the staff believes the proposed alternative to be grossly unrealistic. Less Draconian approaches, such as changes in rate-structure design, are included in the conservation-oriented forecasts cited in Section 7.4.1.2.

(See also the response to comment AQ-7.)

Comment AZ-5:

> Use of coal as a replacement power source is unrealistic since it could not be made available by the mid-1980's if nuclear plants had to be shutdown for lack of storage space. Also, nuclear plants would remain shutdown only until off-site facilities are available which the federal government indicates will be available by the 1980's.

Response AZ-5:

The termination case discussed in the statement showed the use of coal as the only available means of replacement of the bulk power capacity represented by nuclear. This replacement would need be made only as individual nuclear plants were forced to shut down, over a considerable period of time. It was further assumed, as a bounding case, that once shutdown, nuclear plants would not be started up again in the time frame of this study. This assumption is based upon the reasoning that the termination case would be resorted to only in the event that additional storage of spent fuel were found environmentally unacceptable.

Comment AZ-6.1:

> 1. To Oregon, three factors are most pertinent to increased on-site storage of spent fuel. First, corrosion impact is the only parameter that is time dependent and is therefore directly related to storage in water cooled basins for increased periods of time. BNWL-2256, by A. B. Johnson, is a compilation of experience to date with storage of reactor fuel in an aqueous environment. NUREG-0404 should clearly show that corrosion impacts on stored fuel are expected to be minimal because:
>
>   a. fuel is exposed to a much more severe environment in the reactor,
>
>   b. fuel with materials and burnups similar to today's commercial fuel (i.e., Zircalloy-clad and 35,000 MWD/MTU), has been successfully stored for 14 years and destructively examined without identifying any apparent adverse effects. Since corrosion is time dependent any unexpected results would occur first in the small amount of oldest fuel and would permit corrective actions (such as use of storage canisters) on more recently discharged fuel, and
>
>   c. if unexpected corrosion did cause deterioration of fuel cladding the gaseous activity available for release would be minimal due to radioactive decay.

The second factor important to increased storage is that only the most recently discharged fuel is susceptible to melting. Residual heat in older fuel has decayed sufficiently that natural circulation of air will provide adequate cooling. Additionally, loss of primary and back-up cooling systems or failure of the pool liner and concrete structure would be required to cause loss of cooling and subsequent melting of the freshest fuel.

The third factor is the relatively rapid decay of gaseous fission products. Fuel older than several years will make a negligible contribution to any accident consequence that would result in release of gap activity caused by projectile strikes, dropping of heavy objects, or corrosion. This behavior can be quantified by use of the ORIGEN Code and what has been called the "Relative Hazard Index". Reference A has used this technique to compare the "hazard" presented by the total activity in the fuel (inert and gaseous). A similar approach for the gap activity would be pertinent for a comparison of accident consequences, for various quantities of stored fuel, that result in a release of gap activity.

Oregon believes that NUREG-0404 should develop these three concepts. Substantiation of these factors should illustrate that increased storage of spent fuel does not create an additional risk to the public health and safety. In general, NUREG-0404 fails to distinguish between impacts resulting from on-site storage of four-thirds cores and larger amounts.

Response AZ-6.1:

The three points mentioned have received greater emphasis in the final statement.

Comment AZ-6.2:

2. NUREG-0404 apparently makes the implicit assumption that spent fuel discharge from reactors in the 1960's may be stored in aqueous environments until the year 2000. Since the only time dependent variable is corrosion, GEIS should provide the basis for its assumption that corrosion over a 30-40 year period is acceptable.

Response AZ-6.2:

In Reference 4 of Chapter 3 of the draft statement, "Behavior of Spent Fuel in Water Pool Storage" (BNWL-2256), on page 4, the author while considering spent fuel storage for 20-100 years states:

"Based on current experience and on an assessment of the relevant literature, prospects are favorable to extend storage of spent nuclear fuel in water pools, recognizing the following considerations:

- Zircaloy-clad fuel has been stored satisfactorily in pools up to 18 years; stainless-clad fuel has been stored up to 12 years.
- Low temperatures and favorable water chemistries are not likely to promote cladding degradation.
- There are no obvious degradation mechanisms which operate on the cladding under pool storage conditions at rates which are likely to cause failures in the time frame of probable storage."

This point is emphasized in the final statement.

Comment AZ-7:

2. NUREG-0404's use of coal units as replacement for nuclear capability appears to be unnecessarily narrow; other choices exist. It would seem sufficient to compare the environmental impacts from increased storage to the cost of idle generating capacity in order to assess the cost benefit of increased storage of spent fuel.

Response AZ-7:

The staff believes that the costs and benefits to be considered within the framework of cost-benefit analysis as an aid to the choice of alternative actions should be only those which depend on the choice, i.e., that already incurred costs ("sunk" costs) are irrelevant. In these terms, the "cost of idle generating capacity" is the value of that part of its potential output for which a need exists, less the costs of fuel and operation. That value is reasonably measured by the cost of the best alternative means of producing the needed output, which is the approach taken in Section 7.4 of the draft statement. As explained in Section 7.4.1.3, the staff finds it preferable to consider environmental and economic cost comparisons separately, whenever possible, since no general agreement exists as to methods for the suggested monetization of environmental costs.

Comment AZ-8:

3. NUREG-0404 should treat at reactor and AFR facilities as separate options. The reader ought to be able to ascertain any advantage of one type of storage over the other. Currently the GEIS does not treat at reactor and AFR storage consistently. For example, in Section 3.1 they are discussed as one option while pages 4-22 and 4-26 discuss only AFR even though the discussion is applicable to both on-site and AFR storage.

Response AZ-8:

A realistic assessment of spent fuel storage, as performed in this statement, must take into account that the bulk of spent fuel storage will occur in reactor pools.

Comment AZ-9:

1. NUREG-0404 concludes that increased storage of spent fuel does not require modification of Table S-3 (10CFR 51.20) e) (ES-13).

However, the document does not identify what impacts from spent fuel were assumed in Table S-3 and it is not shown how these values might change as the result of increased amounts of stored spent fuel or an increase in the duration of spent fuel storage.

Response AZ-9:

Inspection of the resource requirements and effluent releases for additional interim spent fuel storage capacity required showed no significant increments that would modify the S-3 Table.

Comment AZ-10.1:

4. NUREG-0404 should explain why spent fuel pools at reactor plants were designed so conservatively that 2.5 times the amount of fuel can be safely stored in the same space (ES-4). What construction, operational or regulatory constraints resulted in the original conservative design of the spent fuel pool?

Response AZ-10.1:

Continued development of criticality determination methods have shown that earlier spacing requirements in spent fuel storage pools to ensure subcriticality were conservative. Additionally, the present use of neutron poison materials allows for closer spacing.

Comment AZ-10.2:

9. On page 3-5 NUREG-0404 discusses the use of a 2.5 compaction factor to increase on-site storage. NRC should explain why this factor was assumed rather than some larger factor. A larger factor could be obtained by use of poison storage racks or by double tiering. If NRC is relying on previous utility applications NRC should discuss how the conclusions of NUREG-0404 would change if these other options were selected by the utilities.

Response AZ-10.2:

The average value of 2.5 for a compaction factor chosen in the draft statement is conservative. Larger factors are being obtained. To reflect this in the final statement, an average value of 3.0 is used where individual reactor data are unspecified.

Comment AZ-11.1:

6. NUREG-0404 page ES-12 erroneously infers a Kr-85 release from defective fuel is a result of increase of on-site storage of spent fuel. Table 4-3 makes this same error. Values shown in Table 4-3 are the radiological doses from spent fuel and will occur regardless of whether the fuel is stored at the reactor, an AFR facility, or if it has been sent to a reprocessing plant as originally intended. The GEIS should not imply that these impacts result from increased storage and that they are in addition to those impacts already considered.

Response AZ-11.1:

The point is well taken. Small releases of Kr-85 are the major impact of interim spent fuel storage. However, such releases are only a small fraction of what would be released if spent fuel were reprocessed. An attempt has been made in the final statement to reference more definitive data and provide a more realistic estimate of Kr-85 releases. See also response to comment AU-14.3.

Comment AZ-11.2:

7. NUREG-0404 several places relies on the fact that impacts due to increased storage are minimal because the additional fuel is aged (e.g., ES-5 and 7). Use of the curves developed in Ref. A and as proposed in Oregon Comment 2A (1) would provide an improved basis for these statements.

Response AZ-11.2:

The ORIGEN code was used in this statement to estimate the inventory of radionuclides present in spent fuel as a function of decay time.

Comment AZ-11.3:

16. Page ES-12 states no liquid activity will be released from spent fuel pools. Page 4-13 states AFR facilities will result in less discharge to aquatic environments. This apparent discrepancy should be explained.

Response AZ-11.3:

The statement on page ES-12 of the draft statement pertaining to radioactive liquid effluents has been clarified in the final statement.

Comment AZ-12:

8. Table ES-3 concludes that waste management of the coal cycle causes approximatley zero impacts on mortality. Given the concentration of heavy metals and radioactivity in coal ash, this conclusion does not appear accurate.

Response AZ-12:

The information for the coal fuel cycle in Table E-3 is abstracted from Table 4.12. The footnote in the latter states,

> "The effects associated with these activities (waste management) are not known at this time but are generally believed to be small. The totals would increase only slightly if these values were included."

Comment AZ-13.1:

10. In a letter from Edson Case to Victor Gilinsky dated August 4, 1977 it was stated that existing reactors could increase their fuel cycle to 18 months and maintain a 65 percent capacity factor. This option would purportedly reduce the amount of spent fuel generated while maintaining normal operations. This is inconsistent with the discussion on page 3-35. NRC should resolve this apparent discrepancy.

Response AZ-13.1:

The staff does not believe that the discussion on page 3-35 is inconsistent with the letter from Edison Case. Increase of the fuel cycle to 18 months would permit a higher capacity factor. However, limitations on maximum permissible burn-up still would prevail. It might be necessary to remove some spent fuel earlier during a reloading period than in the case of a 12-month cycle to prevent exceeding the limitation during the longer cycle and thereby increasing the amount of spent fuel generated.

Comment AZ-13.2:

18. Page 3-36 should note that the coast down option may be accomplished but at the expense of subsequent fuel cycles since some of the fuel for those future cycles will be consumed during coast down.

Response AZ-13.2:

Comment noted.

Comment AZ-14:

11. NRC's analysis does not identify the precise amount of generating capacity that will be lost due to storage shortages. Table 3-3 provides the information of interest but not for the most realistic case.

Response AZ-14:

The staff feels that Table 3.3 is rather precise; i.e., it states 46.6 GW will be lost if if no changes are made in AR storage capability. The effect of transshipment (though not in Table 3.3) can be determined by examination of Appendix F.

Comment AZ-15:

12. Page 3-8 states that stored fuel must remain sub-critical even in accident conditions. A projectile is considered to be a credible accident and could cause criticality in the pool by disarrangement of stored fuel. Use of 2000 ppm Boron would precl de criticality yet this is not a license requirement. NR should explain this apparent discrepancy.

Response AZ-15:

Impact of a tornado missile in a reactor spent fuel storage pool is precluded by design.

Comment AZ-16:

13. The discussion of corrosion on page 3-14 is not adequate given its importance to long term storage of spent fuel.

14. Page 4-1 should quantify the additional heat discharge from the plant as the result of increased storage. At the Trojan Nuclear Plant the increase is approximately 0.3 percent additional discharge to the Columbia River and is small enough that no modification to the NPDES will be needed.

Response AZ-16:

Additional discussion of corrosion and heat discharge is included in the final statement.

Comment AZ-17:

15. The information on page 4-7 does not permit a comparision of rail traffic for coal and spent fuel shipments.

Response AZ-17:

While it is difficult to make a direct comparison between coal and spent fuel rail transportation, on page C-9 in Section 3.0 "Fuel Requirements" of NUREG-0404 the statement is made:

"The annual fuel requirements for such a (coal-fired) plant would be 1,857,996 tons."

This estimate, of course, would depend on the type of coal consumed. See Table C.3 on page C-16 for examples. The amounts of bottom ash and collected fly ash resulting from burning coal are shown in Table C.4 page C-18 in tons/day. Scrubber sludge estimates are shown Table C.5 on page C-19 in tons/day. However considering simply coal used, the estimate of 1,857,996 tons would require at least 18,570 100-ton coal cars alone for transportation for a 1000-MWe coal-fired plant. The annual number of equivalent 100-ton rail cars for spent fuel for a 1000-MWe nuclear plant would be seven.

BOSTON EDISON COMPANY

Comment AAA-1:

Although comments on the draft report were requested by June 8, 1978, we wish to take this opportunity to identify several minor corrections with regard to Pilgrim Unit 1 which may still be useful to you. These are:

Page 3-9	In Table 3.4, the pool size for Pilgrim 1 is 880 not 900 and the planned increase is 1440 not 1600. These figures result in a percentage increase of 164% not 180% and a compact storage factor of 2.64 not 2.80.
Page 3-10	The last line of the description of Boston Edison's compact storage should read "the change will increase the capacity from 880 assemblies or approximately 1.5 cores to 2,320 assemblies or 4 cores."

Appendix E (1) In Table E.1, the spent fuel storage capacity for Pilgrim 1 as of June 1, 1978 was 860.

(2) The discharge data in Table E.2 for Pilgrim 1 should read 132 for 1976 and 428 for 1977. Estimates of future discharges are highly dependent on the assumed capacity factor. The factor used to generate the numbers in the Table should be identified. Based on an overall capacity factor of 80%, the future discharge schedule for Pilgrim 1 is estimated to be:

1978	0
1979	0
1980	136
1981	132
1982	116
1983	112
1984	116
1985	120
1986	112

Appendix F (1) On pages F-9, F-13, F-17 and F-21, the number of assemblies in storage on 12/75 for Pilgrim 1 was 20 instead of 204 and the actual discharges in 1976 and 1977 were 132 and 428 assemblies respectively. Note that no assemblies are planned for discharge in 1978.

(2) Subsequent tables in Appendix F may be affected by the changes specified in (1).

Response AAA-1:

The comment has been taken into consideration in preparation of the final statement.

INSTITUT FÜR METALLURGIE

Comment AAB-1:

ad 3.1.3.3 Design Criteria (p 3-14, Vol 1):
As far as I know from discussions with A.B. Johnson jr., BNWL, and other experienced people in this field, the longest todays experience in storage does not exceed 18 years for a Shippingport-fuel bundle (burn-up about 6000 MWd/t U), for power reactor fuel with high burn-up even not more than about 10 years. Therefore from a safety point of view, I think one cannot extrapolate these data to long periods without an additional research or at least surveillance program, but I would agree with an extrapolation as far as interim storage is concerned. Investigations regarding the Corrosion of Fuel Assemblies During Long-term Storage (COFAST) are planned as an international program within the IEA-Working Party on Nuclear Safety (Chairman Dr. W.V. Johnston, USNRC). For your information I include a copy of the minutes of the first specialist meeting with participants of Italy, Sweden, USA (A.B. Johnson jr., BNWL) and Austria.

Response AAB-1:

The staff agrees that additional research and surveillance programs will be necessary to a. that the integrity of fuel cladding will be maintained during spent fuel storage for long periods of time. However, the staff does not believe this to be a safety issue. It notes that the IEA-Working Party on Nuclear Safety plans the continued investigation regarding the corrosion of fuel assemblies during long-term storage as an international program.

Long before failures might occur to an extent that would permit the rearrangement of fuel to a more reactive position, the failures would be evident from the release of radioactive fuel materials to the storage pool water, and corrective action could be taken. Because of the inert and refractory properties of the cladding and fuel materials, the staff believes that even if corrosion and penetration of the cladding were to occur this would not present a health and safety hazard to the public during long-term storage.

Comment AAB-2:

> ad 4.2.2.10 Release Mechanisms (p 4-18, Vol 1):
> From my point of view I agree that the pool water represents a low temperature, low pressure environment, but one should mention the possibility of high residual stresses in the cladding which could result in a driving force unequal to zero for the release of fission products during long storage times.

Response AAB-2:

In Section 3.1.3.3 "Design Criteria" of the draft statement it is stated: "Experience to date indicates that under proper storage conditions LWR spent fuel can be stored under water for long periods without serious degradation of the fuel cladding.[4]" Reference 4 is "Behavior of Spent Nuclear Fuel in Water Pool Storage." On pages 65 and 66 of this reference it is concluded that:

"The residual stress levels in fuel cladding are expected to be low, based on the following considerations:

- the reactor exposure tends to relax high stresses from fabrication[54]
- upon cooling from reactor operating temperatures, the fuel tends to shrink away from the cladding, minimizing interfacial contact pressures due to pellet-clad interactions at pool temperatures
- residual gas pressures are relatively low, but do account for some residual stresses, particularly in pressurized fuel rods (see Appendix A).

"Some cases of pellet-clad bonding have been observed on high-burnup fuel.[55] Clad creep-down onto the pellet column also frequently occurs, particularly involving PWR rods. In some cases, fuel densification has offset some of the loss of pellet-cladding gap due to cladding creep-down. BWR fuel has been generally less susceptible to clad creep-down, due to lower fast fluxes and thicker clad walls.

"A preliminary analysis has been made to assess fuel clad stresses due to residual gas pressures in the fuel rods at the end of the reactor exposure (Appendix A). The analysis was conducted using the GAPCON I computer code. It accounts for residual pressures from fill gas (helium) and from fission gas.

"For BWR fuel rods the calculated end-of-life gap pressure is typically near 30 psi. This results in a maximum clad stress of less than 500 psi. Occasionally, the gap pressure reaches 75 psi, and rarely it reaches 200 to 300 psi, resulting in corresponding hoop stresses of 1,000, 3,000 and 4,000 psi, respectively.

"For PWR fuel, the end-of-life gas pressures in pre-pressurized fuel are typically 250 to 550 psi, causing hoop stresses of 4000 to 8000 psi. Occasionally, PWR gap pressures reach 800 psi, with a corresponding hoop stress of 11,000 psi. The rare maximum PWR gas pressures are $\sim$1200 psi, resulting in a hoop stress of approximately 17,000 psi.

"The above stresses compare to room temperature yield strengths of 70,000 to 100,000 psi for irradiated Zircaloy.[6] In the worst case, clad stresses due to residual gas pressures correspond to slightly over 20 percent of the room temperature yield strength. More typically, they will be five percent or below for BWR rods and ten percent or below for PWR rods."

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16. ABSTRACT (200 words or less)

The Generic Environmental Impact Statement on spent fuel storage was prepared by the Nuclear Regulatory Commission staff in response to a directive from the Commissioners published in the Federal Register, September 16, 1975 (40 FR 42801). The Commission directed the staff to analyze alternatives for the handling and storage of spent light water power reactor fuel with particular emphasis on developing long range policy. Accordingly, the scope of this statement examines alternative methods of spent fuel storage as well as the possible restriction or termination of the generation of spent fuel through nuclear power plant shutdown.

Volume 3 includes Comments on Draft Statement and Staff Responses.

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