UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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

APPLICANTS' RESPONSES TO
NATURAL RESOURCES DEFENSE
COUNCIL, INC. AND SIERRA CLUB
NINETEENTH SET OF INTERROGATORIES

Pursuant to 10 C.F.R. Part 2.740b. and in accordance with the Board's Prehearing Conference Order of February 11, 1982, the United States Department of Energy and Project Management Corporation, for themselves and on behalf of the the Tennessee Valley Authority (the Applicants), hereby respond to the Natural Resources Defense Council, Inc., and the Sierra Club Nineteenth Set of Interrogatories dated June 4, 1982.

Answers to General Questons (a)-(f)

(a) Provide the direct answer to the question.

ANSWER: See the direct answers below under heading "RESPONSE."

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

ANSWER: See the direct answers below under heading "DOCUMENTS."

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

ANSWER: Unless otherwise indicated below in regard to the answer under the heading "DOCUMENTS"; none.

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

ANSWER: See the attached affidavits.

(e) Explain whether Applicants are presently engaged in or intend to engage in any further, ongoing research program which may affect Applicants' answer. This answer need be provided only in cases where Applicants intend 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 Applicants do not intend to rely upon the existence of any such research at the LWA or construction permit

hearing on the CRBR.

ANSWER: If not in Section 1.5 of the PSAR and the direct answer below; none.

(f) Identify the expert(s), if any, which Applicants intend 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 Applicants have 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.

ANSWER: Applicants have not yet identified the expert(s) in question.

General Questions

INTERROGATORY

1. Intervenors note that summaries of recent Staff meetings with Applicants distributed to the service list contain relatively little information identifying positions of Staff and Applicants or concerning what was actually said at the meeting. Have Applicants or consultants prepared any other writeups, summaries, or other documents related to such meetings other than those summaries circulated to the service list? If the answer is yes, please identify and provide all such documents prepared since October 1, 1981.

RESPONSE

1. 1. CRBRP Meeting Summary, SMBDB Planning, February 18, 1982

(dated March 16, 1982)

2. CRBRP Meeting Summary, Accident Analysis, February 25-26, 1982 (dated March 16, 1982)

3. CRBRP Meeting Summary, Loose Parts Monitoring, February 24, 1982 (dated March 17, 1982)

4. CRBRP Meeting Summary, SMBDB, March 25, 1982 (dated April 15, 1982)

5. CRBRP Meeting Summary, Chapter 15.5-15.7 Meeting, April 5, 1982 (dated April 29, 1982)

6. CRBRP Meeting Summary, Materials and Structures, April 6 and 7, 1982 (dated April 29, 1982)

7. CRBRP Meeting Summary, PSAR Section 6.2, Containment Systems, April 1, 1982 (dated April 29, 1982)

8. Trip Report, Plant Protection System, January 11 and 12, 1982.

9. Trip Report, Meeting with NRC to discuss TMBDB, January 15, 1982.

10. Trip Report, Meeting with NRC to discuss Sodium-Concrete Test Plant, February 9 and 10, 1982.

11. Trip Report, Meeting with NRC on TMBDB, April 16, 1982

Contention 1

INTERROGATORY

2. Applicants' updated response to Interrogatory III of Intervenors'

Tenth Set of Interrogatories to Applicants refers to "preventive design features included in the CRBR" (lines 2-3 of response). Have any of these preventive design features been included in LWRs and been shown to be effective in practice? If the answer is yes, identify and describe each such preventive design feature, and explain in detail how its effectiveness has been proven.

RESPONSE

2. Yes. Two types of preventative design factors included in CRBRP are also provided in LWR plants. These are reactor shutdown systems (RSS) and shutdown heat removal system (SHRS). The RSS, (i.e., systems to terminate neutron chain reactions in reactor cores) have been shown effective in practice in LWRs over many years of operation. The SHRS, (i.e., systems to remove sensible and decay heat from primary coolant systems) have been shown effective in practice in LWR plants over many years of operation.

INTERROGATORY

3. Review Applicants' updated response to each interrogatory in Intervenors' Tenth Set of Interrogatories to Applicants, filed April 30, 1982. Would any of these responses change if the interrogatory requested only information necessary to the LWA-1 proceeding? Describe each such change and explain the reason for each change.

RESPONSE

3. Yes. The updated responses would change in the areas where details of the reliability program are presented. The details of the program would be deferred in accordance with the Board's April 22, 1982 order stating that details of the Applicants' reliability program, methodology, and data base will not be used for the LWA-1 Hearings. The Applicants have not done a detailed analysis to determine the specific changes.

INTERROGATORY

4. Identify all classes of accident initiators leading to CDAs for a reactor of the general size and type as the CRBR.

RESPONSE

4. The classes of HCDA initiators for a reactor of the general size and type as the CRBR are those defined in CRBRP-3, Volume 1, Sections 3.1 and 3.2.

INTERROGATORY

5. Identify all relevant criteria to be applied to a reactor of the general size and type as the CRBR to ensure that CDAs are properly classified as within or outside the design basis.

RESPONSE

5. To ensure that HCDAs are properly classified as outside the design basis for a reactor of the general size and type as the CRBRP, the Design Approach to Safety with respect to prevention of HCDAs, as described in Section 15.1.1 of the PSAR, is applied.

INTERROGATORY

6. Identify in detail each general characteristic of the CRBRP design which Applicants believe should be considered at the LWA-1 stage.

RESPONSE

6. The general characteristics of the CRBRP design which should be considered at the LWA-1 stage are discussed in Section 15.1.1 of the PSAR on The Design Approach to Safety and in Section 3 of the ER.

INTERROGATORY

7. Identify and describe in detail each instance of control rod failure in the history of LWRs known to Applicants.

RESPONSE

7. NUREG/CR-1331 and Licensee Event Reports provide the identification and details of LWR control rod failures.

INTERROGATORY

8. Identify any calculations performed by Applicants of CDA analyses for the CRBR heterogeneous core that provide greater energetics or results that would suggest greater energetics than the results published in GEFR-00523.

RESPONSE

8. The Applicants have not performed analyses of the CRBRP heterogeneous core which suggest that energetics levels greater than the results published in CRBRP-GEFR-00523 are likely. As noted in Chapters 9 and 10 of CRBRP-GEFR-00523, reactivity ramp rates of the range 75-100 $/sec would be required to attain the SMBDB energetics level of 101 MJ at sodium slug impact on the reactor closure head. Some additional parametric calculations were also performed to confirm the relationship among ramp rate, fuel temperatures, and work potential at higher energetics levels.

Calculations of the type considered herein always require careful engineering review to assure consistency with basic engineering principles. In the development of the appropriate computer modeling of a given physical problem, or in the actual analyses, computer numerical input or modeling errors are discovered which render the calculational output to be non-physical in meaning. Such non-physical

calculations are usually discarded and have, therefore, not been identified.

INTERROGATORY

9. Identify and provide all reliability and probability analyses referred to in Applicants' response to Intervenors' Request for Admission #84 (related to Original Contention 2), dated August 12, 1976.

RESPONSE

9. The principal reliability and probability analyses which were referred to in Applicants' response to the Intervenors' Request for Admission #84 (dated January 1, 1977) were WARD-D-0118 and NEDM-14082. See response #25 below.

INTERROGATORY

10. Describe in detail each additional "factor" leading to Applicants' position that CDAs should be excluded from the CRBR design basis referred to in Applicants' response to Intervenors' Request for Admission #86 (related to original Contention 2), dated August 12, 1976.

RESPONSE

10. See response to Interrogatory #5 of this set.

INTERROGATORY

11. Identify and provide all "probabilistic evaluations" used by Applicants to preclude CDAs from DBAs referred to in Applicants' response to Intervenors' Request for Admission #92 (related to original Contention 2), dated August 12, 1976.

RESPONSE

11. See Applicants' response to Interrogatory #9 of this set.

INTERROGATORY

12. Identify each of the potential CDA initiators addressed in CRBRP-1 which was not previously identified in the PSAR. Describe fully the methodology used by Applicants in selecting each such initiator and provide all documents in the possession of Applicants related to such methodology.

RESPONSE

12. All the potential HCDA initiators addressed in CRBRP-1 are identified in the PSAR or CRBRP-3, Volume 1, which is referenced in the PSAR.

Contention 2

INTERROGATORY

13. Regarding Interrogatory 2 (Contention 2) of Intervenors' Eighteenth Set of Interrogatories to Applicants: identify each significant plant component (design feature) used to provide TMBDB whose design or other aspects has changed since April 23, 1977.

RESPONSE

13. As noted in Applicants' response to Interrogatory 2 (Contention 2) of Intervenors' Eighteenth Set, the plant components which provide Thermal Margin Beyond the Design Base (TMBDB) are described in CRBRP-3, Volume 2, Section 2.2. The status of TMBDB features as of April 23, 1977, was described in a letter from Van Nort to Boyd, "Transmittal of Third Level Thermal Margin Report," April 22,

1976, and a letter from Buhl to Boyd, "CRBRP Containment - 24 Hour Non-Venting Criteria," November 5, 1976. The only substantial change to this equipment since April 23, 1977, is addition of post-accident high range Reactor Containment Building radiation level instruments. There have been no other major changes to TMBDB equipment specifications.

INTERROGATORY

14. Provide an updated answer to Interrogatory II-1 of Intervenors' Third Set of Interrogatories to Applicants, substituting for the indicated PSAR paragraphs the statements in Section 8.1.1.1 of CRBRP-GEFR-00523.

RESPONSE

14. The statements and conclusions in Section 8.1.1.1 of CRBRP-GEFR-00523 are sensitive to the 12 items identified in Interrogatory II-1, page AA-59, of the updated responses to the extent provided below:

The first two items were examined in Section 6.1.1 and 6.2.2 of CRBRP-GEFR-00523 and found to not significantly affect the conclusions on core coolability, except when complete flow blockages were assumed. In this case, isolated fuel assembly meltdown would occur prior to nonenergetic termination of the accident in the initiating phase. The location and degree of fuel failure (item 3) was found to be the most significant of the twelve listed items relative to the TOP scenario. The extent of sensitivity to assumptions on this item were determined with the parametric analyses performed in Setions 6.1 and 6.2. The maximum departures were assessed in Sections 6.1.5 and 9.3.

Realistic variations of items 4 through 10 are not expected to result in significant sensitivities.

Use of the more detailed PLUTO 2 fuel-coolant interaction model

generally confirm the progression sequence calculated by SAS/FCI. For transients which attain near prompt critical conditions the PLUTO 2 model normally predicts less severe consequences than SAS/FCI. For example, PLUTO 2 predicted a nonenergetic termination of an assumed midplane failure at EOC-4 conditions (Section 6.2.8 and Appendix E), whereas SAS/FCI indicated a potential for a sustained power burst.

Uncertainties in core material reactivity worths are not expected to be of significance for the best-estimate TOP scenario.

INTERROGATORY

15. Provide an updated answer to Interrogatory II-2 of Intervenors' Third Set of Interrogatories to Applicants, substituting for the indicated PSAR paragraph the statements in Section 8.1.1.2 of CRBRP-GEFR-00523.

RESPONSE

15. The statements and conclusions in Section 8.1.1.2 of CRBRP-GEFR-00523 are sensitive to the 12 items identified in Interrogatory II-2, page AA-60, of the updated responses to the following extent:

The conclusions in 8.1.1.2 are not sensitive to any of the 12 items identified. Item (ii) "the location of fuel blockages above the core" is important to the extent that if complete blockages form near the top of the active core, they would preclude access to the upper axial blanket region for fuel dispersal.

INTERROGATORY

16. Provide an updated answer to Interrogatory II-3 of Intervenors' Third Set of Interrogatories to Applicants, referring specifically to the heterogeneous core rather than the indicated PSAR paragraphs.

RESPONSE

16. The initiating phase of both the TOP and LOF accidents is continued until either:

(1) The core is clearly in a nuclear shutdown state.

(2) The core is clearly in a state which can no longer be represented within the fixed geometry conditions of the SAS code.

For case (1) the results of the initiating phase calculations are evaluated for thermal and mechanical stability of the resulting geometry. If short term recriticality is possible, the transition phase analysis is entered; otherwise, the decay heat removal phase analysis is entered.

For case (2) the results of the initiating phase calculation are evaluated to determine if conditions for a true disassembly calculation are met. These criteria were defined as:

- A sustained super-prompt critical excursion is indicated
- A net reactivity at or near prompt critical and increasing by at least 30 $/s
- The peak fuel region must be in a largely molten state with extreme fuel temperatures, equivalent to high fuel vapor pressures, imminent.

If conditions for a disassembly calculation are not met, a meltout phase assessment is entered.

The one case which satisfied the disassembly criteria is described in Sections 6.2.3 and 9.3.

INTERROGATORY

17. Provide an updated answer to Interrogatory II-4 of Intervenors' Third Set of Interrogatories to Applicants, substituting for the indicated PSAR paragraphs the statements in Section 8.1.1.2 of CRBRP-GEFR-00523.

RESPONSE

17. This question appears to duplicate question #15, Set 19, except for item (iii), "the equations of state." The LOF scenario was not found to be sensitive to variations in the fuel vapor pressure by a factor of three (CRBRP-GEFR-00523, Sectons 7.1.2 and 7.2.3).

INTERROGATORY

18. Provide an updated answer to Interrogatory II-17 of Intervenors' Third Set of Interrogatories to Applicants, substituting for the indicated PSAR paragraph Section 8.2.4 of CRBR-GEFR-00523.

RESPONSE

18. The degree of incoherence in fuel temperatures and potential reactivity insertion mechanisms, including their spatial distribution, is discussed in CRBRP-GEFR-00523, Section 8.2.3.

The temporal incoherence in the disruption of the core structure is related to the melt-through of the hexcan walls and the initial conditions at entrance to the meltout phase of the accident. The melt-through of the high and intermediate power fuel assemblies (see Section 8.2.3) is estimated to take place over several seconds with the low power fuel assemblies even further delayed. The internal blanket and control assembly hexcans are estimated to survive for many, perhaps tens of seconds, beyond the fuel assembly melt-through. The above stated incoherencies are found to be significant relative to the time intervals required to remove fuel from the core (Section

8.2.5) and the associated, negative neutronic effects.

INTERROGATORY

19. With respect to the following request for information, we are concerned with four distinct validations relative to the models and computer codes.

> i) Validation that the code's output is the correct numerical calculations that should result from a given set of input data and the model assumptions;
>
> ii) Validation of the models against actual experimental data;
>
> iii) Validation that the models can be extended to the CRBR; and
>
> iv) Validation that the input assumptions for the CRBR case are adequate with respect to the CDA analysis, i.e., are supported by experimental evidence. By "adequate" here and below, we mean that the calculations will not underestimate the CDA work potential (i.e., forces and resulting energetics of a CDA) or overestimate the containment capability of the reactor with respect to a CDA.

I. With respect to each of the following codes and each subroutine of each of the following codes:

(A) SAS-3D

(B) SAS-4A

(C) EPIC (if not included in SAS-3D or SAS-4A, please provide the following information:

(1) Complete, current documentation (i.e., a writeup) of the codes and the subroutines.

(2) Identify, by name and affiliation, the author, or authors, of each model, subroutine, or portion of

each subroutine, which each contributed or worked on.

(3) Identify by name and affiliation (including organization, division, branch, title, etc.) each Applicant employee or consultant that has intimate working knowledge of the code and each subroutine, or parts thereof, including its validity. Where more than one person is involved, delineate which portion of the code or subroutine with which each has an intimate working knowledge.

(4) Describe fully the procedures by which Applicants have assured themselves and continue to assure themselves, that the various computer programs (codes) accurately reproduce the models (see Validation i) above).

(5) Indicate which models (including subroutines, or portions of subroutines) have not been validated as described in Validation i).

(6) Indicate the models (including subroutines, or portions of subroutines) or assumptions that have not been validated as described in Validation i).

(7) For each model, portion of the model, or assumption that has been validated (against experimental (or other) data, see Validation ii) above), describe fully

(a) the procedure by which it was validated,

(b) the results, including all uncertainties and limitations of the validation,

(c) the source of the experimental or other data that was used in the validation.

(8) Explain fully

(a) all instabilities in the numerical performance in the models,

(b) what causes them,

(c) how they are avoided, and

(d) the extent to which this introduces uncertainties in the calculations and limit the validity of the models.

(9) To the extent that any answers to the above questions are based on referenced material not previously provided, please supply the references.

(10) Explain whether Applicants are presently engaged in or intend to engage in any further research or work which may affect the answer. Identify such research or work.

(11) Identify the expert(s), if any, whom Applicants intend to have testify on the subject matter questioned. State qualifications of each such expert.

II. With respect to the Interrogatories identified above where final information was not provided, please provide the following information:

i) What is Applicants' present (preliminary) assessment in these areas?

ii) What are the uncertainties that prevent

Applicants from making a final assessment in these areas?

iii) What is the precise information that Applicants require to resolve these uncertainties?

iv) Are Applicants presently engaged in other research related to these areas? Do Applicants intend to engage in such research in the future?

III. Please identify each and every routine in

(1) the entire SAS-3D code;

(2) the entire SAS-4A code;

(3) the entire EPIC code (if not included in the SAS-3 or SAS-4A codes).

Separately, for each routine identified above, please supply the following information:

(a) Was the routine verified by comparison with other codes, or by comparison with the results of hand calculations, or by comparison with what sound engineering judgment deemed to be physically reasonable?

(b) If the routine was verified by comparison with other codes, how was the other code or codes verified? Identify the other code or codes.

(c) If the answer to (a) or (b) above is that the routine was verified by hand calculations, please supply the hand calculations or the appropriate documentation, i.e.,

(i) the name(s) of the individual(s) who performed the calculations and made the

comparison; and

(ii) the laboratory notebook, memorandum, or other written record that documents the comparison.

(d) If the answer to (a) or (b) above is that the subroutine was verified by comparison with what sound engineering judgment deemed to be physically reasonable, please describe in detail the nature of and basis for the engineering judgment. In addition, supply:

(i) the name(s) of the individual(s) who rendered the judgment and made the comparison; and

(ii) the laboratory notebook, memorandum, or other written record that documents the comparison.

(e) Did the author(s) of the models actually perform the coding? If not, identify the programmer(s).

(4) How do Applicants <u>continue</u> to assure themselves that the overall code and its subroutines accurately reproduces the models as described in the PSAR and its references?

(5) Please identify and provide all intra-laboratory memoranda generated by personnel in the Accident Analysis Section, the Coolant Dynamics Section, and other Sections of the ANL Reactor Analysis and Safety Division that critique or otherwise evaluate the models developed by other personnel in these respective sections, limited to the development of any and all models and subroutines that are identified in 1) above. Also provide all subsequent memoranda that are responses to criticisms or evaluations identified above

or that represent a continuation of the dialogue related to the model evaluation.

RESPONSE

19 (I)(A)(1 through 11)

Answers to this question were provided by Applicants in "Applicants Updated Response #1 to Natural Resources Defense Council, Inc., and Sierra Club Interrogatories (Second, Third, Fourth, Fifth, and Sixth Sets)" on pages AA-5 through AA-9, as revised in "Applicants Second Supplemental Updated Response #1 to Natural Resources Defense Council, Inc., and Sierra Club Interrogatories (Second, Third, Fourth, Fifth, and Sixth Sets)."

19 (I)(B)(1 through 11)

Applicants have not used the SAS-4A code as a basis for licensing the plant and do not plan to rely on this code in LWA-1 proceedings. Discovery responses will be updated if and when the code is used for licensing.

19 (I)(C)(1 through 11)

The EPIC code has not been used by the Applicants nor are there any plans to use the code in the future. A comparison of EPIC with PLUTO 2 was carried out (Reference 25 of CRBRP-GEFR-00523) which showed that the codes show good agreement if several of the advanced PLUTO 2 features are not used.

19 (II)(i through iv)

This part of question 19 makes reference to the preceding part of question 19, namely 19 (I), which relates principally to code validation. Validation of the SAS code is an ongoing, continuous process as more data and analyses become available. The Applicants'

planned research program, documented in Appendix A to CRBRP-3, Vol. 1, partly relates to SAS. In addition, in the normal course of its ongoing evaluation, the Applicants maintain awareness of other research and development work related to phenomena and models in the SAS-3D code. Results from these R&D programs are factored into code validation and application to the extent that the results are applicable. With respect to validation of the SAS-3D code, the Applicants' present assessment is that the code is adequately validated.

19 (III)(1)(a through e)

Answers to this question were provided by Applicants in "Applicants Updated Response #1 to Natural Resources Defense Council, Inc., and Sierra Club Interrogatories (Second, Third, Fourth, Fifth, and Sixth Sets)" in the response to Set VI, Question I(A)(1), pages AA-114 through AA-121, and in the response to Set VI, Question I(A)(2), pages AA-125 and AA-126. Applicants note that code comparison activities have been carried out by the Whole Core Accident Comparative Calculations (WAC) Group over the past four years. Several codes or parts thereof have been included in these comparisons. SAS3D has been included in the comparisons, principally as used by the NRC representatives (SAS3D/EPIC) and by the FRG (KFK) representatives. The relevant WAC activities are documented in Items 275 through 283 of the listings of Argonne National Laboratory memoranda submitted with "Applicants Supplemental Updated Response #1...," dated April 30, 1982; "Applicants Second Supplemental Updated Response #1...," dated May 24, 1982, and in this response (below). Applicants have not relied on these calculations as part of their verification and validation of SAS3D. However, Applicants maintain cognizance of these activities.

19 (III)(2)

Applicants have not used the SAS-4A code as a basis for licensing the plant and do not plan to rely on this code in LWA-1 proceedings.

Discovery responses will be updated if and when the code is used for licensing.

19 (III)(3)

The EPIC code has not been used by the Applicants nor are there any plans to use the code in the future. A comparison of EPIC with PLUTO 2 was carried out (Reference 25 of CRBRP-GEFR-00523) which showed that the codes show good agreement if several of the advanced PLUTO 2 features are not used.

19 (III)(4)

This question was answered in "Applicants Updated Response #1...," on page AA-126.

19 (III)(5)

This question was answered in "Applicants Updated Response #1...," on page AA-127, as supplemented in "Applicants Supplemental Updated Response #1...," dated April 30, 1982, and "Applicants Second Supplemental Updated Response #1...," dated May 24, 1982. One additional item should be added to the list of memoranda provided in the Supplemental Responses:

283 Foreign Trip Report, Hartmut U. Wider, "EEC Whole Core Accident Comparative Calculation (WAC) Meeting in Brussels, Belgium, March 23-24, 1982."

Contention 3

INTERROGATORY

20. Describe fully the programs and methods used by Applicant to ensure that the analyses of potential accident initiators, sequences,

and events are sufficiently comprehensive to assure that analyses of the DBAs will envelop the entire spectrum of credible accident initiators, sequences, and events.

RESPONSE

20. Reactor power plant accident sequences and their appropriateness for use in design have been reviewed. Efforts to identify appropriate accidents have been based on experience. Further efforts involved recognition of the characteristics of systems used to control them. Systematic searches resulted in lists of DBAs, such as the list of accidents listed in the NRC's Standard Format and Content of Safety Analysis Reports (LMFBR Edition). This NRC list is the base point for identification of CRBRP accidents.

Additional systematic efforts to identify DBAs for CRBRP have involved use of the engineers' knowledge of the CRBRP design approaches and systematic methods such as Failure Modes and Effects Analyses (FMEAs).

The search included consideration of human errors which could be postulated to initiate, exacerbate, or interfere with mitigation of CRBRP accidents. A large number of accident sequences were considered and excluded from DBA list because their effects were bounded by accidents on the list and no new design requirements developed from their consideration. (The resulting list of DBAs is identified in PSAR Chapter 15.0.)

INTERROGATORY

21. Was the program described in CRBRP-1 used by Applicants in any manner to ensure that the list of potential accident initiators, sequences, and events are sufficiently comprehensive to assure that analysis of the DBAs will envelop the entire spectrum of credible accident initiators, sequences, and events?

RESPONSE

21. No. The process described in CRBRP-1 was not used by Applicants to ensure that analysis of DBAs will envelope the spectrum of credible accidents.

The results recorded in CRBRP-1 were reviewed to determine if any of the results are inconsistent with previous Project conclusions with respect to DBAs. No inconsistencies were found.

INTERROGATORY

22. Identify and produce all documents describing the programs or activities used by Applicants to ensure that the list of potential accident initiators, sequences, and events are sufficiently comprehensive to assure that analyses of the DBAs will envelop the entire spectrum of credible accident initiators, sequences, and events.

RESPONSE

22. As noted in the response to Interrogatory #20 above, the documents addressing design basis accidents are: (1) NRC's Standard Format and Content for Safety Analysis Reports (LMFBR Edition) and (2) Chapter 15 of the CRBRP PSAR.

Contentions 1, 2, and 3

INTERROGATORY

23. Regarding Interrogatory 8 of Intervenors' Eighteenth Set of Interrogatories to Applicants, specify what changes, if any, have been made in the design of the CRBRP since the TMI-2 accident as a result of lessons learned from that accident.

RESPONSE

23. Applicants have not performed a specific analysis to identify which of these changes resulted from the TMI-2 accident "lessons learned." However, the following significant changes and additions have been made to the PSAR since April 1977.

Change	PSAR Amendment Number
o Relocate the radioactive argon processing system (RAPS) entirely into the containment	
A. Surge Vessel	36
B. Cryostill	65
o Add RSB confinement features so that the RSB operating floor is a confinement structure at all times except when the railroad door is open	36
o Shift Loop 3 decay heat removal loads (previously powered from a battery) to a third emergency diesel generator for power division 3	63
o Add EVST natural draft/natural circulation cooling loop	44
o Accommodation of flooding due to feedwater/steam pipe breaks	45
o Revise reactor shutdown system design requirements	45 53
o Lower the elevaton of top suppressor plate to reduce gas entrainment	45

o	Revise ground acceleration values of SSE, OBE	46
o	Update industrial security system	47
o	Revise seismic instrumentation	47
o	CRBRP accident monitoring system	49
o	Catch pans as ESF for air-filled cells	54
o	Install digital radiation monitor data processing and control system	54
o	Establish design basis sodium/water reaction event	59
o	Revise SMBDB and TMBDB	60
o	Cell liners as ESF for inerted cells	64
o	Add acoustic sensors on safety/relief and vent valves	In process
o	Add inoperable status monitoring system	66
o	Establish requirements for emergency response facilities	65
o	Accident monitoring	66
o	Heterogeneous core	51
o	Control room improvements	67

INTERROGATORY

24. Regarding Interrogatory 12 of Intervenors' Eighteenth Set of Interrogatories to Applicants: explain the extent to which the statement of Mr. Clare, as described by Applicants, is also applicable to portions of the CRBRP design, other than the electrical portion.

RESPONSE

24. Mr. Clare's statement, "for the electrical portions of our design, it is in fact feasible, to a certain extent, to apply some statistical meaning to the data. . .," is applicable to the non-electrical portions of the CRBRP design to a more limited extent. The non-electrical tests generally involve fewer test articles and fewer tests because of the nature of the test articles (e.g., complete mechanical components).

INTERROGATORY

25. Answer Interrogatory 16 of Intervenors' Eighteenth Set of Interrogatories to Applicants in reference to WARD-D-0118 and NEDM-14082, as originally requested.

RESPONSE

25. The Applicants do not currently plan to rely on WARD-D-0118 or NEDM-14082 at the LWA-1 stage.

INTERROGATORY

26. Regarding Interrogatory 17 of Intervenors' Eighteenth Set of Interrogatories to Applicants, do Applicants believe that the Board's Order Following Conference with Parties (April 22, 1982) permits Applicants to rely upon "probabilistic analyses of CRBRP accident risks and/or consequences" in <u>any</u> way during the LWA-1 proceeding? If the answer is yes, describe in detail the extent to which such

reliance is permitted.

RESPONSE

26. This interrogatory requests a legal interpretation of the Board's Order, the meaning of which speaks for itself. The Applicants will comply with the provisions of the Board's Order.

INTERROGATORY

27. Will Applicants reply upon "probabilistic analyses of CRBRP accident risks and/or consequences" in any way during the LWA-1 proceeding? If the answer is yes, describe each analysis, portion of analysis, or other factor, including the existence and general characteristics of such analysis, upon which Applicants intend to rely.

RESPONSE

27. Applicants do not intend to rely upon an adequate, comprehensive analysis comparable to the Reactor Safety Study ("Rasmussen Report") that could identify CRBRP accident possibilities of greater frequency or consequence than the accident scenarios analyzed by Applicant and staff in the LWA-1 proceeding.

INTERROGATORY

28. In the NRC Workshop on Safety Goals (July 23, 1981), R. M. Bernero noted the following specific problems with modeling and quantifying human errors:

(1) What individual pre-accident and post-accident human errors do we consider for quantification, and what is the basic data source?

(2) How do we account for important performance shaping

factors which modify the basic human error rates for the particular scenario being evaluated?

(3) How do we model and quantify dependent human errors which are coupled because of operator laxity, confusion, or misinterpretation ("mindset")?

(4) How do we model and quantify human actions which are "nonroutine" including mitigation actions and post-accident errors of commission?

Describe Applicants' precise methodology for dealing with each of the specific problems noted in 1-4 above. Identify and produce any and all documents in the possession of Applicants related to such methodology.

RESPONSE

28. The Applicants have not attempted to model and then quantify human error. Therefore, the problems anticipated in Intervenors' statement have not been applicable.

Contention 4

INTERROGATORY

29. What is the currently projected startup date for reprocessing of CRBR fuel (*see* ER Section 5.7-6)?

RESPONSE

29. It is currently projected that initial operation of the Developmental Reprocessing Plant (DRP) will occur in about 1996 (see DOE/EIS-0085-FS, page 76).

INTERROGATORY

30. Is there a design basis threat for the SAF? For the DRP? For the SSTS? If so, what is it?

RESPONSE

30. See the Preamble to Interrogatories V through XIII of the 8th Set of Interrogatories for a discussion of DOE's approach to design basis threat applicable to SAF and DRP. However, it is DOE policy that "the effectiveness of Nuclear Safeguards and security systems in DOE activities provide comparable effectiveness with that required of licensees by the Nuclear Regulatory Commission" (DOE 5632.2, No. 5). Consequently, it may be inferred that the design threat given in 10CFR73.1, is considered in designing safeguards for the listed facilities and transportation.

INTERROGATORY

31. What does it mean to state that NDA verification will take place "as frequently as may be desired" (see ER Section 5.7-42)? How often is this?

RESPONSE

31. This phrase referred to the feed, product, and scrap containers to be used at the process which converts plutonium now in storage to stoichiometric PuO_2. The feed plutonium would be measured before transfer from the storage area to the conversion process and sealed. It would be measured again after receipt and before being fed into the process. Product PuO_2 will be placed into containers, accurately measured and sealed, before transfer to the SAF line. Recoverable scrap would be placed into containers, measured and sealed before transfer for recovery. NDA verification of such sealed containers would take place if and when there was any reason to question validity of the seals or the tag-value of the contents of a container.

INTERROGATORY

32. Describe those ways in which the level of assurance in the SSTS system is greater than in a commercial transport mode (see ER Section 5.7-46).

RESPONSE

32. DOE's transportation safeguards system complies with more stringent criteria for equipment capabilities, courier standards, and operational procedures. Criteria for the equipment capabilities are contained in approved design drawings and safety analysis reports. Criteria for courier standards are contained in a document titled "The DOE Transportation Safeguards System," Albuquerque Operations Office Manual Chapter 24XA. Criteria for operations are contained in Albuquerque Operations Office Standards Operating Procedures.

INTERROGATORY

33. How sensitive to loss will the DOE accounting system at the DRP be (see ER Section 5.7-56)? Put another way, what is the projected ID for each inventory period (specify also the period) and on an annual basis.

RESPONSE

33. It is assumed that the DRP would be shut down and cleaned out for a physical inventory and material balance at six-month intervals. Since the materials measurement system has not been designed and analyzed, it is not possible to be more specific regarding the "sensitivity to loss" than that presented in the ER at this time.

INTERROGATORY

34. What specific actions have been taken to assure that DOE and NRC

safeguards are "equally credible and comparably effective" (see Applicants' Response to 16th Set of Interrogatories, p.13)?

RESPONSE

34. The responsible offices in NRC and DOE notify each other of any proposed new rulemaking. It is DOE policy, as stated in DOE Order 5632.2, No. 5, that DOE safeguards are equally credible and comparably effective to NRC's. Specifically, to assure the comparability of NRC and DOE, BNL was tasked to identify and evaluate if any significant difference existed between NRC and DOE requirements could be found. No significant differences were identified.

INTERROGATORY

35. What specific factors lead to the conclusion that co-location would not result in a significant impact on safeguards effectiveness (see Applicants' Updated Response to 12th Set of Interrogatories, p.47)?

RESPONSE

35. The specific factors which lead to the conclusion that co-location would result in a significant impact on safeguards effectiveness are presented in Section 5.7.1.5 of the CRBRP Environmental Report (see pages 5.7-48 and 5.7-49 discussing transportation of fresh MOX fuel and pages 5.1-49 and 5.1-50 discussing spent fuel transportation.

INTERROGATORY

36. In light of Intervenors' Updated Responses, dated April 30, 1982, to discovery by NRC Staff (particularly Interrogatories 8 and 9), state whether you agree or disagree with the following statements:

a. The Applicants are prohibited from commenting on such

materials under provisions of the Atomic Energy Act.

b. Plutonium in an easily useable form will be available in substantial quantities at the CRBR and its supporting fuel cycle facilities.

If you disagree with all or part of either statement, state the basis for such disagreement.

RESPONSE

36. a. The Applicants are prohibited from commenting on such materials under provisions of the Atomic Energy Act.

b. Intervenors define "easily usable form" as any form and isotopic form that can be used directly in the fabrication of a nuclear explosive or plutonium dispersal device, or that could be converted into such a form using relatively available chemical processing apparatus. Applicants would agree that most of the plutonium containing materials in the CRBRP fuel cycle meet this definition of "easily usable." An obvious exception would be radioactive spent fuel. Applicants consider this definition of "easily usable" to be misleading, in the sense that chemical extraction of the plutonium from most of the fuel forms in the CRBRP is not "easy" and involves potential risks of radiation exposure or criticality accidents.

The Intervenors define "available" as located on site and capable of being transported off site by a postulated threat of up to 15 well trained and equipped individuals, 1 to 3 of whom might be employees," and "substantial quantities" as in the range 20 to 100 kg of plutonium.

Applicants can neither confirm nor deny statement b. As described in the ER, the CRBRP fuel cycle could involve the fabrication, transportation, irradiaton, and reprocessing of as much as 900 kg of

plutonium per year. The Intervenors contend that "available" implies that their postulated adversary would easily be able to seize and to get away with a significant amount of plutonium from fixed sites or during shipment. Applicants deny that this would be easy.

INTERROGATORY

37. Is the current DOE safeguards system designed to protect SNM against diversion or theft resulting from collusion between insiders? If so, how? How, if at all, does DOE's approach to the collusion threat differ from NRC's.

RESPONSE

37. The current DOE safeguards system does incorporate design features to protect SNM (especially high enriched uranium, plutonium and U-233) against diversion or theft resulting from collusion between insiders. The following measures are typical of design measures employed by DOE and NRC: (1) selection of authorized personnel on the basis of character and reliability (security clearances for DOE), (2) designation of material access areas, material balance areas and item control areas with individual access controls, (3) designation of at least three categories of personnel: (a) operators who handle materials and/or operate process equipment, (b) material control and accounting personnel, who witness and record all external and internal transfers, (c) physical protection personnel (security personnel for DOE), who control access, monitor external transfers, and search personnel and packages entering or leaving material access areas. In addition, custodians are responsible for keeping track of materials in MBA's and ICA's; health physicists monitor transfers and equipment operations; production and QA personnel monitor and account for materials; and in the newer facilities, materials are generally contained in remotely operated vaults or process equipment and are not accessible to any of the authorized personnel.

Contention 6

INTERROGATORY

38. Identify in detail and produce each of the "other environmental impact documents" referred to by applicants on page 5.7-3, line 3 of ER amendment XIV (p. 3 (82-0034) [7,1] #22).

RESPONSE

38. For Plutonium in existing DOE inventories:

(1) ERDA-1537, "Final Environmental Impact Statement, Waste Management Operations, Savannah River Plant," September 1977.

(2) ERDA-1538, "Final Environmental Impact Statement, Waste Management Operations, Hanford Reservation," December 1975.

(3) DOE/EIS-0023, "Final Environmental Impact Statement, Long-Term Management of Defense High-Level Radioactive Wastes, Savannah River Plant," November 1979.

(4) DOE/EIS-0062, "Final Environmental Impact Statement, Double-Shell Tanks for Defense High-Level Radioactive Waste Storage, Savannah River Plant (Supplement to ERDA-1537)," April 1980.

(5) DOE/EIS-0063, "Final Environmental Impact Statement, Double-Shell Tanks for Defense High-Level Radioactive Waste Storage, Hanford Site (Supplement to ERDA-1538)," April 1980.

(6) DOE/EIS-0062, "Final Environmental Impact Statement, Defense Waste Processing Facility, Savannah River Plant," February 1982.

(7) DOE/EIS-0089D, "Draft Environmental Impact Statement, Operation of PUREX and Uranium Oxide Plant Facilities, Hanford site, Richland, Washington, May 1982.

For Plutonium which may come from processing domestic nuclear power reactor spent fuel, the environmental impacts are addressed in the Final Environmental Impact Statements for the supplying reactor(s). As no specific reactor spent fuel has been identified, no specific documents are identified.

INTERROGATORY

39. Answer Interrogatory 4 of Intervenors' Eighteenth Set of Interrogatories to Applicants by identifying each principal environmental impact associated with the operation of the Savannah River Plant (H Canyon and F Canyon) and the Idaho National Engineering Laboratory, and compare it to the projected impact (if any) of the model reprocessing plant discussed in WASH-1535 and the Draft Supplement EIS (DOE/EIS-0085-D).

RESPONSE

39. Specific principal environmental impacts associated with operation of the Savannah River Plant to supply fuel for the CRBRP have not been analyzed. Process descriptions and overall SRP site impacts from routine operations are analyzed in the Final Environmental Impact Statement Waste Management Operations, Savannah River Plant, ERDA-1537. A comparison with WASH-1535 and DOE/EIS-00850 has not been made.

The Idaho National Engineering Laboratory is not being considered for use in supplying fuel for the CRBRP.

INTERROGATORY

40. Answer Interrogatory 5 of Intervenors's Eighteenth Set of Interrogatories to Applicants for the Savannah River Plant (H Canyon and F Canyon) and the Idaho National Engineering Laboratory.

RESPONSE

40. Gaseous and liquid effluent releases from the Savannah River processing canyons for 1976-1980 are contained in "Release of Radioactivity at the Savannah River Plant," DPSPU 82-25-1, C. Ashley, C. C. Zeigler, and P. A. Culp, January 1982. The Idaho National Engineering Laboratory is not being considered for use in supplying fuel for CRBRP.

INTERROGATORY

41. Explain in detail how the disposal of wastes from the CRBR spent fuel, including high level wastes from processing, will be managed, since Applicants claim it is to be classified as commercial rather than defense waste.

RESPONSE

41. The managment of radioactive wastes from processing CRBRP spent fuel is described in ER Section 5.7.1.3.

INTERROGATORY

42. Identify all reasonably identifiable alternative sources of fuel for the CRBRP other than the Hanford PUREX plant.

RESPONSE

42. The plutonium for the first five years of operation of the CRBRP will be provided by DOE from a combination of existing DOE inventories, processed domestic nuclear power reactor spent fuel and, if necessary, foreign sources.

INTERROGATORY

43. Provide the updated answer to Interrogatory II.2(a) of

16th and 18th Sets of Interrogatories, an answer is not required.

INTERROGATORY

45. Identify the likely transportation routes (rail and truck) between the Hanford PUREX facility and the CRBR.

RESPONSE

45. Likely transportaton routes between the Hanford PUREX facility and CRBRP have not been identified at this time.

Contention 7

INTERROGATORY

46. Is it Applicants' position that the reliability goals of the Three Mile Island-2 reactor were met?

RESPONSE

46. The Applicants do not know the Three Mile Island-2 reactor reliability goals and thus cannot judge whether or not they were met.

INTERROGATORY

47. Explain what is meant by "capital LMFBR" in Applicants' response to Interrogatory 1 of Intervenors' Eighteenth Set of Interrogatories to Applicants (section on Economic Feasibility).

RESPONSE

47. This is a typographical error. The correct words are "capital cost of LMFBRs."

INTERROGATORY

48. Have Applicants performed any analyses of the following alternative sites during the LMFBR demonstration plant site selection process:

a. TVA Hartsville site?

b. TVA Yellow Creek site?

c. Washington Public Power Supply System (WPPSS) Unit 4 site?

If the answer is yes, identify and provide all such analyses and all documents in the possession of Applicants relating to such analyses. Describe the conclusions reached by Applicants and explain in detail the basis for all such conclusions. If the answer is no, explain whether Applicants intend to perform such analyses, and, if not, why not.

RESPONSE

48. The Hartsville (Johntown) site was considered in the Applicants' original alternative siting analysis (see Environmental Report Section 9.2 and Appendix A). The Yellow Creek site was not included in the original analysis because of the seismic design uncertainty in the western end of the TVA system at the time of the analysis. Both sites are considered as alternative candidate sites in the Applicants' "Update to the CRBRP Alternative Siting Analysis Within the TVA Power Service Area" (see Appendix G of the Environmental Report--An advanced copy of Appendix G will be made available for inspection and copying.)

Contention 8

INTERROGATORY

49. Explain in detail what is meant by the term "30 effective full

power years (EFPY)," how it differs, if at all, from the "entire design lifetime of 30 years, in Applicants' answer to Interrogatory 1 of Intervenors' Ninth Set of Interrogatories to Applicants, and the reason for the change in terminology.

RESPONSE

49. The use of the term "30 effective full-power years (EFPY)" in the Applicants' Updated Response No. 2 to the 7th, 9th, 10th, and 13th Sets of Interrogatories was a misquote of the actual term used in the analysis. The analysis results provided in the updated response are based on 22.5 effective full-power years (EFPY) which is a product of the 30-year design lifetime of the Clinch River Breeder Reactor plant times the design plant capacity of 75%. Corrections to the Applicants' Updated Response No. 2 should be made as follows:

Page No.	
AB-95	Last sentence of first paragraph of (b) "...that the reactor will operate for 30 effective full power years (EFPY)," should be changed to "...that the reactor will operate for 22.5 effective full-power years ((EFPY)."
AB-96	Last sentence of (d) "Fluence levels are based on 30 effective full-power years (EFPY) of operation," should be changes to "Fluence levels are based on 22.5 effective full-power years (EFPY) of operation."
AB-101	Footnote on Table 4 "*After 30 effective full power years (EFPY) of reactor operation..." should be changes to "*After

22.5 effective full-power years (EFPY) of reactor operation..."

AB-102 Footnote on Table 5

"*After 30 effective full-power years (EFPY) of reactor operation..." should be changed to "*After 22.5 effective full-power years (EFPY) of reactor operation..."

AB-103 Footnote on Table 6

"Fluence is based on 30 effective full-power years (EFPY) of reactor operation," should be changed to "Fluence is based on 22.5 effective full-power years (EFPY) of reactor operation."

AB-104 Footnote on Table 7

"Fluence is based on 30 effective full-power years (EFPY) of reactor operaton," shold be changed to "Fluence is based on 22.5 effective full-power years (EFPY) of reactor operation."

The use of the term "effective full-power years (EFPY)" was adopted because the term accounts for plant capacity and design lifetime in a single term and is consistent with the terminology used in studies on light water reactor decommissioning and neutron activation product inventories as documented in the following reports:

R. I. Smith, G. J. Konzek, W. E. Kennedy, Jr., "Technology, Safety, and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station, Appendices," NUREG/CR-0130, Volume 2, June 1978

H. D. Oak, G. M. Holter, W. E. Kennedy, Jr., G. J. Donzek,

"Technology, Safety, and Costs of Decommissioning a Reference Boiling Water Reactor Power S¬`tion, Appendices," NUREG/CR-0672, Volume 2, June¬¬¬¬LC¬¬{hV¬¬¬¬}9¬}Q¬}¬}I¬}I¬}=¬}¬}¬}(

50. Explain in detail the reason for each and every change in Tables 4, 5, and 6 of Applicants' answer to Interrogatory 1 of Intervenors' Ninth Set of Interrogatories to Applicants, and identify and provide all references used by Applicants in making such changes, other than those listed in the response.

RESPONSE

50. The revisions made in Table 4 (page AB-101) of the Applicants' Updated Response No. 2 to the 6th, 7th, 9th, and 13th Sets of Interrogatories are based on the following changes:

(1) The location at which the activities were evaluated. The updated response is based on the predicted neutron flux at the inner surface of the fixed radial shield or reactor vessel. The neutron flux is the average value over a cylindrical surface area centered at the reactor core midplane and extending on (1.0) foot above and below reactor core midplane.

The first response was based on the average flux values in the fixed radial shield or reactor vessel and did not represent maximum expected activity levels.

(2) The multigroup neutron flux distribution (42 groups) was updated to reflect refinements in the analytical modeling of the reactor core and reactor system components, changes in the reactor design configuraton (e.g., heterogeneous core versus homogeneous core), improvements in the numerical

solution technique (e.g., discrete ordinates transport theory versus diffusion theory). These changes are normal design evoluton changes as the reactor system design matured to the current configuration defined in the PSAR.

(3) The evaluation of activities was updated to a basis of 22.5 effective full-power years consistent with the CRBRP design lifetime of 30 years at 75% plant capacity.

The revisions made in Table 5 (page AB-102) of the Applicants' Updated Response No. 2 to the 6th, 7th, 9th, and 13th Sets of Interrogatories is the change to 22.5 effective full-power years versus 30 years operation at full power. The half-lives of all isotopes listed in Table 5 were reviewed and determined to be short relative to the 22.5 effective full-power years of operation. No changes in activities were made based on this evaluation.

The revisions made in Table 6 (page AA-103) of the Applicants' Updated Response No. 2 to the 6th, 7th, 9th, and 13th Sets of Interrogatories are based on the changes described in the previous response describing the changes to Table 4 (AB-101) with the exception that the previous response was for a 30 year design lifetime at 75% plant capacity which is consistent with the updated response for 22.5 effective full-power years.

Contention 11

INTERROGATORY

51. Identify and provide all documents concerning "conflicting evidence" related to cancer induction in human beings resulting from irradiation at higher dose levels than those permissible under NRC regulations, referred to in Applicants' updated response to Intervenors' Request for Admission #9, dated July 28, 1976 (1-20).

RESPONSE

51. The "conflicting evidence" referred to in this interrogatory is that relating to cancer induction resulting from exposure to radiation in utero. Earlier evidence on this issue is reviewed at some length and extensively documented in the 1972 BEIR Report (pp. 160-167) and in the 1972 UNSCEAR Report (Vol. II, pp. 427-428, 431). This evidence was updated in the 1977 UNSCEAR Report (pp. 412-413) and in the 1980 BEIR Report (pp. 155-157). An extensive critique of this evidence was published by Totter and MacPherson in 1981 (Health Phys., 40, 511-524), which elicited further discussion from Kneale and Stewart (Health Phys., 42, 388-389, 1982) and response from MacPherson and Totter (Health Phys., 42, 389-390, 1982). We presume that the referenced documents and journals are available to the Intervenors.

Contention 14

INTERROGATORY

52. Have Applicants performed any analyses to determine whether CRBR systems will reach levels of neutron activation and contamination which require remote removal techniques? If so, identify and produce all analyses, and describe the results of such analyses.

RESPONSE

52. No.

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
DEPARTMENT OF ENERGY	)	
		DOCKET NO. 50-537
PROJECT MANAGEMENT CORPORATION	)	
TENNESSEE VALLEY AUTHORITY	)	

AFFIDAVIT OF Dr. Paul W. Dickson, Jr.

being duly sworn, deposes and says as follows:

1. That he is employed by Westinghouse Electric Corporation as Technical Director, Clinch River Breeder Reactor Project, Westinghouse Advanced Reactors Division, Post Office Box W, Oak Ridge, Tennessee 37830

2. That he is duly authorized to execute the responses on behalf of the applicants to the NRDC's Interrogatory Set 19, Interrogatories 2,3,7 9-12, 20-22 concerning Contention 1 and Interrogatories 23-28 concerning Contentions 1,2 and 3.

3. That the above-mentioned and attached answers are true and correct to the best of his knowledge and belief.

Paul W. Dickson Jr.
SIGNATURE

SUBSCRIBED and SWORN to before me this 18th day of June, 1982.

Phyllis A. Cruze
Notary Public

My commission expires My commission expires May 10, 1983.

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the matter of ,)

Department of Energy ,)

PROJECT MANAGEMENT CORPORATION and,)

TENNESSEE VALLEY AUTHORITY ,)

DOCKET NO. 50-537

AFFIDAVIT OF F. Charles Gilbert, being duly sworn, deposes and says as follows:

1. That he is employed as Deputy Assistant Secretary for Nuclear Materials, U.S. Department of Energy, and that he is duly authorized to answer interrogatories numbered 39, 40, and 42 in the nineteenth set.

2. That the above-mentioned and attached answers are true and correct to the best of his knowledge and belief.

F. C. Gilbert
Signature

SUBSCRIBED and SWORN to before me this 15 day of June, 1982.

Mary B. Fitch
Notary Public

My Commission expires July 1, 1986

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the matter of	,)	
Department of Energy	,)	
PROJECT MANAGEMENT CORPORATION and	,)	DOCKET NO. 50-537
TENNESSEE VALLEY AUTHORITY	,)	

AFFIDAVIT OF Thomas H. Isaacs, being duly sworn, deposes and says as follows:

1. That he is employed as Deputy Director, Office of Safeguards and Security, U.S. Department of Energy, and that he is duly authorized to answer interrogatories 30, 31, 33, 34, 36b, and 37 in the nineteenth set.
2. That the above-mentioned and attached answers are true and correct to the best of his knowledge and belief.

Thomas H. Isaacs
Signature

SUBSCRIBED and SWORN to before me this 18 day of June, 1982.

Mary B. Ritchie
Notary Public

My Commission expires July 1, 1986

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the matter of ,)		
Department of Energy ,)		DOCKET NO. 50-537
PROJECT MANAGEMENT CORPORATION and,)		
TENNESSEE VALLEY AUTHORITY ,)		

AFFIDAVIT OF Larry A. Forsythe, being duly sworn, deposes and says as follows:

1. That he is employed as Chief, Environment, Safety and Health Branch, Division of Safety, Environment and Emergency Actions, Office of Military Application, U.S. Department of Energy, and that he is duly authorized to answer interrogatories 32 and 36a in the nineteenth set.

2. That the above-mentioned and attached answers are true and correct to the best of his knowledge and belief.

Larry A. Forsythe
Signature

SUBSCRIBED and SWORN to before me this 18 day of June, 1982.

Mary B. Tilche
Notary Public

My Commission expires July 1, 1982

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the matter of ,)		
Department of Energy ,)		DOCKET NO. 50-537
PROJECT MANAGEMENT CORPORATION and,)		
TENNESSEE VALLEY AUTHORITY ,)		

AFFIDAVIT OF John R. Longenecker, being duly sworn, deposes and says as follows:

1. That he is employed as Acting Director, Office of the Clinch River Breeder Reactor Plant Project, Office of Nuclear Energy, U.S. Department of Energy, and that he is duly authorized to answer interrogatories numbered 1, 46, and 47 in the nineteenth set.
2. That the above-mentioned and attached answers are true and correct to the best of his knowledge and belief.

John R. Longenecker
Signature

SUBSCRIBED and SWORN to before me this 18 day of June, 1982.

Mary B. Ritchie
Notary Public

My Commission expires July 1, 1982

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the matter of	)
U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION	)
PROJECT MANAGEMENT CORPORATION and	)
TENNESSEE VALLEY AUTHORITY	)

AFFIDAVIT OF ROY C. THOMPSON, Ph.D.

Roy C. Thompson, Ph.D., being duly sworn, deposes and says as follows:

1. That he is employed as Senior Staff Scientist, Biology Department, Pacific Northwest Laboratory, and that he is duly authorized to answer 6-4-82 Admissions, Contention 11, Nos. 35-37, and 6-4-82 Interrogatories, Contention 11, No. 51.

2. That the above-mentioned and attached answers are true and correct to the best of his knowledge and belief.

Roy C. Thompson

Roy C. Thompson, Ph.D.

SUBSCRIBED and SWORN to before me this 10th day of June, 1982.

Jeffrey H. Ru

Notary Public

My commission expires 4/20/86.

Benton County

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the matter of	)
U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION	)
PROJECT MANAGEMENT CORPORATION and	)
TENNESSEE VALLEY AUTHORITY	)

AFFIDAVIT OF JOHN W. HEALY

John W. Healy, being duly sworn, deposes and says as follows:

1. That he is employed as a Staff Member, Los Alamos National Laboratory, and that he is duly authorized to answer 6-4-82 Admissions, Contention 11, Nos. 35-37, and 6-4-82 Interrogatories, Contention 11, No. 51.

2. That the above-mentioned and attached answers are true and correct to the best of his knowledge and belief.

John W. Healy

John W. Healy

SUBSCRIBED and SWORN to before me this 10th day of June, 1982.

Jeffrey H. Cha

Notary Public

My commission expires 4/20/86.

Benton County

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the matter of	,)	
Department of Energy	,)	
PROJECT MANAGEMENT CORPORATION and,	)	DOCKET NO. 50-537
TENNESSEE VALLEY AUTHORITY	,)	

AFFIDAVIT OF George L. Sherwood, Jr., being duly sworn, deposes and says as follows:

1. That he is employed as a Nuclear Engineer, Office of the Clinch River Breeder Reactor Plant, U.S. Department of Energy, and that he is duly authorized to answer interrogatories numbered 29, 38, and 41 in the nineteenth set.
2. That the above-mentioned and attached answers are true and correct to the best of his knowledge and belief.

George L. Sherwood Jr.
Signature

SUBSCRIBED and SWORN to before me this 14 day of June, 1982.

Patricia G. Colomberg
Notary Public

My Commission expires _____, 19__.

PATRICIA G. COLOMBERG
NOTARY PUBLIC
My Commission Expires [illegible] 1986

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of
U. S. DEPARTMENT OF ENERGY
PROJECT MANAGEMENT CORPORATION
TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-537

AFFIDAVIT OF LAWRENCE J. KRIPPS

Lawrence J. Kripps, being duly sworn, deposes and says as follows:

1. That he is employed as a Safety and Environmental Engineer, of Energy Incorporated, and that he is duly authorized to answer interrogatories numbered 35 and 48 in the Nineteenth Set.

2. That the above-mentioned and attached answers are true and correct to the best of his knowledge and belief.

Signature

SUBSCRIBED and SWORN to before me this 17th day of June, 1982.

Notary Public

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
UNITED STATES DEPARTMENT OF ENERGY	)	DOCKET NO. 50-537
	)	
PROJECT MANAGEMENT CORPORATION	)	
	)	
TENNESSEE VALLEY AUTHORITY	)	

AFFIDAVIT OF JAMES F. MURDOCK

James F. Murdock, being duly sworn, deposes and says as follows:

1. That he is employed by U. S. Department of Energy as Senior Reactor Engineer, CRBRP/PO.

2. That he is duly authorized to answer the Interrogatories numbered 49, 50 and 52 dealing with Contention 8 in NRDC's Nineteenth Set of Interrogatories dated June 4, 1982.

3. That the above-mentioned and attached answers are true and correct to the best of his knowledge and belief.

James F. Murdock
Signature

SUBSCRIBED and SWORN to before me
this 18th day of June 1982

Ora R. Minor
Notary Public
My Commission Expires April 28, 1984

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the matter of

UNITED STATES DEPARTMENT OF ENERGY)

PROJECT MANAGEMENT CORPORATION)

TENNESSEE VALLEY AUTHORITY)

DOCKET NO. 50-537

AFFIDAVIT OF DENNIS M. SWITICK

Dennis M. Switick, being duly sworn, deposes and says as follows:

1. That he is imployed by the General Electric Company as Manager, Safety Analysis, Advanced Reactor Systems Department, 310 De Guigne Drive, Sunnyvale, California 94086.

2. That he is duly authorized to answer the interrogatories numbered 8, and 14 through 18 of NRDC's Nineteenth Set of Interrogatories.

3. That the above-mentioned and attached answers are true and correct to the best of his knowledge and belief.

Dennis M. Switick
(Signature)

Subscribed and sworn to before me this 17th day of June, 1982.

CHAE-SOP CHU
NOTARY PUBLIC-CALIFORNIA
SANTA CLARA COUNTY
My Commission Expires July 22, 1983

Notary Public

My Commission expires July 22, 1983.

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the matter of	)	
UNITED STATES DEPARTMENT OF ENERGY	)	DOCKET NO. 50-537
PROJECT MANAGEMENT CORPORATION	)	
TENNESSEE VALLEY AUTHORITY	)	

AFFIDAVIT OF LEE E. STRAWBRIDGE

Lee E. Strawbridge, being duly sworn, deposes and says as follows:

1. That he is employed by the Westinghouse Advanced Reactors Division as Manager, Nuclear Safety and Licensing, P. O. Box 158, Madison, Pennsylvania 15663.

2. That he is duly authorized to answer the Interrogatories numbered 4, 5, 6 and 13 of NRDC's Nineteenth Set of Interrogatories.

3. That the above-mentioned and attached answers are true and correct to the best of his knowledge and belief.

Lee E Strawbridge
(Signature)

Subscribed and sworn to before me this 15th day of June 1982.

Lorraine Dudurich
Notary Public

My Commission expires 5/28/84.

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the matter of	)	
UNITED STATES DEPARTMENT OF ENERGY	)	DOCKET NO. 50-537
PROJECT MANAGEMENT CORPORATION	)	
TENNESSEE VALLEY AUTHORITY	)	

AFFIDAVIT OF L. WALTER DEITRICH

L. Walter Deitrich, being duly sworn, deposes and says as follows:

1. That he is employed by the Reactor Analysis and Safety Division of Argonne National Laboratory, 9700 So. Cass Avenue, Argonne, Illinois 60439, as Associate Division Director.

2. That he is duly authorized to answer the Interrogatory numbered 19 of NRDC's Nineteenth Set of Interrogatories.

3. That the above-mentioned and attached answers are true and correct to the best of his knowledge and belief.

(Signature)

Subscribed and sworn to before me this 18th day of June, 1982.

Notary Public

My Commission expires 9/25/84.

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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

CERTIFICATE OF SERVICE

Service has been effected on this date by personal delivery or first-class mail to the following:

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for George L. Edgar
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DATED: June 18, 1982

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