

RELATED CORRESPONDENCE

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:
Marshall E. Miller, Chairman
Gustave A. Linenberger, Jr.
Dr. Cadet H. Hand, Jr.

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

In the Matter of)
)
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UNITED STATES DEPARTMENT OF ENERGY)
PROJECT MANAGEMENT CORPORATION)
TENNESSEE VALLEY AUTHORITY)

Docket No. 50-537

(Clinch River Breeder Reactor Plant))
)
)

RESPONSE OF INTERVENORS TO NRC STAFF
FIRST SET OF CONSTRUCTION PERMIT INTERROGATORIES
AND REQUESTS FOR ADMISSIONS TO NATURAL RESOURCES DEFENSE
COUNCIL, INC. AND THE SIERRA CLUB
CONCERNING CONTENTIONS 1, 2, AND 3 (HCDAs)
DATED APRIL 8, 1983

Pursuant to 10 CFR §§ 2.742 and 2.740b, and in accordance with the Board's Construction Permit Scheduling Order of March 29, 1983, Intervenor, Natural Resources Defense Council, Inc. and the Sierra Club hereby respond to NRC Staff's First Set of Construction Permit Interrogatories and Requests for Admissions to Natural Resources Defense Council, Inc. and the Sierra Club Concerning Contentions 1, 2, and 3 (HCDAs).

DS03

INTERROGATORIES

Interrogatory

1(a)-1 List the relevant specific SER sections and subsections which NRDC contends inadequately discuss the Staff's conclusion that the probability of ATWS or other CDA initiator occurrence is sufficiently low that CDAs may be excluded from the DBA envelope.

Response

1(a)-1 Intervenors have not completed our review of the SER and therefore cannot answer this question at this time. The Staff safety analysis as documented in the SER is not based on quantitative probability analyses and therefore it is safe to say that the SER as a whole is inadequate in this regard.

Interrogatory

1(a)-2 For each SER section and subsection listed by NRDC in its answer to Interrogatory 1(a)-1, set forth with specificity why NRDC contends that these sections and subsections are inadequate.

Response

1(a)-2 See Answer 1(a) above and Intervenors' testimony at the LWA-1 hearing regarding contentions 1-3.

Interrogatory

1(a)-3 At what probability of occurrence does NRDC contend that CDA initiators are of sufficiently low likelihood that they can be excluded from the plant design basis envelope? Set forth the bases for NRDC's answer.

Response

Intervenors addressed this in our Response to Interrogatory 1-1a of Staff's First Round of Discovery to NRDC (May 6, 1982)

and in our LWA-1 Testimony. Intervenors' position in this regard has not changed.

Interrogatory

1(a)-4 List all ATWS events and CDA initiators which NRDC contends may lead to CDAs.

Response

The kinds of events that can lead to CDAs are amply described in numerous reports on CDAs including, for example, CRBRP-1. See also Intervenors' LWA-1 Testimony.

Interrogatory

1(a)-5 Describe in detail the sequence of events by which ATWS events or CDA initiators may lead to CDAs.

Response

See CRBR-1 and other reports on CDAs and our LWA-1 Testimony. See Response to Interrogatory 2(b) of Applicants' Fourth Set of Interrogatories to Intervenors.

Interrogatory

1(a)-6(a) Define, "reliable data", as that term is used in Contention 1(a). Set forth the bases for NRDC's definition.

(b) Set forth the criteria, data, or other factors that NRDC contends should be utilized in determining whether data is "reliable".

Response

You have asked this Interrogatory previously. Intervenors' answer remains the same. The basis of Intervenors definition is that this is what we mean by the terms.

Interrogatory

1(a)-7 In NRDC's May 6, 1982 response to Interrogatory 1-1.2 of the Staff's First Round of Discovery, filed on April 15, 1982, NRDC stated that it has not reached a final determination regarding the appropriate operational definition of "credible" as used in 10 CFR 100. NRDC also stated that it also had not finally determined the level of confidence required to judge whether events are "credible" or "not credible." Has a final determination now been reached? If so state what it is. If not, state when it will be provided.

Response

Yes. It is given in Intervenor's LWA-1 testimony.

Interrogatory

1(a)-8 In NRDC's May 6, 1982 response to Interrogatory 1-10 of the Staff's First Round of Discovery, filed on April 15, 1982, NRDC stated that "one must be able to demonstrate that the data base when used in the model or programs is a scientifically validated procedure for determining that the predicted results represent an accurate estimate of the true values, that is, accurate to within the stated confidence intervals." Define what NRDC considers an acceptable demonstration of a scientifically validated procedure. Provide the bases for NRDC's answer.

Response

Generally accepted procedures used in the fields of the applied sciences. Intervenor's believe applicable experimental data and the scientific method should be used. See response to Interrogatory 2-14(b) of Staff's First Round of Discovery to NRDC, et al. (May 6, 1982).

Interrogatory

1(a)-9 Define "scientifically validated procedure" as used by NRDC in its response to Interrogatory 2 of "Natural Resources Defense Council, et al. Response to Applicants' Interrogatories Dated November 18, 1975," dated December 9, 1975, in this proceeding.

Response

"Scientifically validated procedure" means accepted procedures used in the fields of the applied sciences. See Response to Interrogatory 2-14(b) of Staff's First Round of Discovery to NRDC et al. (May 6, 1982).

Interrogatory

1(a)-10 Provide a list of what NRDC contends to be "scientifically validated procedures" for determining the reliability of CRBR shut-down systems. Describe the source of these procedures, and the bases for concluding that these procedures are scientifically validated.

Response

Intervenors do not have a list. See response to 1(a)-9 above.

Interrogatory

1(a)-11 Specify the bases for NRDC's answer to Interrogatory 1(a)-9 indicating what acceptance criteria, methodology, data and tests you consider necessary and sufficient to establish that a procedure for determining reliability of CRBR shut-down systems is "scientifically validated."

Response

Intervenors' point is that the applicable experimental data and the scientific method should be utilized as opposed to arbitrary, unfounded and superstitious assumptions as well as nuclear theology and dogma and unsupported "engineering judgments."

CONTENTION 1(b)

Interrogatory

1(b)-1 List all relevant sections and subsections of the SER which NRDC contends inadequately discuss the Applicants' reliability program as a basis for eliminating CDAs from the DBA envelope.

Response

Applicants' reliability program is discussed in Appendix C.

Interrogatory

1(b)-2 Set forth in detail, in NRDC's own words, and without reference or citation to another document, why the Staff's analysis in each SER section and subsection listed in NRDC's answer to Interrogatory 1(b)-1 is inadequate.

Response

Intervenors have not completed our review of the SER and therefore cannot answer this question. Intervenors' general concerns have been set forth in our LWA-1 testimony.

Interrogatory

1(b)-3 List all methodologies which NRDC contends are acceptable for predicting the probability of CDAs. Set forth the bases for NRDC's answer.

Response

Scientific method. It is soundly based on over 300 years of experience.

Interrogatory

1(b)-4 Define, "sufficient failure model (sic) data", as that term is used in Contention 1(b)(1). Set forth the bases for NRDC's definition.

Response

The definition of these words can be found in Webster's Collegiate Dictionary. Intervenors mean input data of such quality that one can demonstrate by propagation of uncertainties that the result meets the applicable criterion taking into account all uncertainties.

Interrogatory

1(b)-5 What failure mode data does NRDC consider necessary to validly employ fault tree and event tree analyses in assessing CRBR reliability? Set forth the bases for NRDC's answer.

Response

Whatever it takes to demonstrate the probability of a CDA is sufficiently low to justify exclusion of the CDA from the containment design basis. Intervenors do not claim this can be done for CRBR given the design and timing constraints.

Interrogatory

1(b)-6 Define, "Applicants' projected data base", as that phrase is used in Contention 1(b). Set forth the bases for NRDC's definition.

Response

The input data used in Applicants' reliability analyses.

Interrogatory

1(b)-7 List and describe with particularity where and why the Applicants' and/or Staff's data base is inadequate.

Response

Intervenors' criticisms of Staff reliability analysis and the reasons why we believe it supports incorporating the CDA

within the containment design basis envelope were presented in our testimony on Appendix J at the LWA-1 hearings. Intervenor also believe that Applicants' comprehensive PRA analysis should have been completed prior to the CP, rather than the OL.

Interrogatory

1(b)-8 List the credible failure modes or human elements that NRDC contends are not, but should be included in the reliability program.

Response

The burden of proof is not on intervenors. The point is that PRA is a useful technique for identifying such failure modes and a comprehensive PRA should have been performed prior to the CP.

Interrogatory

1(b)-9 Specify each aspect of the Applicant's "reliability program" that NRDC contends is inadequate, or which contributes to the inability of the "reliability program," even if implemented, to eliminate CDAs as DBAs.

Response

The primary problems with Applicants' reliability program that we have identified to date are (1) the criteria have been watered down; (2) the timing of the program is such that a comprehensive PRA will not be available in time for the CP decision. Intervenor have not seen the bulk of the quantitative reliability data generated by Applicants and consequently cannot provide a more complete answer.

Interrogatory

1(b)-10 What level of experience, within the meaning of NRDC's response number 2(a) under Contention 2(b) of its January 13, 1977 "Admissions by Natural Resources Defense Council to Applicants' Request (First Set)" does NRDC contend is sufficiently extensive, with respect to the development of reliability data for instrumentation and electronic equipment similar to that used in the CRBR shutdown and shutdown heat removal systems, to permit that data to be a useful predictor of the reliability of the similar CRBR equipment.

Response

The experience would have to be (a) relevant to CRBR, (b) sufficiently extensive such that when the confidence limits (due to statistical and other uncertainties) are propagated through the appropriate model the results allow one to confidently predict that the appropriate criteria are met.

Interrogatory

1(b)-11 Define, "sufficiently low probability", as that term is used in Contention 1(b)-3. Provide the bases for NRDC's definition.

Response

Small enough to demonstrate that the CDA frequency is less than the criterion Intervenor presented in our LWA-1 testimony.

Interrogatory

1(b)-12 Specify the bases for selecting the probability identified in response to Interrogatory 1(b)-11 above, indicating what acceptance criteria, methodologies, data, and tests NRDC relies on in support of these bases.

Response

Intervenor presented the bases in our LWA-1 testimony.

Interrogatory

1(b)-13 Assuming the data base is established as postulated in the subcontention, what does NRDC contend precludes establishing that CDAs have a sufficiently low probability as defined above?

Response

The current CRBR design.

Interrogatory

1(b)-14 Regarding Contention 1(b)(4): Set forth with specificity NRDC's basis for asserting that Applicants must complete the test program used for their reliability program prior to their projected date for completion of construction of the CRBR.

Response

Intervenors' basis is common sense. It would be much less useful if the tests were completed after the construction was completed. In the absence of a comprehensive PRA, Intervenors do not believe one can reliably conclude that a CRBR CDA is not credible, and without an adequate data base, including test results, one is unlikely to have an adequate PRA.

Interrogatory

1(b)-15 Identify the page number and, if appropriate, section of the documents specified in NRDC's "New Information Relevant to Intervenors' Contentions", attached to the March 12, 1982 letter to Staff and Applicants' counsel from NRDC counsel, at pages 2 and 3, relating to former Contention 2, now Contention 1, upon which you intend to rely in supporting a position regarding Contention 1 in this proceeding. Specify to which subpart of Contention 1 each reference relates, and indicate how you contend that the reference supports that subcontention.

Response

Intervenors are unable to locate the March 12, 1982 letter.

Interrogatory

1(b)-16 Define "established", as that term is used in Contention 1(b)-(4). Set forth with particularity what Applicants and/or Staff must show to "establish" that the Applicants' test program will be completed prior to the CRBR projected construction completion date.

Response

"Establish" means "to show or settle" or, in this case, "demonstrate." The test results must verify the performance of the equipment being tested.

CONVENTION 2 GENERAL INTERROGATORY

Does NRDC contend that Staff must analyze all CDA scenarios and their consequences for purposes of licensing the CRBR and demonstrating that the radiological source term for the CRBR would result in potential hazards not exceeded by those from any accident considered credible? If the answer is yes, specify the bases, including supporting data upon which NRDC relies, for so concluding. If the answer is no, indicate what NRDC contends the criteria should be for determining what CDAs and their consequences should be analyzed; specify the bases for selecting the criteria.

Response

No. The criterion and its basis was presented in our LWA-1 testimony.

CONTENTION 2(f)

Response

Contention 2(f) is hereby withdrawn and consequently no responses to contention 2(f) Interrogatories are given.

CONTENTION 2(g)

Response

Contention 2(g) is hereby withdrawn and consequently no responses to contention 2(g) Interrogatories are given.

CONTENTION 2(h)

Response

Contention 2(h) is hereby withdrawn and consequently no responses to contention 2(h) Interrogatories are given.

CONTENTION 3(a)

Interrogatory

3(a)-1 Identify the analytic methodology which NRDC believes was utilized in the Rasmussen Report, WASH-1400.

Response

Probabilistic Risk Assessment.

Interrogatory

3(a)-2 Describe the analytic methodology which NRDC believes was utilized in WASH-1400, in NRDC's own words. Do not answer this question by reference or citation to another document.

Response

In PRA, accident sequences (event trees) are characterized with the objective of identifying the most significant accident sequences. Probabilities are assigned to elements in the event trees (i.e. system failure rates) and these are summed by appropriate algebraic techniques, and fault tree analyses. The consequences of various accident sequences are analyzed and grouped into specific release categories. The probabilities and

consequences are then combined to provide an overall risk assessment. See WASH-1400 Main Report, pp. 41-52.

Interrogatory

3(a)-3 Define "CRBR accident possibilities," as that term is used in Contention 3(a). Set forth the bases for NRDC's definition.

Response

Abnormal Clinch River Breeder Reactor event sequences that result in the potential for harm. (See also Response to 3(b)-1 below.)

Interrogatory

3(a)-4 List all CRBR accident possibilities which NRDC contends have greater frequency and/or consequence than the accident scenarios analyzed by Applicants and the Staff. Provide the specific frequencies (or range of frequencies), and the specific consequences (or range of consequences) for each accident possibility listed. Provide the basis for each accident possibility, by listing all documents which support the answer to this interrogatory.

Response

Intervenors have no such list. Contention 3 contends that one of the purposes of PRA is to identify such events.

Interrogatory

3(a)-5 To the extent not included in your answer to Interrogatory 3(a)-4 above, list all specific accident possibilities not analyzed by Applicants and/or the Staff which have greater frequency or consequences than those analyzed by the Applicants and the Staff, which NRDC contends must be analyzed as part of the CRBR review.

Response

See response to 3(a)-4 above.

Interrogatory

3(a)-6 Set forth the acceptance criteria, empirical data, tests, research, or other factors which NRDC contends must be utilized by the Staff to determine which CRBR accident possibilities must be analyzed by the Staff.

Response

Intervenors have not developed such criteria, etc. It is not intervenors responsibility to do so.

Interrogatory

3(a)-7 List the specific reference documents which provide the basis for NRDC's contention that the criteria, empirical data, tests, etc. identified in the answer to Interrogatory 3(a)-6 must be utilized to determine the CRBR accident possibilities.

Response

See response to 3(a)-6 above.

Interrogatory

3(a)-8 Define, "sufficient attention", as that term is used by Contention 3(a). Set forth the bases for NRDC 's definition.

Response

Intervenors' basic point is that without conducting a comprehensive PRA, one cannot have confidence that CDAs are outside the DBA envelope.

CONTENTION 3(b)

Interrogatory

3(b)-1 Define, "accident initiators," "sequences," "events," and "spectrum," as those terms are used in Contention 3(b). Set forth the bases for NRDC 's definitions.

Response

"Accident initiators" are the beginning or commencement of a potentially damaging event of a type that one would prefer to avoid; "sequences" implies the consequences following the initiation of an event; "events" are occurrences. The basis for these definitions are common English language usage as set forth in English dictionaries such as Webster's New Collegiate Dictionary.

Interrogatory

3(b)-2 Define, "credible," as that term is used in Contention 3(b). Set forth the bases for NRDC 's definition.

Response

As defined in our LWA-1 testimony.

Interrogatory

3(b)-3 Set forth the analytical methodology criteria, empirical data, tests, research, or other factors which NRDC contends should be utilized by the Staff to determine if accident initiators, sequences and events are credible. Set forth the bases why these criteria, data, or other factors should be utilized by the Staff.

Response

Accepted scientific procedures, principally the scientific method, should be used. It is not Intervenor's responsibility to establish the criteria and empirical data, tests and research program to demonstrate that CDAs in CRBR are not credible events.

Interrogatory

3(b)-4 Define, "sufficiently comprehensive", as that term is used in Contention 3(b). Set forth the bases for NRDC 's definition.

Response

"Sufficiently comprehensive" means "adequately inclusive." The basis for this definition is the same as that given in 3(b)-1 above.

Interrogatory

3(b)-5 Describe what would, in NRDC's judgment, constitute a sufficiently comprehensive analysis of DBAs to ensure enveloping the DBA spectrum for CRBR.

Response

Intervenors did not say a sufficiently comprehensive analysis of DBAs, rather a sufficiently comprehensive analysis of accident initiators, etc.

Interrogatory

3(b)-6 Set forth the specific probability limit that NRDC contends characterize accident initiators, sequences, and events as "credible".

Response

Intervenors set no specific probability limits on the initiators, but on the probability of a CDA from all potential initiators. The criterion Intervenors use was set forth in our LWA-1 testimony.

Interrogatory

3(b)-7 List all CRBR accident initiators and sequences which NRDC contends are not included in the Staff's analysis of accident

initiators and sequences in the SER.

Response

Intervenors haven't completed their analysis of the SER. Furthermore, we contend that due to the potential common mode system failures, a comprehensive PRA and common cause failure mode and effects analyses would be necessary in order to demonstrate, if that were possible, that CDAs are not credible.

Interrogatory

3(b)-8 For each accident initiator and sequence listed in NRDC's answer to Interrogatory 3(b)-7, set forth all CRBR systems and subsystems which NRDC believes are involved in those initiators and sequences.

Response

See response to 3(b)-7.

Interrogatory

3(b)-9 For each accident initiator and sequences listed in NRDC's answer to Interrogatory 3(b)-7, set forth NRDC's understanding of the precise mechanisms and/or sequence of events which will lead to an accident.

Response

See response to 3(b)-7.

Interrogatory

3(b)-10 List each relevant section and subsection of the 1983 SER for CRBR which NRDC believes inadequately discusses potential accident initiators, sequences and events.

Response

Intervenors have not completed their analysis of the SER.

Interrogatory

3(b)-11 For each section and subsection of the SER listed in NRDC's answer to Interrogatory 3(b)-10, discuss in detail why the Staff's analysis is inadequate, and set forth specific subject matters and items which NRDC contends should be discussed in each section.

Response

See response to 3(b)-10.

CONTENTION 3c

Interrogatory

3(c)-1 Define "core melt-through", as that term is used in Contention 3(c). Set forth the bases for NRDC 's definition.

Response

"Core melt-through" means "the penetration of core materials through the bottom of the reactor and guard vessel following a CDA."

Interrogatory

3(c)-2 List all accidents "associated with" core melt-through.

Response

For CRBR safety and analysis purposes, Intervenor believe it is prudent to assume that any CDA will result in essentially whole core involvement, a full core meltdown and meltthrough of the reactor and guard vessel.

Interrogatory

3(c)-3 Define, "loss of core geometry", as that term is used in Contention 3(c). Set forth the bases for NRDC 's definition.

Response

"Loss of core geometry" means "irreversible physical movement of fuel and/or fuel cladding."

Interrogatory

3(c)-4 Define, "sodium-concrete interactions", as that term is used in Contention 3(c). Set forth the bases for NRDC's definition.

Response

"Sodium-concrete interactions" means "chemical reactions involving the CRBR coolant and concrete -- principally the floor and lower walls of the reactor cavity."

Interrogatory

3(c)-5 List and describe the mechanisms and/or sequence of events by which sodium-concrete interactions at CRBR may result. Set forth the bases for NRDC's answer.

Response

These are generally described in the SER, Appendix A.

Interrogatory

3(c)-6 List and describe the mechanisms and/or sequence of events by which loss of core geometry may lead to core meltthrough accidents. Set forth the bases for NRDC's answer.

Response

Failure to adequately cool the core, i.e. core heat generation exceeding the heat removal capability of the core, leads to temperatures in the fuel in excess of the melting point. The core melts and falls or drains to the bottom of the reactor vessel under the force of gravity. The conduction of

heat from the molten core to the reactor vessel heats the reactor vessel to a point where it is no longer capable of maintaining its shape under the weight of the core and sodium coolant. See SER Appendix A.

Interrogatory

3(c)-7 List each relevant section and subsection of the SER which NRDC contends inadequately analyzes accidents associated with core meltthrough following loss of core geometry.

Response

Appendix A.

Interrogatory

3(c)-8 For each section and subsection of the SER listed in NRDC's answer to Interrogatory 3(c)-7, discuss in detail why the Staff's analysis is inadequate, and set forth specific subject matters and items which NRDC contends should be discussed in each section and subsection.

Response

Intervenors' analysis of the SER is not complete. Intervenors' primary criticism is with Staff's use of "realistic" rather than "conservative" or bounding assumptions in assessing the consequences, including the time at which venting might be required, and Staff's failure to treat the CDA as a confinement system design basis accident.

Interrogatory

3(c)-9 List each relevant section and subsection of the SER which NRDC contends inadequately analyzes sodium-concrete interactions.

Response

See response to 3(c)-8 above.

Interrogatory

3(c)-10 For each SER section and subsection listed in NRDC's answer to Interrogatory 3(c)-9, discuss in detail why the Staff's analysis is inadequate, and set forth specific subject matters and items which NRDC contends should be discussed in each SER section and subsection.

Response

See response to 3(c)-8 above.

Interrogatory

3(c)-11 List the environmental parameters (i.e., temperature) and characteristic values for each parameter which NRDC believes are associated with sodium-concrete interactions.

Response

Intervenors have not made any independent analyses of these, but will rely on the PSAR, SER and other documents identified by Applicants and Staff.

Interrogatory

3(c)-12 Set forth with particularity the CRBR plant locations which NRDC contends that sodium-concrete interactions could occur. For purposes of this interrogatory, the location of such interactions should be specified by building, elevation, room, and component which, if failed, may lead to sodium-concrete interactions.

Response

Intervenors are primarily concerned with the interactions that would take place in the reactor cavity.

Interrogatory

3(c)-13 In NRDC's May 5, 1982 response to Interrogatory 3-3.c of the Staff's First Round of Discovery, filed on April 15, 1982, NRDC stated that "intervenors have not developed at this time specific acceptance criteria, which intervenors contend must be utilized." Have the criteria now been developed? If so, please provide them along with their bases. If not, please state when they will be provided.

Response

No. If Intervenors do so, these will be incorporated in their testimony at the CP hearings.

Interrogatory

3(c)-14 In NRDC's May 5, 1982 response to Interrogatory 3-3.e of the Staff's First Round of Discovery, filed on April 15, 1982, NRDC stated that the "probability of a CDA progressing to full core involvement and meltthrough is high." Define "high" as used in this response. What is the basis for this statement?

Response

For purposes of CRBR safety analyses, it is prudent to assume it is 100% although obviously this is taken as a conservative bounding assumption. It is Intervenors' understanding that Staff and Applicants are also in agreement in this regard. See SER, Appendix A.

CONTENTION 3(d)

Interrogatory

3(d)-1 List all human errors which NRDC believes will initiate, exacerbate, or interfere with the mitigation of CRBR accidents.

Response

NRDC has no such list. Human errors are known to be a principle cause of nuclear reactor accidents as was indicated in

Intervenors' LWA-1 testimony.

Interrogatory

3(d)-2 For each human error listed by NRDC in its answer to Interrogatory 3(d)-1, list all accidents that will be initiated, exacerbated, or whose mitigation will be interfered with.

Response

See response to 3(d)-1 above.

Interrogatory

3(d)-3 List all relevant sections and subsections of the SER which NRDC contends inadequately identify and analyze human error which may initiate, exacerbate, or interfere with mitigation of CRRR accidents.

Response

Intervenors have not completed their review of the SER.

Interrogatory

3(d)-4 For each section and subsection listed in NRDC's answer to Interrogatory 3(d)-3, discuss in detail why the Staff's analysis is inadequate, and set forth specific subject matters which NRDC contends should be discussed in each SER section and subsection.

Response

See response to 3(d)-3 above.

Interrogatory

3(d)-5 Define "analyze", as that term is used in Contention 3(d). Set forth the bases for NRDC 's definition.

Response

"Analyze" means "to study or determine the nature and relationship of the parts of by analysis." Analysis is the separation of a whole into its component parts; an examination of

a complex, its elements, and their relations. The basis for these definitions is common English language usage as found in Webster's New Collegiate Dictionary.

Interrogatory

3(d)-6 Describe in detail what NRDC believes the Staff must do in order to adequately analyze human errors which may initiate, exacerbate, or interfere with mitigation of CRBR accidents.

Response

A comprehensive PRA and extensive failure mode and effects analyses is a minimum requirement.

Interrogatory

3(d)-7 Does NRDC consider human error at CRBR to be more or less of a potential problem than in LWRs? Set forth the bases for NRDC's answer.

Response

Intervenors do not know, but as an informed estimate, Intervenors would assume it to be roughly comparable.

Interrogatory

3(d)-8 Set forth the criteria NRDC utilizes (or contends should be utilized) in determining whether human error is more or less serious at CRBR when compared to LWRs. Set forth the bases for NRDC's answer.

Response

Intervenors have developed no such criteria.

ADMISSIONS

Admission

1. Intervenors have not estimated the probability of occurrence of any CDA initiator for CRBR.

Response

Intervenors can neither admit nor deny the statement since "CDA initiator" is not defined. Intervenors admit that Intervenors have not performed an independent PRA of CRBR.

Admission

2. Intervenors have not identified any mechanisms for CDA initiation in CRBR not already addressed or enveloped in the CRBR PSAR, and the CRBR SER, NUREG-0968.

Response

Intervenors can neither admit nor deny the statement as Intervenors have not completed their analysis of the SER.

Admission

3. The Staff has identified and evaluated all potential mechanistic CDA initiators for CRBR.

Response

Intervenors can neither admit nor deny the statement. At one level, Intervenors would admit since all CDAs can be classified as due to reduced coolant flow or excessive heat generation. At the other extreme, it is humanly impossible to identify every sequence of events that could lead to a CDA.

Admission

4. The risk from a CDA at CRBR is not significantly different than that at a LWR, as set forth in Appendix A of the CRBR SER.

Response

Intervenors can neither admit nor deny the statement without more precise understanding of "significantly." Intervenors testified at the LWA-1 hearings that consequences of a CDA in an LMFBR were greater than the consequences of LWR CDA (i.e., core meltdown).

Admission

5. Intervenors do not have a working knowledge of the computer codes described in Appendix A of the CRBR SER, which were utilized by the Staff in its CDA analyses for CRBR.

Response

Intervenors can neither admit nor deny the statement without knowing what is implied by "working knowledge."

Admission

6. Failure modes and failure consequences of CRBR systems will be adequately identified by the CRBR reliability program, if that program is implemented in accordance with the criteria set forth in Appendix C of the CRBR SER.

Response

Intervenors deny the statement. The criteria are too vague to reach this conclusion.

Admission

7. Applicants have committed to incorporating the results of the CRBR reliability program into the ongoing design and construction of CRBR.

Response

Intervenors admit the statement without admitting as to the adequacy of the program or the commitment.

Admission

8. The Staff's criteria for the CRBR reliability program (described in Appendix C of the CRBR SER) requires an equipment performance and qualification test program.

Response

Intervenors admit the statement.

Admission

9. The Staff's CDA analyses, as set forth in Appendix A of the CRBR SER, is adequate for the purposes of licensing CRBR construction.

Response

Intervenors object. This calls for a legal conclusion.

Admission

10. Analytical models used in the CDA analyses need not be verified or validated by comparison with experimental data.

Response

Intervenors deny the statement. Analytical models that are not verified or validated should not be relied upon to conduct reactor safety analyses for the purpose of demonstrating that licensing requirements are met.

Admission

11. Intervenors have not identified any DBA initiators for CRBR not already identified, addressed, or enveloped by the Staff in the SER, or by the Applicants in the PSAR.

Response

Intervenors can neither admit nor deny the statement as their analysis of the SER is not complete.

Admission

12. The Staff's analysis of accidents associated with core melt-through, as described in Appendix A of the CRBR SER, is adequate for the purposes of licensing CRBR construction.

Response

Intervenors can neither admit nor deny the statement as their analysis of the SER is not complete.

Admission

13. The Staff considered the impact of human error in its evaluation of CRBR accidents and its review is adequate for the purposes of licensing CRBR construction.

Response

Intervenors object. This calls for a legal conclusion.

Admission

14. The long term rates of penetration of sodium into concrete in all experiments relevant to Thermal Margin Beyond Design Basis ("TMBDB") conditions are bounded by a rate of 0.2 in./hour.

Response

Intervenors can neither admit nor deny the statement since we have no basis of knowing what is meant by "long term" nor do we have access to all experiments.

Admission

15. Under the conditions existing after reactor vessel

penetration, a postulated one inch per hour penetration rate of sodium and core debris into concrete is a reasonable upper bound to the experimental data.

Response

Intervenors deny the statement. See SER Appendix A, Attachment 1.

Admission

16. In the event of an accident in which the core debris and sodium penetrate the bottom of the vessel, the minimum time for the sodium to boil dry in the reactor cavity is expected to be in the range of 70 to 130 hours.

Response

Intervenors admit that this appears to be a reasonable assumption based on our preliminary review.

Admission

17. The reactor cavity and pipeway cell liners can be expected to remain intact under TMBDB conditions for at least 50 and 30 hours respectively.

Response

Intervenors can neither admit nor deny the statement. We have not analyzed this as yet.

Admission

18. It is feasible to develop criteria for venting the containment through the cleanup system such that protection from over-pressure or hydrogen burning within containment will be ensured under TMBDB conditions, and the guidelines of 10 C.F.R. 100 will not be exceeded.

Response

Intervenors deny the statement if the question refers to the present CRBR containment. It is the Intervenors' position that

the CRBR containment design basis should be a CDA. Under these conditions 10 C.F.R. 100 is not met. See our LWA-1 Testimony and Findings.

Admission

19. The feasibility of designing a satisfactory containment vent cleanup system is established by the FFTF experience and the analysis and testing directly related to the CRBR system.

Response

Intervenors deny the statement. FFTF was not licensed and it is 1/3 smaller than CRBR and on a much larger site.

Admission

20. The CACEO code provides useful guidance for determining the pressures and temperatures developed in the containment building on the time-scale of interest in a vessel melt-through accident.

Response

Intervenors admit the statement without admitting the adequacy of the guidance in any particular application.

Admission

21. NRDC has not demonstrated by documented engineering analysis that CDAs should be considered DBAs.

Response

Intervenors deny the statement. We did so in the LWA-1 Hearing. It is noted, however, that the Board found that no party proved or disproved that a CDA is outside the DBA envelope.

Admission

22. NRDC's engineering analyses, in which it demonstrated tha CDAs should be considered DBAs, is not documented.

Response

Intervenors deny the statement. See response to 21 above.

Admission

23. NRDC has not demonstrated by documented engineering analysis that CDAs occurence will result in failure of the containment systems.

Response

Intervenors can neither admit nor deny the statement. We do not understand the admission. Beyond what we presented at the LWA-1 hearings, NRDC's case will be presented at the CF hearings.

Admission

24. NRDC's engineering analyses, in which it demonstrates tha CDAs occurrence will result in failure of the containment system, is not documented.

Response

Intervenors can neither admit nor deny the statement. See response to 23 above.

Admission

25. The Staff's analysis of CDAs is fully documented in the CRBR SER, and the supporting reference document NUREG/CR-3224.

Response

Intervenors can neither admit nor deny the statement. NUREG/CR-3224 has not been made available to us and we have not completed our review of the SER.

Admission

26. The bases for the Staff's conclusions with regard to CDA consequences are fully documented.

Response

Intervenors deny the statement. There are many computer modeling assumptions that are not documented in the SER.

Admission

27. Physically reasonable modeling of CDA sequences and phenomena do not result in consequences that would fail the containment systems.

Response

Intervenors deny the statement. Human error is physically reasonable and human error can lead to containment failure.

Admission

28. NRDC has no documented, physically reasonable models of CDA sequences and phenomena that have been shown to result in consequences that will fail the CRBR containment systems.

Response

Intervenors admit the statement, however our case will be presented in our testimony at the CP hearing.

Admission

29. NRDC has not performed any evaluation of the available reliability data for the important safety systems for CRBR.

Response

Intervenors deny the statement. Intervenors have evaluated CRBRP-1.

Admission

30. NRDC's evaluation of the available reliability data for the important safety systems in the CRBR is not documented.

Response

Intervenors admit the statement. See response to 28 above.

Admission

31. NRDC has not identified and documented any errors in the Staff's evaluation of the reliability data for the important safety systems for CRBR.

Response

Intervenors deny the statement. Intervenors did this in the LWA-1 proceeding.

Admission

32. NRDC has not identified and documented any errors in the Staff's evaluation of the potential for CDAs at CRBR as discussed in the CRBR SER.

Response

Intervenors admit the statement. However, Intervenors' analysis of the SER is incomplete. When this analysis is completed Intervenors' case will be presented as part of their CP hearing testimony.

Admission

33. NRDC has not identified and documented any errors in the Staff's evaluation of the loss-of-flow without scram event presented in the CRBR SER and its supporting document NUREG/CR-3224.

Response

Intervenors admit the statement. However, Intervenors' analysis of the SER is incomplete and we have not been provided NUREG/CR-3224. When this analysis is completed, Intervenors' case will be presented as part of their CP hearing testimony.

Admission

34. NRDC has not identified and documented any errors in the Staff's evaluation of the transient overpower without scram event presented in the CRBR SER and its supporting document NUREG/CR-3224.

Response

Intervenors admit the statement. However, Intervenors' analysis of the SER is incomplete and we have not been provided NUREG/CR-3224. When this analysis is completed, Intervenors' case will be presented as part of their CP hearing testimony.

Admission

35. NRDC has not identified and documented any errors in the Staff's evaluation of the protected loss-of-heat-sink presented in the CRBR SER and its supporting document NUREG/CR-3224.

Response

Intervenors admit the statement. However, Intervenors' analysis of the SER is incomplete and we have not been provided NUREG/CR-3224. When this analysis is completed, Intervenors' case will be presented as part of their CP hearing testimony.

Admission

36. The Staff's evaluation of the potential for CDAs in the CRBR presented in Chapter 15 and Appendix A of the CRBR SER,

supports the conclusion that CDAs should be considered outside the design basis spectrum of accidents.

Response

Intervenors deny the statement. Intervenors believe Chapter 15 provides inadequate support for such a conclusion.

Admission

37. The Staff's evaluation of the consequences of the loss-of-flow without scram event presented in Appendix A of the CRBR SER and the reference document NUREG/CR-3224, support the conclusion that highly energetic consequences from this event are very unlikely.

Response

Intervenors deny the statement. Intervenors believe Chapter 15 provides inadequate support for such a conclusion. We have not been provided NUREG/CR-3224 and cannot comment as to its content.

Admission

38. The Staff's evaluation of the loss-of-flow without scram event presented in Appendix A of the CRBR SER, and the reference document NUREG/CR-3224, support the conclusion that physically reasonable analyses of CDAs do not produce energetics that will yield failure of the reactor vessel closure head.

Response

Intervenors deny the statement. Intervenors believe Chapter 15 provides inadequate support for such a conclusion. We have not been provided NUREG/CR-3224 and cannot comment as to its content.

Admission

39. The Staff's evaluation of the CDA events described in the

CRBR SER, and the reference document NUREG/CR-3224, adequately represent the range of consequences that can be expected from CDAs in the CRBR.

Response

Intervenors deny the statement. The Staff fails to conservatively analyze CDAs and their consequences. We have not been provided NUREG/CR-3224 and cannot comment as to its content.

Admission

40. NRDC has not identified and documented any errors in the Staff's evaluation of the range of consequences that can be expected from CDAs in the CRBR, as presented in the CRBR SER and the reference document NUREG/CR-3224.

Response

Intervenors admit the statement. However, Intervenors' analysis of the SER is incomplete and they have not been provided NUREG/CR-3224. When this analysis is completed, Intervenors' case will be presented as part of their CP hearing testimony.

Admission

41. The CDA evaluation methodology used by the Staff utilizes physical reasoning and engineering judgment to augment its assessments of results from computer code calculations.

Response

Intervenors cannot admit nor deny this statement, but admit this is a reasonable inference.

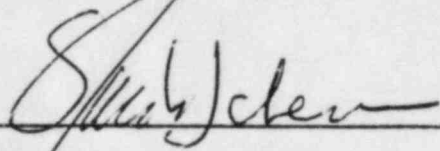
Admission

42. CDA evaluation methodology should not be based on a purely mechanical application of computer codes to predict the consequences of CDAs without resort to engineering judgment.

Response

Intervenors admit the statement.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "Barbara A. Finamore", is written over a horizontal line.

Barbara A. Finamore
S. Jacob Scherr

Natural Resources Defense
Council, Inc.
1725 I Street, NW, #600
Washington, D.C. 20006
(202) 223-8210

Dated: April 22, 1983

April 21, 1983

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:
Marshall E. Miller, Chairman
Gustave A. Linenberger, Jr.
Dr. Cadet H. Hand, Jr.

UNITED STATES DEPARTMENT OF ENERGY
PROJECT MANAGEMENT CORPORATION
TENNESSEE VALLEY AUTHORITY

(Clinch River Breeder Reactor)

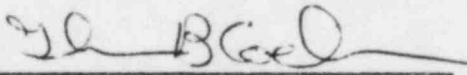
Docket No. 50-537

AFFIDAVIT OF THOMAS B. COCHRAN

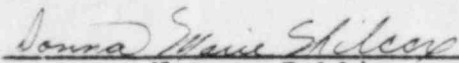
I, Dr. Thomas B. Cochran, being duly sworn, depose and say:

1. I am employed as a Senior Staff Scientist by the Natural Resources Defense Council, Inc., and, as such, I am duly authorized to execute the foregoing answers to interrogatories.

2. The foregoing answers are true and correct to the best of my knowledge and belief.


Dr. Thomas B. Cochran

Subscribed and sworn to before me
this 21st day of April 1983.


Notary Public

My Commission Expires July 31, 1987

DS03

CERTIFICATE OF SERVICE

I hereby certify that copies of RESPONSE OF INTERVENORS, NATURAL RESOURCES DEFENSE COUNCIL, INC. AND THE SIERRA CLUB TO APPLICANTS' NINTH SET OF INTERROGATORIES DATED APRIL 8, 1983; RESPONSE OF INTERVENORS TO NRC STAFF FIRST SET OF CONSTRUCTION PERMIT INTERROGATORIES AND REQUESTS FOR ADMISSIONS TO NATURAL RESOURCES DEFENSE COUNCIL, INC. AND THE SIERRA CLUB, CONCERNING CONTENTION 10, DATED APRIL 8, 1983; RESPONSE OF INTERVENORS TO NRC STAFF FIRST SET OF CONSTRUCTION PERMIT INTERROGATORIES AND REQUESTS FOR ADMISSIONS TO NATURAL RESOURCES DEFENSE COUNCIL, INC. AND THE SIERRA CLUB, CONCERNING CONTENTION 11(A) (ALARA), DATED APRIL 8, 1983; RESPONSE OF INTERVENORS TO NRC STAFF FIRST SET OF CONSTRUCTION PERMIT INTERROGATORIES AND REQUESTS FOR ADMISSIONS TO NATURAL RESOURCES DEFENSE COUNCIL, INC. AND THE SIERRA CLUB CONCERNING CONTENTION 9 (EMERGENCY PREPAREDNESS), DATED APRIL 8, 1983; and RESPONSE OF INTERVENORS TO NRC STAFF FIRST SET OF CONSTRUCTION PERMIT INTERROGATORIES AND REQUESTS FOR ADMISSIONS TO NATURAL RESOURCES DEFENSE COUNCIL, INC. AND THE SIERRA CLUB CONCERNING CONTENTIONS 1, 2, AND 3 (HCDAs) DATED APRIL 8, 1983 were served this 22nd day of April 1983 by hand* or by first class mail upon:

- * Marshall E. Miller, Esq.
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* Indicates hand delivery.

DS03

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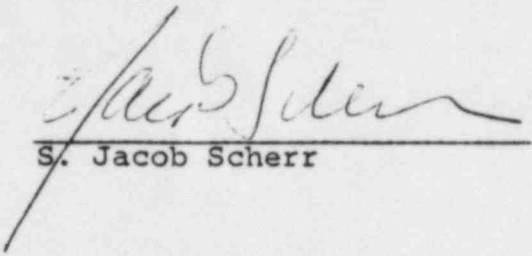
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S. Jacob Scherr