4/30/82

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
U.S. DEPARTMENT OF ENERGY	)	
PROJECT MANAGEMENT CORPORATION	)	Docket No. 50-537
TENNESSEE VALLEY AUTHORITY	)	
	)	
(Clinch River Breeder Reactor Plant)	)	

NRC STAFF'S ANSWERS TO NATURAL RESOURCES DEFENSE COUNCIL, INC. AND THE SIERRA CLUB TWENTY-SECOND SET OF INTERROGATORIES TO STAFF

The Nuclear Regulatory Commission Staff (Staff) hereby responds to Intervenors' Natural Resources Defense Council, Inc. and the Sierra Club Twenty-second set of Interrogatories to the Staff filed on March 18, 1982. At the April 6, 1981 Prehearing Conference, the Licensing Board sustained the Staff's objections with regard to Interrogatories I., #4 and #4 and Interrogatories II., #1 through #5 pertaining to Contention 23. Attached hereto are the Staff's answers to NRDC's and the Sierra Club's interrogatories, together with the affidavits of those individuals who participated in answering the interrogatories.1/

Additionally, in the April 14, 1982 Order Following Conference with Parties, the Licensing Board renumbered NRDC's contentions. When an old contention number appears in the interrogaotry quesiton or answer, the new contention number will be indicated in parentheses.

1/ The affidavits of Mr. Lowenberg, Mr. Morris, Mr. Nehemias, Mr. Yaniv and Mr. Branagan are unsigned. However, a copy of their signed and notarized affidavits will be filed shortly.

Each answer to an interrogatory will be preceded by a copy of the particular quesiton to which the answer is responding. Each question is instructed to be answered in six parts, as follows.

A) Provide the direct answer to the question.

B) Identify all documents and studies, and the particular parts thereof, relied upon by Staff, now or in the past, which serve as the basis for the answer. In lieu thereof, at Staff's option, a copy of such document and study may be attached to the answer.

C) Identify principal documents and studies, and the particular parts thereof, specifically examined but not cited in (b). In lieu thereof, at Staff's option a copy of each such document and study may be attached to the answer.

D) Identify by name, title and affiliation the primary Staff employee(s) or consultant(s) who provided the answer to the question.

E) Explain whether Staff is presently engaged in or intend to engage in any further, on-going research program which may affect Staff's answer. This answer need be provided only in cases where Staff intends to rely upon ongoing research not included in Section 1.5 of the PSAR at the LWA or construction permit hearing on the CRBR. Failure to provide such an answer means that Staff does not intend to rely upon the existence of any such research at the LWA or construction permit hearing on the CRBR.

F) Identify the expert(s), if any, which Staff intends to have testify on the subject matter questioned, and state the qualifications of each such expert. This answer may be provided for each separate question or for a group of related questions. This answer need not be provided until Staff has in fact identified the expert(s) in question or determined that no expert will testify, as long as such answer provides reasonable notice to Intervenors.

For all the responses to interrogatories in this set the following are the answers to the requested parts in the Protocol for Discovery.

B) All documents and studies, and the particular parts thereof, relied upon by the Staff now or in

the past which serve as the basis for the answer are mentioned in the direct answer to the question unless otherwise noted.

C) There were no principal documents and studies specifically examined but not cited in (b) unless otherwise noted.

D) The name, title and affiliation of the Staff employee(s) or consultant(s) who provided the answer to the question are available in the affidavits unless otherwise noted.

E) The Staff is not presently engaged in nor intends to engage in any further, on-going research program which may affect Staff's answer unless otherwise noted.

F) At this time, the Staff has not determined who will testify on the subject matter questioned. Reasonable notice will be given to all parties after the Staff has made this determination. At that time, a statement of professional qualifications will be provided for each witness.

Respectfully submitted,

Bradley W. Jones
Counsel for NRC Staff

Geary S. Mizuno
Counsel for NRC Staff

Dated at Bethesda, Maryland
this 30th day of April, 1982

NRC STAFF"S ANSWERS TO NRDC'S AND THE SIERRA CLUB'S INTERROGATORIES

I. Contention 5 (renumbered as 4)

Intervenors request that the interrogatories in this section be answered by the relevant official(s) or employee(s) of the NRC Office of Nuclear Material Safety and Safeguards.

Interrogatory 1

In light of the analysis in the NASAP report, for each principal chemical and physical form in which plutonium-containing material is found in the CRBR fuel cycle:

a. identify the chemical and physical form of such material;

b. identify where such material is found in the CRBR fuel cycle (e.g., fuel fabrication plant, reprocessing plant);

c. identify whether such material is directly weapons-usable, i.e., does not require further chemical processing;

d. identify what quantities of such material are considered to be of "safeguards significance,"[1/] (i.e., give the approximate mass needed for a clandestine fission explosive (CFE));

e. indicate Staff's estimate of the time needed to convert such material into a form suitable for a CFE;

f. define the response time Staff deems to be adequate for detecting the diversion of an amount of such material considered to be of safeguards significance;

g. identify the degree of Staff's assurance (e.g., 99 percent confidence level) that detection will occur within the period specified in subpart (e) above.

1/ Intervenors use the term "safeguards significance" to define a significant quantity of material in relation to the amount of nuclear material needed for a nuclear explosive. (Cf. NASAP Report, DOE/NE-0001/2, pp. 3-38 and 4-4.) The use of this definition is meant to avoid the need for Staff to release details concerning weapons design.

Response

A) a) In addition to that charged to the core, plutonium is synthesized in the CRBR blanket and fuel pellets through neutron capture of uranium-238. The resultant isotopic distribution of plutonium is present as the solid dioxide (PuO_2) intimately dispersed in solid UO_2 material. Upon reaction with nitric acid at the reprocessing plant, the uranium and plutonium pass into solution, each is complexed, extracted, and isolated in an acidified nitrate solution. A Plutonium salt is precipitated from nitrate solution. The resultant precipitate is decomposed to Plutonium dioxide by heating. This product is transferred to a refabrication plant, where it is intimately mixed with depleted uranium dioxide power and is reductively pelletized as solid mixed oxide suitable for reactor use. After loading into fuel pins, this form is placed in the CRBR core.

b) (i) production in PuO_2 in situ within UO_2 materials in fuel and blanket assemblies (CRBRP).

(ii) an equilibrium of plutonium complexes in acidified aqueous/organic solutions through precipitation and oxidation to PuO_2: (reprocessing plants)

(iii) solid dioxide (PuO_2) intimately mixed with UO_2 to form mixed oxide pellets: (refabrication plant)

(iv) reloaded intimately mixed oxides of PuO_2 and UO_2 in pellets: CRBR driver fuel.

c) The NASAP Report (DOE/NE-0001) contains the following statement on page 2-43 of Volume 2:

> A significant difference between LMFBR MOX and recycle MOX fuel materials lies in the fact that LMFBR fuels would have plutonium concentrations of 15 to 25%, which are considered to be weapons-usuable, whereas recycle fuels would contain only 4 to 6% plutonium. Consequently, it is theoretically possible that a nuclear device could be made directly from fresh LMFBR fuel without the need for chemical separation; in recycle systems, PuO_2 itself is the only material that is weapons-usable.

Based on this quotation, the mixed PuO_2/UO_2 fuels for the CRBR reactor core may be considered to be weapons-usuable and will be safeguarded appropriately. Spent blanket fuel and waste discards from reprocessing would not meet these criteria and are not considered directly weapons-useable. Plutonium containing solutions at the reprocessing plant would likewise not be directly weapons-useable. Although spent core fuel elements would have a high Pu to U ratio, they are not considered to be theft targets for non-national groups due to their high levels of radioactivity and fission product poisons.

d) The Staff considers plutonium in quantities equal to or greater than 2 kg to be of "safeguards significance" unless such special nuclear material is not readily separable from other radioactive material and has a total external radiation dose rate in excess of 100 rems per hour at a distance of 3 feet from any accessible surface without intervening shielding.

e and f) The Staff believes that it is not justifiable to assume any reduction in risk to the public due to difficulties that a non-national group might encounter in designing and building a crude nuclear explosive after obtaining five or more formula kilograms of special nuclear material. NRC regulations for protection against theft or diversion of formula quantities of strategic nuclear material are consistent with this premise.

g) The Staff does not attempt to quantify an assurance level with respect to protection against theft of special nuclear material.

B) 1. HEF Conceptual Design Report, ORN7/CFRP-81/4.
2. NASAP Report, "Nuclear Proliferation and Civilian
3. Nuclear Power, "DOE/NE-0001, Volumes III, IX.
4. NASAP Report (DOE/NE-0001)

5. August 8, 1977 memorandum from the EDO to the Directors of NMSS, NRR, RES, IE and SD; subject "Operating Assumption on Clandestine Fission Explosive."

D) Homer Lowenberg, John W. Hockert, Senior Staff Scientist, Division of Safeguards, Office of Nuclear Material Safety and Safeguards and Paul Baker, Research and Technical Assistance Project Manager, Division of Safeguards, Office of Nuclear Material Safety and Safeguards provided the answer to c and d of the question. R. Davis Hurt, MC&A Program Analyst, Division of Safeguards, Office of Nuclear Material Safety and Safeguards, Sarah A. Mullen, Safeguards Analyst, Division of Safeguards, Office of Nuclear Material Safety and Safeguards, John W. Hockert, Senior Safeguards Scientist, Division of Safeguards, Office of Nuclear Material Safety and Safeguards and Paul Baker, Research and Technical Assitance Project Manager, Division of Safeguards, Office of Nuclear Material Safety and Safeguards provided the answer to e, f and g of the question.

Interrogatory 2

In determining what constitutes an adequate safeguards system, does Staff conservatively or otherwise assume that a crude CFE could be designed and constructed by a small group of people (perhaps one), none of whom has ever had access to the classified literature, without necessarily using a great deal of technological

equipment or conducting any experiments? (See OTA Report, Nuclear Proliferation and Safeguards, pp. 140-141.)

Response

A) The following conservative operating assumption, for use of NRC Staff members with safeguards responsibilities, was disseminated by the Executive Director for Operations on August 8, 1977, "Operating Assumption: It is assumed that a small non-national group of people could design and build a crude nuclear explosive device which would produce a significant nuclear yield of an equal mass of high explosive. To accomplish this, they would need an amount of special nuclear material which is at least equal to the five-kilogram formula quantity, and they would have to possess the appropriate technical capabilities.

B) August 8, 1977 memorandum from the EDO to the Directors of NMSS, NRR, RES, IE, and SD, subject "Operating Assumption on Clandestine Fission Explosives".

C) John W. Hockert, Senior Staff Scientist, Division of Safeguards, Office of Nuclear Material Safety and Safeguards and Paul Baker, Research and Technical Assistance Program Manager, Division of Safeguards, Office of Nuclear Material Safety and Safeguards provided the answer to the question.

Interrogatory 3

In light of recent analyses and recommendations by the General Accounting Office, see GAO, Assessment of Various Aspects of this Nation's Nuclear Safeguards Program (EMD-80-48) (1980), describe what steps have been taken to coordinate nuclear threat definition policy and levels of protection provided to similar nuclear materials by DOD, DOE, and NRC. To the extent differences among the three agencies still exist with respect to the application of physical security and material control and accounting at facilities that possess or handle strategic quantities of special nuclear material, specify what such differences are, with specific reference to:

a. the internal threat to such facilities assumed by each agency, including assumptions regarding:

   i. the number of people;
   ii. the degree of collusion;
   iii. the degree of armament;
   iv. the degree of training;
   v. the degree of planning; and

b. the external threat to such facilities assumed by each agency, including assumptions regarding the factors listed in subpart (a)(i) through (a)(v) above.

Response

A) In response to the referenced GAO report, DOD chaired the development of a joint, classified DOD/DOE/NRC paper coordinating nuclear threat definition. The paper declares that "identical threat guidance has not been issued by DOE, DOD, and NRC. This is partially a reflection of a conclusion in the referenced GAO report, which all three agencies support, that differences in individual site characteristics ... and nature of operation must be factored into the security program. [unclassified (U)]

The answers to parts (a) and (b) of this question can be found in the reference classified (c) paper (reference 1 below in B). Since the time the paper was written (Spring 1980), the NRC has approved 10 C.F.R. Part 11, which requires individuals who use, process or store formula quantities of SNM in the licensed sector to have security clearances (Nov. 21, 1980).

B) 1. Memorandum I-04726/80 from Adm. Daniel Murphy, the Deputy Under Secretary of Defense, to the Assistant to the President for National Security Affairs, Subject: The February 25, 1980 Report of the Comptroller General on U.S. Nuclear Safeguards, plus its four attachments. (C)

2. Letter from the Comptroller General of the U.S. to the Honorable Zbigniew Brzezinski, forwarding GAO report on U.S. Nuclear Safeguards, March 27, 1980. (U)

D) Sarah A. Mullen, Safeguards Analyst, Division of Safeguards, Office of Nuclear Material Safety and Safeguards provided the answer to the question.

Interrogatory 6

Does Staff believe that having reasonable assurance that Applicants will comply with NRC safeguards requirements at the CRBR site and related NRC-licensed activities (e.g. transportation) is sufficient to enable Staff to determine that CRBR safeguards are adequate?

Response

A) The Staff believes that if the Applicant meets the relevant NRC regulations, CRBR safeguards will be adequate. At this stage of the licensing process, reasonable assurance that the Applicant will comply with NRC safeguards requirements is sufficient.

D) Charles E. Gaskin, Plant Protection Analyst, Division of Safeguards, Office of Nuclear Material Safety and Safeguards provided the answer to the question.

Interrogatory 7

With respect to unlicensed DOE facilities at which CRBR fuel cycle activities will or are likely to be conducted:

a. Does Staff believe that such facilities are operated in a manner that would be in compliance with the Commission's present regulations on safeguards?

b. Has Staff ever assessed the adequacy of safeguards at such facilities? If the answer is yes, identify the assessment and provide a summary of the analysis and conclusions.

c. Does Staff believe that mere compliance with existing DOE safeguards requirements at such facilities is sufficient to enable Staff to determine that CRBR safeguards are adequate?

d. Does Staff believe that current safeguards are adequate at:

i. the Savannah River Plant;
ii. the Hanford reservation;
iii. Idaho National Engineering Laboratory.

Response

A) a. As part of the CRBR environmental review, the Staff will assess the general features of the safeguards

systems that the Applicant plans to employ at unlicensed facilities used in the CRBR fuel cycle. The purpose of the review is to determine if the Applicant's proposed safeguards systems can reasonably be expected to protect against the possibility of attempted sabotage or theft. It is not necessary as part of this review to determine if the Applicant's safeguards systems would exactly comply with the NRC regulations.

b. As part of the CRBR environmental review, the Staff will assess the reasonableness of the Applicant's proposed safeguards systems for the unlicensed CRBR fuel cycle facilities. This will be covered in the revised CRBR Environmental Statement.

c. The Staff will assess the reasonableness of the Applicant's proposed safeguards systems at unlicensed CRBR fuel cycle facilities. The conclusion will not be based on whether the Applicant complies with DOE safeguards regulations, but on the Staff's assessment of whether the proposed safeguards systems are reasonable for protection against theft and sabotage.

d. The Staff will make its judgment of adequacy based on safeguard information furnished in DOE's Environmental

Report, not on beliefs regarding current safeguards at these specific plants.

D) R. Davis Hurt, MC&A Program Analyst, Division of Safeguards, Office of Nuclear Material Safety and Safeguards provided the answer to the question.

II. Contention 8 (renumbered as 11)

Interrogatory 1

John W. Gofman argues, in Radiation and Human Health, Sierra Club Books 1981, pp. 760-853 that the BEIR I, III and UNSCEAR (1977) estimates of genetic risk from radiation exposure do not adequately account for many irregularly inherited diseases and consequently they underestimate the genetic effect of radiation exposure with respect to irregularly inherited diseases by a factor between 6 and 100. (See Gofman, supra, page 791.) If Staff disagrees with Gofman's analysis in this regard or if Staff disagrees with Gofman's estimate of the total of all genetic and chromosomal diseases or defects (at page 849) please explain precisely the nature of your disagreement.

Response

A) The Staff has sent excerpts of the referenced document to Dr. Michael A. Bender, a genetics consultant to the Staff, and is awaiting Dr. Bender's reply.

Interrogatory 2

Does Staff believe that dose limitations under 10 C.F.R. Part 100 should be based on the principle that risk should be equal whether the whole body is irradiated uniformly or whether there is non-uniform irradiation (see ICRP 26 at §104)?

Response

A) No. The numerical criteria in 10 C.F.R. Part 100.11 are not intended to serve as acceptable limits for emergency

doses to the public, under accident conditions. Rather, they are intended to serve as reference values for comparison and evaluation of various reactor sites with respect to potential serious accidents of exceedingly low probability. In the event of an actual accident, appropriate actions will be taken, at levels substantially below the criteria in Part 100, to protect members of the public near the plant from radiation.

B) 10 C.F.R. Part 100, "Reactor Site Criteria", 27 Fed. Reg. 3509, April 1962, unless otherwise noted.

E) Continuing staff evaluation of information submitted by the Applicant in the course of this review will provide a basis for staff decisions regarding acceptability thereof.

Interrogatory 3

Were the limits on whole body and thyroid exposure under 10 C.F.R. Part 100 based on limiting the occurrence of stochastic effects to an acceptable level, or were they also intended to prevent non-stochastic effects?

Response

A) No. See answer to Question 2 above. The dose criteria stated in 10 C.F.R. Part 100.11 were never intended to be used as acceptable emergency doses to human beings. Rather these values were selected as reference values for evaluation and comparison of reactor sites. As stated in

10 C.F.R. Part 100, the value of 25 rems corresponds numerically to the NCRP once-in-a-lifetime accidental or emergency dose for radiation workers, which may be disregarded in determining subsequent radiation exposure status.

B) 10 C.F.R. Part 100, "Reactor Site Criteria", 27 Fed. Reg. 3509, April 1962, unless otherwise noted.

Interrogatory 4

Provide the supporting basis for Staff's answer to question 3 above.

Response

A) As stated in the answers to Questions 2 and 3 above, the numerical criteria in 10 C.F.R. Part 100.11 were not selected on the basis of biological radiation risks, or on consideration of doses to human beings. They were selected as a basis for consideration and evaluation of reactor sites.

B) 10 C.F.R. Part 100, "Reactor Site Criteria", 27 Fed. Reg. 3509, April 1962, unless otherwise noted.

Interrogatory 5

If the current dose limits in 10 C.F.R. Part 100 were intended to prevent non-stochastic effects, explain how a limitation of 300 rems to the thyroid is intended to prevent non-stochastic effects.

Response

A) See answers to Questions 2, 3, and 4 above.

B) 10 C.F.R. Part 100, "Reactor Site Criteria", 27 Fed. Reg. 3509, April 1962, unless otherwise noted.

Interrogatory 6

When internal and external exposures to radiation are received together, does Staff believe that a dose limitation approach for stochastic effects, as taken in ¶110 of ICRP 26, is more appropriate than the approach taken in ICRP 2, namely the concept of establishing separate annual dose equivalent limits for individual tissue and organs? (This question is directed at the methodology and not at the choices of the weighting factors or individuals organs or the annual dose equivalent limit for whole body exposure.)

Response

A) Yes. By letter of 7/24/81, NRC commented on the EPA proposed "Federal Radiation Protection Guidance for Occupational Exposures..." (46 Fed. Reg. 7836). The letter (second paragraph) notes that the ICRP system of dose limitation "...is logical and self-consistent, and appears to be based on the best scientific information available. The proposed ICRP guidance endorses summation of external dose and internal committed dose equivalent..." In the comments enclosed with that letter, General Comment A.(3), it was stated that the NRC endorses the adoption of the ICRP system of dose limitation in recognition of some very desirable features

of that system, specifically noting that it provides a method (a) to combine doses to multiple organs, doses from multiple radionuclides, and doses from internal and external exposures and (b) to express these doses in terms of a wholebody dose equivalent on the basis or risk considerations, which may be compared to the dose limits.

B) The 7/24/81 letter to EPA. Reference is also made to ICRP Publication 26.

Interrogatory 7

Identify the latest EPA position with respect to proposed occupational exposure limits.

Response

A) The Administrator of the Environmental Protection Agency (EPA) is charged under Executive Order 10831, Reorganization Plan No. 3 of 1970, and Public Law 86-373 to "...advise the president with respect to radiation matters, directly or indirectly affected health, including guidance for all Federal agencies in the formulation of radiation standards and in the establishment and execution of programs of cooperation with States." This guidance has historically taken the form of qualitative and quantitative "Radiation Protection Guidance." The existing guidance is set forth in Report No. 1 of the Federal Radiation Council dated May 13, 1960.

On January 23, 1981 (46 Fed. Reg. 7836) EPA published "Federal Radiation Protection Guidance for Occupational Exposures: Proposed Recommendations, Request for Written Comments, and Public Hearings." We are not aware of any later EPA position.

Interrogatory 8

Identify the latest Staff position with regard to proposed occupational exposure limits.

Response

A) The current NRC Staff position regarding occupational radiation exposure limits is set forth in 10 C.F.R.. Part 20, "Standards for Protection Against Radiation." By letter of 7/24/81, NRC commented on the EPA proposed "Federal Radiation Protection Guidance for Occupational Exposures..." (46 Fed. Reg. 7836). The letter and enclosure identify the Commission's position with regard to each of the EPA recommendations. An ad hoc NRC drafting group, taking direction from that letter, is developing a revision of 10 C.F.R. Part 20 that would, if promulgated, implement recommendations and biophysical data set forth in ICRP Publications 26 and 30. This working paper

reflects the considerations of the drafting group only and as of a specific time; it has not been circulated for formal NRC staff review or been considered by the Commission.

B) Copies of current 10 C.F.R. Part 20 and the latest version of the draft revision of 10 C.F.R. Part 20 are attached. The 7/24/81 letter to EPA was attached to the answer to Question 6.

E) The work of the drafting group to revise 10 C.F.R. Part 20 continues. This includes some contractural effort to assess the potential value/impact of the draft revision.

Interrogatory 9

If the approach taken in ICRP 26 at ¶104 and ¶110 for limiting stochastic effects were adopted, what is Staff's position with regard to the most appropriate values for the tissue weighting functions? For example, does Staff favor the recommendations of ¶105 of ICRP 26, or does it favor the weighting factors currently being proposed by EPA, or does Staff recommend some other weighting factors?

Response

A) The NRC letter to EPA of 7/24/81, referenced in, and attached to the answer to Question 8, recommended adoption of the ICRP-26 system of dose limitation intact, specifically identifying the EPA proposed weighting

factors among major and undesirable departures from the ICRP-26 system. The draft revision of 10 C.F.R. Part 20, also referenced in, and attached to the answer to Question 8, would implement the weighting factors recommended in (105) of ICRP Publication 26. (Again, note that a "Staff position" has not been established on this draft revision as of this time.)

B) Reference is made to ICRP Publications 26 and 30, the 7/24/81 letter to EPA and the draft revision of 10 C.F.R. Part 20.

Interrogatory 10

Does Staff believe that the risks associated with whole body exposure of 25 rems is equivalent to the risk of irradiating the thyroid only to 300 rems?

Response

A) This interrogatory is too vague to be able to provide a meaningful response. It is not clear what types of "risks associated with whole body exposure" are to be compared with "the risk of irradiating the thyroid". In addition, it is not clear from statement 10 whether the thyroid is exposed to internal or external radiation.

Interrogatory 11

If the answer to Question 10 is yes, please provide the source of data which Staff believes best represents mortality or morbidity risk data for whole body and thyroid exposures.

Response

A) No response is necessary.

Interrogatory 12

If Staff believes that the risks associated with 25 rems to the whole body are not equivalent to the risks associated with irradiating the thyroid to 300 rems, for purposes of establishing organ doses other than thyroid, does Staff believe that the thyroid (300 rem) or the whole body (25 rem) dose limit is the more appropriate reference? Please explain the basis of the answer to this question.

Response

A) No response is necessary.

IV. Contention 24 (which relates to Contention 2)

Interrogatory 1

Answer the questions below with respect to the following conclusion reached by NRC Staff in its 1977 Final Environmental Statement on the CRBR (p. 7-11):

> The design information and evaluations available at this time have been reviewed. Based on this review, our conclusion is that the accident risks can be made acceptably low with the incorporation of the features and requirements in the design as discussed above. The Staff's safety evaluation will provide the basis for determining what plant features and R&D programs are acceptable in this regard. The Staff believes it is within the state-of-the-art to design, construct and operate the CRBRP in such a manner that the consequences of accidents will not be significantly different from those already assessed for LWRs.

a. Identify and describe the precise nature of each of the design features and requirements to which Staff was referring in the second sentence of this statement.

b. Provide the exact page references in the FES and other relevant documents where such design features and requirements are discussed.

c. What was Staff's basis for believing, at the time the FES was issued, that Applicants' then-current design features would not serve to make CRBR accident risks and consequences acceptably low?

d. What was Staff's basis for believing, at the time the FES was issued, that incorporation of the design features and requirements discussed by Staff would serve to make CRBR accident risks acceptably low?

e. Does Staff still agree with this conclusion?

f. If Staff no longer agrees with this conclusion, indicate the precise manner in which Staff's current position differs from such conclusion.

g. Fully describe the extent to which the accident at Three Mile Island has caused Staff to change its position from that described in the above statement.

h. Fully describe the extent to which Applicants have, in Staff's judgement, incorporated the design features and requirements referred to by Staff in the years since the FES was issued.

i. Fully describe the extent to which the incorporation of such design features and requirements by Applicants comply with the changes proposed by Staff in the above statement.

j. Fully identify all CRBR design changes or modifications, beyond those referred to in the above statement, which Staff believes would further reduce the risks and consequences of CRBR accidents.

Response

A) a and b) The design features referred to which could feasibly make severe accident probabilities acceptably low are described in Section 7.1.1 of the FES on pages 7-2, 7-7 and 7-8. Other design features which could

feasibly reduce the consequences of such improbable accidents are described in Section 7.1.3 of the FES on page 7-10 and in Section II.D.4 of the Site Suitability Report on pages II-45 through II-49. The former general requirements are firm and their adequate implementation will be the objective of the safety review. Not all the latter features will necessarily be determined to be required during the CP safety review.

c) The CRBR design was evolving during the period prior to issuance of the FES. Various general design concepts were under consideration, but no combination of features proposed by the applicant was acceptable to the staff. Eventually the staff determined that the general design features described in Section 7.1.1 of the FES could in combination, if properly implemented, make the probability of severe accidents acceptably low.

d) The answer to this question is included in Sections 7.1.1 and 7.13, and Appendix I of the FES, in the Site Suitability Report and in the staff's responses to the eleventh set of interrogatories.

e) Yes, the Staff agrees with the conclusion.

f) Not applicable.

g) The accident at Three Mile Island has not caused the staff to change its position regarding the general design features referred to in the quotation from the FES.

h) The extent to which the Applicants have incorporated the subject design features and requirements is currently under evaluation. The staff conclusions regarding this will be discussed in the SER.

i) No changes have been proposed by the staff.

j) Although there may be minor design changes or modifications identified by the staff during the safety review as necessary to acceptably implement the general design requirements described in Section 7.1.1 of the FES, it is unlikely that any general or major changes will be determined to be necessary to further reduce the probability of severe accidents. Of the design features which could feasibly reduce severe accident consequences (Section 7.1.3 of FES and Section II.D.4 of the Site Suitability Report), not all will necessarily be required, but it is unlikely that any new features of this type not already identified as feasible will be identified later.

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(Clinch River Breeder Reactor Plant)	)	

AFFIDAVIT OF BILL M. MORRIS

I, Bill M. Morris, being duly sworn, state as follows:

1. I am employed by the U.S. Nuclear Regulatory Commission as a Section Leader of the Technical Review Section, Clinch River Breeder Reactor Program Office, Office of Nuclear Reactor Regulation.

2. I am duly authorized to participate in answering Interrogatory IV, #1 of the 22nd Set and I hereby certify that the answers given are true to the best of my knowledge.

Bill M. Morris

Subscribed and sworn to before me
this day of April, 1982.

Notary Public

My Commission expires:

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AFFIDAVIT OF JOHN V. NEHEMIAS

I, John V. Nehemias, being duly sworn, state as follows:

1. I am employed by the U.S. Nuclear Regulatory Commission as a Senior Health Physicist, Radiological Assessment Branch, Division of Systems Integration, Office of Nuclear Reactor Regulation.

2. I am duly authorized to participate in answering Interrogatories #2 through #5 of Section II of the 22nd Set and I hereby certify that the answers given are true to the best of my knowledge.

_____
John V. Nehemias

Subscribed and sworn to before me
this day of April, 1982.

_____
Notary Public

My Commission expires:

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(Clinch River Breeder Reactor Plant)	)	

AFFIDAVIT OF EDWARD F. BRANAGAN, JR.

I, Edward F. Branagan, Jr., being duly sworn, state as follows:

1. I am employed by the U.S. Nuclear Regulatory Commission as a Radiological Physicist, Radiological Assessment Branch, Division of Systems Integration, Orfice of Nuclear Reactor Regulation.

2. I am duly authorized to participate in answering Interrogatories #1, #10, #11, and #12 of Section II of the 22nd Set and I hereby certify that the answers given are true to the best of my knowledge.

Edward F. Branagan, Jr.

Subscribed and sworn to before me
this day of April, 1982.

Notary Public

My Commission expires:

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
UNITED STATES DEPARTMENT OF ENERGY	)	Docket No. 50-537
PROJECT MANAGEMENT CORPORATION	)	
TENNESSEE VALLEY AUTHORITY	)	
	)	
(Clinch River Breeder Reactor Plant)	)	

AFFIDAVIT OF ROBERT J. DUBE

I, Robert J. Dube, being duly sworn, state as follows:

1. I am employed by the U.S. Nuclear Regulatory Commission as a Section Chief of Regulatory Activities and Analyses Section, Fuels Facilities Safeguards Licensing Branch, Division of Safeguards, Office of Nuclear Material Safety and Safeguards.

2. I am duly authorized to participate in answering Interrogatories in Section I, #1(c) through (f), #2, #3, #6 and #7 in the 22nd Set and I hereby certify that the answers given are true to the best of my knowledge.

Robert J. Dube
ROBERT J. DUBE

Subscribed and sworn to before me this 28th day of April, 1982.

Robert F. Abbey Jr.
Notary Public
My Commission expires: July 1, 1982

ROBERT F. ABBEY, JR.
NOTARY PUBLIC STATE OF MARYLAND
My Commission Expires July 1, 1982

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
UNITED STATES DEPARTMENT OF ENERGY	)	Docket No. 50-537
PROJECT MANAGEMENT CORPORATION	)	
TENNESSEE VALLEY AUTHORITY	)	
	)	
(Clinch River Breeder Reactor Plant)	)	

AFFIDAVIT OF HOMER LOWENBERG

I, Homer Lowenberg, being duly sworn, state as follows:

1. I am employed by the U.S. Nuclear Regulatory Commission as a Chief Engineer, Office of Nuclear Material Safety and Safeguards.

2. I am duly authorized to participate in answering Interrogatory #1(a) and (b) of the 22nd Set and I hereby certify that the answers given are true to the best of my knowledge.

HOME LOWENBERG

Subscribed and sworn to before me
this day of April, 1982.

Notary Public

My Commission expires:

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
UNITED STATES DEPARTMENT OF ENERGY	)	Docket No. 50-537
PROJECT MANAGEMENT CORPORATION	)	
TENNESSEE VALLEY AUTHORITY	)	
	)	
(Clinch River Breeder Reactor Plant)	)	

AFFIDAVIT OF SHLOMO S. YANIV, S. C.d.

I, Shlomo S. Yaniv, being duly sworn, state as follows:

1. I am employed by the U.S. Nuclear Regulatory Commission as a Geologist and Health Effects Specialist, Health Effects Branch, Division of Health, Siting, and Waste Management, Office of Nuclear Reactor Regulation.

2. I am duly authorized to participate in answering Interrogatories #6, #7, #8 and #9 of Section II of the 22nd Set and I hereby certify that the answers given are true to the best of my knowledge.

SHLOMO S. YANIV, S. C.d.

Subscribed and sworn to before me
this day of April, 1982.

Notary Public

My Commission expires: