

DOCKETED
USNRC

'83 MAY 20 A11:27

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

Before Administrative Judges:
Gary J. Edles, Chairman
Dr. W. Reed Johnson
Howard A. Wilber

In the Matter of)
)
)

UNITED STATES DEPARTMENT OF ENERGY)
PROJECT MANAGEMENT CORPORATION)
TENNESSEE VALLEY AUTHORITY)

(Clinch River Breeder Reactor Plant))
)
)

Docket No. 50-537 CP

INTERVENORS' BRIEF IN SUPPORT OF THEIR
EXCEPTIONS TO THE ATOMIC SAFETY AND
LICENSING BOARD'S PARTIAL INITIAL DECISION
(LIMITED WORK AUTHORIZATION) OF FEBRUARY 28, 1983

NATURAL RESOURCES DEFENSE
COUNCIL, INC.

Barbara A. Finamore
S. Jacob Scherr

HARMON & WEISS

Ellyn R. Weiss
Dean R. Tousley

Counsel for Intervenor

May 18, 1983

8305240553 830518
PDR ADOCK 05000537
G PDR

DS03

TABLE OF CONTENTS

STATEMENT OF RELEVANT FACTS.....	2
I. Intervenor's Contentions 1, 2, and 3.....	3
Summary.....	4
A. Contentions 1 and 3.....	4
Exceptions.....	4
1. The Board erred in failing to resolve Intervenor's Contention 1(a); that is, whether core disruptive accidents should be considered credible and treated as design basis accidents for the purpose of site suitability analysis under 10 CFR §§ 50.10(e)(2) and Part 100. (Opinion, p. 22).....	4
3. The Board erred in concluding that it did not need to find at this juncture (the LWA-1 proceeding) that the CRBR will be built and operated in a manner that precludes the necessity for considering CDAs within the design basis. (Opinion, p. 22).....	4
81. The Board erred in limiting the scope of Intervenor's Contention 1(a) at the LWA-1 stage. (Order Following Conference With Parties, April 22, 1982, at 2-4).....	9
83. The Board erred in limiting the scope of Intervenor's Contention 3(b)-3(d) at the LWA-1 stage. (Order Following Conference With Parties, April 22, 1982, at 6-7).....	9
90. The Board erred in denying Intervenor's July 29, 1982 "Motion to Reconsider Rulings on Contentions". (Order Following Conference With Parties, August 5, 1982, at 6).....	9
7. The Board erred in failing to rule that Applicants and Staff are unable to justify excluding CDAs as DBAs because a showing of design feasibility is not adequate to demonstrate that design intent will be achieved. (Findings of Fact, ¶ 13).....	11
78. The Board erred in deferring Intervenor's Contention 1(b) for purposes of litigation and discovery until after the LWA-1 evidentiary hearing and partial initial decision. (Order Following Conference With Parties, April 22, 1982, at 5).....	14

99. The Board was in error in excluding evidence on Applicants' Reliability Program (Appendix C of the PSAR). Tr. 1692).....14
9. The Board erred in relying in any way on the evidence that the Applicants have proposed, and the Staff will require, implementation of a reliability program for assurance that the reliability inherent in the CRBR design characteristics will be realized and will not be degraded by potential common cause failures. (Findings of Fact, ¶ 16).....14
10. The Board erred in relying in any way on the evidence that Applicants have undertaken a series of systems interaction studies, such as key systems reviews, as support for the conclusion that human error, system interdependencies and common cause failures will not affect the CRBR systems reliability. (Findings of Fact, ¶ 16).....15
79. The Board erred in deferring Intervenor's Contention 3(a) for purposes of litigation and discovery until after the LWA-1 evidentiary hearing and partial initial decision. (Order Following Conference With Parties, April 22, 1982, at 6).....16
90. The Board erred in denying Intervenor's July 29, 1982 "Motion to Reconsider Rulings on Contentions". (Order Following Conference With Parties, August 5, 1982, at 6).....17
91. The Board erred in denying in large part Intervenor's August 23, 1982 "Motion to Strike Portions of the Testimony and Exhibits of Applicants". (Tr. 1295-1350).....17
92. The Board erred in denying Intervenor's September 9, 1982 "Motion to Strike and Motion to Amend Applicants' Exhibit 1 to Conform With the Licensing Board's April 22, 1982". (Order, September 27, 1982).....17
2. The Board erred in failing to find that CDAs are credible events that should be included within the CRBR design basis.....19
4. The Board erred in concluding that Intervenor's have identified no threshold matters that would prevent CRBR from attaining the objective of preventing DBAs from progressing to CDAs. (Opinion, p. 22).....19

5. The Board erred in disregarding and failing to confront evidence demonstrating that, according to Staff and Applicants' own analysis, a core disruptive accident should be included within the CRBR design basis, since there is greater than one chance in a million (10^{-6}) per reactor year of a CRBR CDA radioactive release with potential consequences greater than the 10 CFR Part 100 dose guidelines.....	19
8. The Board erred in finding that the potential for, and actions to minimize, human error and common cause failures have been considered in the design to assure the likelihood that common cause failures or human error could cause a CDA is made extremely low. (Findings of Fact, ¶ 16).....	22
12. The Board erred in failing to require that loss of coolant accidents caused by a large primary coolant pipe break, which could lead to CDAs, be included within the CRBR design basis	23
B. Contention 2.....	24
Exceptions.....	24
13. The Board erred in concluding that, based upon the available information and review to date, there is reasonable assurance that the proposed site is a suitable location for a reactor of the general size and type proposed in the application from the standpoint of radiological health and safety considerations. (Conclusions of Law, ¶ 4).....	24
14. The Board erred in failing to resolve whether the designated site suitability source term (SSST) results in radiological consequences that envelope the spectrum of credible accidents.....	24
26. The Board erred in failing to resolve whether the CRBR radiological source term chosen by the Staff would result in potential hazards not exceeded by those from any accident considered credible, as required by 10 CFR 100.11(a), fn. 2.....	24
82. The Board erred in limiting the scope of Intervenor's Contention 2(a)-2(d) at the LWA-1 stage. (Order Following Conference With Parties, April 22, 1982, at 5-6).....	24
15. The Board erred in failing to resolve the issue of whether the proposed containment design will reduce off-site doses to levels within the dose guidelines values recommended for site suitability analysis.....	25

16. The Board erred in giving significant weight to the Staff conclusion that feasible design concepts and remedial actions can be implemented to provide satisfactory containment system protective capability, as related to both environmental impacts and the health and safety of the public. (Findings of Fact, ¶ 30).....25
17. The Board erred in failing to determine whether the containment system "feasible design concepts and remedial actions" suggested by the Staff would, if implemented, result in a reactor of the general size and type as that proposed in the CRBR application. (Findings of Fact, ¶ 30).....25
18. The Board erred in disregarding and failing to confront substantial evidence demonstrating that the site suitability source term chosen by the Staff would result in bone doses at the LPZ boundary well in excess of the bone dose guideline value specified by the Staff for the CP (and LWA-1) review.....26
27. The Board erred in failing to find that the Staff and Applicant 3 did not use appropriately conservative assumptions in their site suitability analysis, as required by 10 CFR § 100.2(b), in order to take into account the lack of experience with a reactor of the general size and type as the CRBR, which is novel in design and unproven as a prototype or pilot plant.....26
19. The Board erred in failing to rule that the Staff's site suitability dose calculations for the LPZ are in error for failing to use current dosimetric and metabolic models.....27
20. The Board erred in failing to rule that the Staff's site suitability dose calculations for the LPZ are in error for failing to use conservative plutonium isotopic concentrations.....27
21. The Board erred in failing to rule that the Staff's site suitability dose calculations for the LPZ are in error for failing to consider the dose from the entire passage of the cloud (10 CFR 100.11(a)(2)).....28
22. The Board erred in failing to rule that the Staff's site suitability dose calculations for the LPZ are in error for failing to consider releases via the containment vent/purge system.....29

23. The Board erred in failing to rule that the Staff's site suitability dose calculations for the LPZ are in error for failing to consider the integrated dose commitment beyond 50 years.....30
24. The Board erred in failing to rule that the Staff's site suitability dose calculations for the LPZ are in error for failing to assume a bounding fuel release fraction from the core (SSST).....31
25. The Board erred in failing to find that, at a minimum, the site suitability source term plutonium fraction should be set at a level high enough to bound CDAs, should the CDA be included in the CRBR design basis after a full safety review.....31
28. The Board erred in finding that the DBA dose results are considered to be acceptable because they fall well below the dose guidelines of 10 CFR Part 100. (Opinion, p. 21).....32
29. The Board erred in failing to require that the CRBR dose guideline values be reduced by a factor of ten at the construction permit stage to take into account continuing uncertainty in plutonium dose and health effects models.....33
30. The Board erred in finding that the Morgan hypothesis does not affect the validity of the Staff's recommended dose guideline values. (Findings of Fact, ¶ 24).....33
31. The Board erred in finding that the record presents no evidence of a logical nexus between the "warm particle" hypothesis and the validity of the 10 CFR Part 100 dose guideline values. (Findings of Fact, ¶ 25).....33
32. The Board erred in failing to find that the dose guideline values selected by Staff for use in the site suitability review are inadequate to prevent serious injury to individuals offsite if an unlikely, but still credible, accident should occur, as required by 10 CFR Part 100.....34
35. The Board erred in finding that the 10 CFR Part 100 dose guideline values do not represent design or accident mitigation objectives. (Opinion, fn. 25).....34
37. The Board erred in failing to find that in light of all the deficiencies outlined above, the Staff's ultimate cost/benefit balancing under NEPA is arbitrary and capricious.....35

II. Intervenor's Contention 5(b).....	35
Summary.....	35
Exceptions.....	35
43. The Board erred in failing to find that the Applicants' and Staff's analyses of the effects of CRBR accidents upon the Y-12 plant and other nearby facilities are inadequate, since the analyses fail to analyze adequately the risks of CDA accidents more severe than Staff's CDA Class 1 or Applicants' HCDA Case 2, which involves equal consideration of both probabilities and consequences.....	35
44. The Board erred in failing to find that the Applicants' and Staff's analyses of the effects of CRBR accidents upon the Y-12 plant and other nearby facilities are inadequate, since the analyses do not take into account the use in CRBR of plutonium recovered from LWR high burnup spent fuel, which has higher isotopic concentrations of Pu-238 and Pu-241 and, therefore, more serious dose consequences.....	37
40. The Board erred in failing to find that the Applicants' and Staff's analyses of a site suitability source term (SSST) accident upon the Y-12 plant and other nearby facilities are inadequate because they fail to take into account operation of the containment vent/purge system in the course of such an accident.....	37
41. The Board erred in failing to determine whether short- or long-term evacuation of the Y-12 plant and other nearby facilities would be required in the event of an SSST accident in which the CRBR containment vent/purge system is called into operation.	37
45. The Board erred in failing to rule that Applicants' and Staff's analysis of whether long-term evacuation of nearby facilities would be required in the event of an SSST accident are inadequate, since these analyses rely solely on the EPA's Protective Action Guidelines.....	38
38. The Board erred in failing to find that the Y-12 plant is vital to national security.....	39
39. The Board erred in failing to find that the consequences of long-term evacuation of Y-12 would be unacceptable in terms of national security risk.....	39

III. Intervenor's Contentions 4 and 6(b)(4).....	40
Exceptions.....	40
46. The Board erred in failing to find that the three primary criteria utilized by the Staff in analyzing safeguards risks and consequences at the CRBR and its supporting fuel cycle facilities do not provide "high assurance" that safeguards objectives will be met and the Commission's safeguards regulations satisfied.....	40
47. The Board erred in finding that there is no evidence to support Intervenor's argument that the safeguards requirements of DOE Orders may not be enforced. (Findings of Fact, ¶ 120).....	41
48. The Board erred in giving significant weight to the testimony of Applicants' witnesses that Applicants have committed to meet all DOE safeguards and security Orders. (Opinion, p. 45).....	41
49. The Board erred in failing to find that the Staff's conclusion that risks associated with the CRBR and its fuel cycle are not greater than risks associated with other, similar licensed and non-licensed facilities, is based upon an inadequate NEPA analysis.....	43
50. The Board erred in failing to find that the Staff's analysis of CRBR safeguards risks and consequences is inadequate in that it lacks an independent analysis of Applicants' submissions.	44
51. The Board erred in failing to find that the Staff's analysis of CRBR safeguards risks and consequences is inadequate in that it failed to take account of significant uncertainties with respect to the nature and scope of the safeguards systems, and their effectiveness, at the facilities which will reprocess CRBR fuel.....	44
52. The Board erred in failing to find that, given the lack of independent effectiveness of the material control and accounting and physical security systems, it cannot reasonably be concluded at this time that safeguards objectives, i.e., high assurance of deterrence, detection and apprehension of diversion or theft of formula quantities of special nuclear material, can or will be achieved at CRBR fuel cycle facilities.....	46

84. The Board erred in granting the portion of Applicants' March 29, 1982 Motion for a Protective Order regarding discovery requests related to Intervenor's Contention 4. (Order Following Conference With Parties, April 14, 1982, at 14, paragraph 2).....	47
85. The Board erred in granting Applicants' April 2, 1982 Motion for a Protective Order. (Order Following Conference With Parties, April 14, 1982, at 14-15).....	47
97. The Board erred in granting portions of Applicants' November 12, 1982 "Motion to Strike Portions of the Testimony of Dr. Thomas B. Cochran (Part V)". (Tr. 3767-88; 3887-3992).....	47
98. The Board erred in granting portions of the Staff's motion to strike portions of Intervenor's Exhibit 12. (Tr. 3870-86).....	47
IV. Contentions 6(b)(1) and 6(b)(3).....	49
Summary.....	49
53. The Board erred in finding that the fuel composition used by the Applicants in their fuel cycle analyses is equivalent to LWR fuel with a burn-up on the order of 20,000 megawatt days per metric ton. (Findings of Fact, ¶ 127).....	49
54. The Board erred in concluding that there is an adequate supply of the lower burnup LWR spent fuel proposed for CRBR use. (Opinion, pp. 48-49).....	49
55. The Board erred in disregarding and failing to confront substantial evidence that the plutonium isotopic concentrations assumed by the Staff and Applicants in their SSST and fuel cycle analyses are more reasonably associated with a burnup of 12,000-14,000 megawatt days per metric ton.....	49
56. The Board erred in failing to find that for a reactor of the general size and type as the CRBR, the Staff and Applicants should assume that it will be fueled at some point in its operating lifetime by plutonium recovered from LWR high burnup spent fuel, and should analyze the CRBR environmental impacts and site suitability based upon the use of such fuel.....	49

57. The Board erred in finding that the analysis of the Developmental Reprocessing Plant with an assumed total release of tritium and carbon-14 bounds all potential and alternative reprocessing facilities. (Findings of Fact, ¶ 131).....52
59. The Board erred in failing to find that the Staff failed to perform an in-depth, searching analysis of the potential impacts of reprocessing CRBR spent fuel at plants other than the conceptual Development Reprocessing Plant.....52
63. The Board erred in failing to find that the Staff failed to perform an independent assessment of Applicants' submissions regarding the environmental effects of the CRBR fuel cycle as required by NEPA.....52
58. The Board erred in finding that Intervenor's contend that the containment factor for the CRBR fuel reprocessing facility will likely be a factor of ten greater than that claimed by the Staff and Applicants, based on operational experience at Hanford and Savannah River. (Findings of Fact, ¶ 133).....54
60. The Board erred in failing to find that the Staff's and Applicants' analyses of the environmental impacts from reprocessing CRBR fuel are inadequate in that they fail to analyze liquid effluents at the Savannah River Plant or the Hanford PUREX plant.....54
61. The Board erred in failing to find that the Staff's and Applicants' analyses of the environmental impacts from reprocessing CRBR fuel are inadequate in that they fail to analyze transuranic releases at the Savannah River Plant or the Hanford PUREX plant.....54
62. The Board erred in failing to find that the Staff's and Applicants' analyses of the environmental impacts from reprocessing CRBR fuel are inadequate in that they fail to analyze accidental or bypass leakage at the Savannah River Plant or the Hanford PUREX plant.....55
64. The Board erred in failing to find that the Staff's and Applicants' analyses of the environmental effects of the CRBR fuel cycle are inadequate in that they fail to disclose and consider significant uncertainties regarding potential radiological releases from CRBR waste management activities.....55
95. The Board erred in granting Applicants' November 12, 1982 "Motion to Strike Portions of the Testimony of Dr. Thomas B. Cochran (Part III)". (Intervenor's Exhibit 13) (Tr. 4478-4517; 4572-82; 4603-10).....55

V. Contentions 5(a) and 7(c).....57

Exceptions

65. The Board erred in finding that none of the ten alternative sites is environmentally preferable to or substantially better than the CRBR site. (Findings of Fact, ¶ 146).....57
66. The Board erred in finding that the evidence of record does not indicate that substantial accident risk reductions would accrue with a change of site. (Opinion, p. 56).....57
67. The Board erred in relying upon the Staff's analysis of CRBR accident risks in FSFES Appendix J for its ruling that "the reduction in doses that are calculated at the alternative sites does not lead to the conclusion that the alternative sites are either substantially better or obviously superior." (Opinion, p. 54).....58
68. The Board erred in relying upon the Staff's conclusion that, because the CRBR 0 to 30 mile population density projected at the time of plant startup is below the 500 person per square mile "trip" level of Regulatory Guide 4.7, the numerical differences in population between the Clinch River site and each of the alternative sites are not significant. (Findings of Fact, ¶ 174).....60
69. The Board erred in failing to find that each of the alternative sites within the TVA region would meet the CRBR programmatic objective of utility participation.....61
70. The Board erred in finding that since no offsetting benefits were present at alternative sites, delays in moving to alternative sites would not be consistent with DOE's timing objective under the LMFBR program.....62

VI. Contentions 7(a) and 7(b).....62

Exceptions.....62

71. The Board erred in failing to find that the alternative steam generator tenting program suggested by the GAO would be a substantially better design approach since there is significant uncertainty concerning the ability of the steam generator to withstand sharp temperature transients.....62

72. The Board erred in failing to find that the Staff's analysis of the CRBR programmatic objective of economic feasibility is inadequate in that it failed to include an examination of the actual and projected costs of the CRBRF	64
73. The Board erred in finding that the CRBRP is reasonably likely to meet the objective of demonstrating economic feasibility. (Findings of Fact, ¶ 207).....	64
VII. Other Contentions.....	65
Exceptions.....	65
76. The Board erred in refusing to admit for litigation Intervenor's Contention 17. (Order Following Conference With Parties, April 14, 1982, at 7-8).....	64
95. The Board erred in granting Applicants' November 12, 1982 "Motion to Strike Portions of the Testimony of Dr. Thomas B. Cochran (Part III)". (Intervenor's Exhibit 13) (Tr. 4478-4517; 4572-82; 4603-10).....	65
77. The Board erred in refusing to admit for litigation Intervenor's Contention 22. (Order Following Conference With Parties, April 14, 1982, at 9-10).....	66
VIII. Other Procedural Errors.....	66
Exceptions.....	66
88. The Board erred in denying Intervenor's motion to qualify Dr. Thomas B. Cochran as an expert interrogator. (Tr. 1244-46).....	66
89. The Board erred in denying Intervenor's October 20, 1982 "Motion for Qualification of an Expert Interrogator Under 10 CFR § 2.733". (Order Regarding Procedural Motions, November 1, 1982, at 3-7).....	67
93. The Board erred in striking portions of Intervenor's Exhibit 3. (Tr. 2810-71; 7094-7104).....	68
94. The Board erred in striking portions of Intervenor's Exhibit 4. (Tr. 3051-99; 7094-7104).....	68

Table of Authorities

CASES

<u>Alaska v. Andrus</u> 580 F.2d 465 (1978).....	14
<u>Calvert Cliffs' Coordinating Committee, Inc. v Atomic Energy Commission</u> , 449 F.2d 1109 (D.C. Cir. 1971).....	39, 51
<u>Chelsea Neighborhood Association v. U.S. Postal Service</u> , 516 F.2d 378 (2d Cir. 1975).....	35, 48
<u>Greene County Planning Board v. Federal Power Commission</u> , 455 F.2d 412 (2d Cir.), <u>cert. denied</u> , 409 U.S. 849 (1972).....	44, 53
<u>Izaak Walton League of America v. Marsh</u> , 655 F.2d 346 (D.C. Cir. 1981).....	39
<u>Natural Resources Defense Council v. U.S. Nuclear Regulatory Commission</u> , 685 F.2d 459, <u>cert. granted sub non. Balt. G. & E. Co. v. NRDC</u> 103 S. Ct. 443 (1982).....	14
<u>North Slope Borough v. Andrus</u> , 486 F. Supp. 332 (D.D.C. 1980).....	14
<u>Scientists' Institute for Public Information v. Atomic Energy Commission</u> , 481 F.2d 1079 (D.C. Cir. 1973).....	14
<u>Sierra Club v. Alexander</u> , 484 F. Supp. 455 (N.D.N.Y.), <u>aff'd</u> , 633 F.2d 206 (2d Cir. 1980).....	44, 53
<u>Sierra Club v. Froehlke</u> , 349 F. Supp. 1289 (W.D. Tex. 1973).....	48
<u>Sierra Club v. Sigler</u> , 695 F.2d 957 (5th Cir. 1983).....	14, 35, 48, 51
<u>Strycker's Bay Neighborhood Council v. Karlen</u> , 444 U.S. 223 (1980).....	39
<u>Union of Concerned Scientists v. Atomic Energy Commission</u> , 499 F.2d 1069 (D.C. Cir. 1974).....	5, 6

AGENCY DECISIONS

<u>Arkansas Power and Light Company</u> (Arkansas Nuclear One Unit 2) ALAB-94, 6 AEC 25, 32 (1973).....	68, 69
<u>Boston Edison Company</u> (Pilgrim Nuclear Power Station, Unit 2), ALAB-632, 13 NRC 91 (1981).....	48
<u>Boston Edison Company</u> (Pilgrim Unit 2), ALAB-479, 7 NRC 774 (1978).....	59

<u>Department of Water and Power of the City of Los Angeles (Malibu Nuclear Plant Unit No. 1) Docket No. 50-214, 3 AEC 179 (1967)</u>	7
<u>Florida Power and Light Company (St. Lucie Unit No. 2), ALAB-335, 3 NRC 830 (1976)</u>	60
<u>Gulf States Utilities Company (River Bend Station, Units 1 and 2), ALAB-444, 6 NRC 760 (1977)</u>	68
<u>Gulf States Utilities Company (River Bend Station, Units 1 and 2), LBP-75-50, 2 NRC 419 (1975)</u>	14
<u>Offshore Power Systems (Floating Nuclear Power Plants), CLI-79-9, 10 NRC 257 (1979)</u>	12
<u>Power Reactor Development Company, Docket No. F-16, 1 AEC 128, (1959)</u>	7
<u>Public Service Company of New Hampshire (Seabrook Station, Units 1 & 2), CLI-77-8, 5 NRC 503 (1977)</u>	64
<u>Public Service Company of New Hampshire (Seabrook Station, Units 1 & 2,, ALAB-422, 6 NRC 33 (1977)</u>	12, 39, 42
<u>Tennessee Valley Authority (Hartsville Nuclear Plant, Units 1A, 2A, 1B, and 2B), ALAB-463, 7 NRC 341 (1978)</u>	7
<u>Tennessee Valley Authority (Yellow Creek Nuclear Plant, Units 1 and 2), LBP-78-7, 7 NRC 215 (1978)</u>	8
<u>Virginia Electric & Power Company (North Anna Power Station, Units 1, 2, 3, and 4), ALAB-256, 1 NRC 10, (1975)</u>	7
<u>Virginia Electric & Power Company (North Anna Power Station, Units 1 and 2), LBP-74-49, 7 AEC 1183 (1974)</u>	8

STATUTES

<u>Administrative Procedure Act, 5 U.S.C. Section 556(d)</u>	7
<u>Atomic Energy Act, 42 U.S.C. Section 2232(b)</u>	68
<u>National Environmental Policy Act of 1969, 42 U.S.C. § 4321 et seq.</u>	13, 36, 49

REGULATIONS

10 CFP, Part 100.....4, 5, 7, 19, 20, 21, 25, 26, 27, 30, 32, 35

10 C.F.R.

§ 2.732.....	7
§ 2.733.....	3, 67, 68
§ 2.762.....	3
§ 50.10(e).....	17
§ 50.10(e)(2).....	4, 5, 6, 8
§ 50.34a(a).....	66
§ 50.35(a).....	66
§ 50.36(a).....	66
§ 51.20.....	56
§ 51.52(b).....	4
§ 51.52(c).....	4
§ 100.2(b).....	6, 12, 27, 34
§ 100.11(a).....	29
§ 100.11(a)(2).....	21, 28, 29, 31
§ 100.11(a), fn.1.....	5, 24, 31

40 C.F.R § 1502.2214

26 Fed. Reg. 1224 (Feb. 11, 1961).....5, 35

44 Fed. Reg. 61372 (Oct. 25, 1979).....56

45 Fed. Reg. 40101 (June 13, 1980)36

NRC Regulatory Guide 4.7.....60, 61

NRC Regulatory Guide 1.109.....21

STATEMENT OF RELEVANT FACTS

Intervenors, Natural Resources Defense Council, Inc. and the Sierra Club, set forth herein only those facts and items of procedural history necessary for review of the exceptions to the ASLB Partial Initial Decision (Limited Work Authorization) filed by Intervenors on March 18, 1983. Additional procedural history of this proceeding can be found in United States Department of Energy, Project Management Corporation, Tennessee Valley Authority (Clinch River Breeder Reactor Plant), LBP-83-____, 17 NRC __, Partial Initial Decision (Limited Work Authorization) (February 28, 1983) pp. 1-12^{1/}

On January 11, 1982, Applicants filed a motion to reopen the Clinch River Breeder Reactor construction permit and limited work authorization proceedings, which had been suspended on April 25, 1977 by request of the Administration. The Natural Resources Defense Council, Inc. and the Sierra Club, which had been granted leave to intervene in 1975, submitted a Revised Statement of Contentions and Bases on March 5, 1982. Following a prehearing conference, the Board issued an Order Following Conference With Parties on April 14, 1982, admitting Intervenors' Contentions 1 through 11 (as renumbered), but, inter alia, denying Intervenors' Contentions 17 and 22. On April 22, 1982, the Board issued another Order Following Conference With Parties, which, over Intervenors' strong objections, deferred the litigation of Intervenors' Contentions 1(b) and 3(a) to the construction permit proceedings, and severely limited the scope of the remainder of Intervenors' Contentions 1, 2, and 3, which deal primarily with the issues of core disruptive accidents and site suitability. Intervenors appealed this Order to

^{1/} The Partial Initial Decision will hereinafter be cited as Opinion ____, ASLB Findings of Fact ____, or ASLB Conclusions of Law ____.

the Commission in a June 11, 1982 "Petition to the Commission to Exercise Their Inherent Supervisory Authority to Delineate the Scope of the Limited Work Authorization Proceeding for the Clinch River Breeder Reactor," which was denied as interlocutory on November 17, 1982.

In the April 14 Order Following Conference With Parties, the Board also granted the bulk of Applicants' March 29, 1982 and April 2, 1982 Motions for a Protective Order. These actions served to severely restrict Intervenor's discovery on Contention 4, which questions the adequacy of safeguards and security measures at the CRBR and its supporting fuel cycle. On May 27, 1983, the Board granted another Motion by Applicants for a Protective Order, and prohibited discovery relating to certain environmental impacts of obtaining plutonium for CRBR fuel. On July 30, 1982, the Staff issued a 400-page Draft Supplement to the 1977 Final Environmental Statement on construction and operation of the CRBR ("Draft Supplement"). The Draft Supplement contained an entirely new chapter, Appendix J, which set out probabilistic estimates of the probability and consequences of CRBR core disruptive accidents, despite the Staff's previous statements that it would not use such probabilistic estimates at the LWA stage.

On July 29, 1982 Intervenor's filed a "Motion to Reconsider Rulings on Contentions," which was prompted by the expanded scope of the Draft Supplement. The Board denied this motion, retaining its earlier ruling deferring contentions 1(b) and 3(a) and holding that details of the CRBR design are beyond the scope of the LWA proceeding.^{2/}

On August 23, 1982, and again on September 9, 1982, Intervenor's moved to strike portions of Applicants' testimony and exhibits that dealt with the

^{2/} Order Following Conference with Parties, August 5, 1982, at 6.

details of the CRBR design. The Board denied both motions, claiming for the first time that CRBR design details are admissible for an "illustrative" purpose. (Tr. 1295-1350; Order, September 27, 1982). The Board also denied two motions, made by Intervenors on August 23 and October 20, 1982, to qualify Dr. Thomas B. Cochran as an expert interrogator under 10 CFR § 2.733. (Tr. 1244-46; Order Regarding Procedural Motions, November 1, 1982).

During the hearings, the Board granted Applicants' and Staff's motions to strike large portions of Intervenors' prefiled written testimony, specifically Intervenors' Exhibits 3, 4, 12 and 13. (Tr. 2810-71; 3051-99; 3767-88; 3870-86; 3887-3992; 4478-4524; 4572-82; 4591-94; 4603-10; 4924-44; 7094-7104).

On February 28, 1983, the Board issued a Partial Initial Decision, 17 NRC ____ (1983), which authorized the issuance of a Limited Work Authorization-1 to Applicants. On March 18, 1983, Intervenors filed with the Appeal Board in a timely manner a list of 101 substantive and procedural exceptions to the Partial Initial Decision. Pursuant to 10 CFR § 2.762, Intervenors hereby submit a brief in support of these exceptions.^{3/}

I. Intervenors' Contentions 1, 2, and 3^{4/}

Exceptions 1-37, 78-79, 81-83, 90, 99
ASLB Opinion, pp. 16-30
ASLB Findings of Fact, paragraphs 1-40
ASLB Conclusions of Law, paragraphs 4-7
Intervenors' Proposed Findings of Fact, paragraphs 1-132
Intervenors' Proposed Conclusions of Law, paragraphs 1-14

^{3/} It is our hope that the Appeal Board, in fulfillment of its obligation to review the entire record, will give particular attention to Intervenors' detailed and comprehensive proposed findings of fact, which track the evidentiary record and explain our arguments in detail.

^{4/} A list of Intervenors' Contentions is provided in Attachment A.

Summary

In Contentions 1, 2, and 3, Intervenor maintain that neither Applicants nor Staff have provided reasonable assurance that, based upon all the available information and review to date, the proposed site is a suitable location for a reactor of the general size and type as the CRBR, from the standpoint of radiological health and safety under the Atomic Energy Act, 10 CFR Part 100, and other Commission rules and regulations. 10 CFR §50.10(e)(2). The Board erred in explicitly declining to resolve the core disruptive accident issue to the extent necessary for an LWA determination, in disregarding and failing adequately to confront evidence demonstrating that core disruptive accidents are in fact credible and that the site is unsuitable, in misapplying the burden of proof, and in denying Intervenor the opportunity to litigate the crucial issues of systems reliability and probability risk assessments. In fact, it is difficult to tell from the Partial Initial Decision that Intervenor participated at all, let alone as a full, active participant for almost four years.

A. Contentions 1 and 3

Exceptions:

1. The Board erred in failing to resolve Intervenor's Contention 1(a); that is, whether core disruptive accidents should be considered credible and treated as design basis accidents for the purpose of site suitability analysis under 10 CFR 50.10(e)(2) and Part 100. (Opinion, p. 22).

3. The Board erred in concluding that it did not need to find at this juncture (the LWA-1 proceeding) that the CRBR will be built and operated in a manner that precludes the necessity for considering CDAs within the design basis. (Opinion, p. 22).

It is undisputed that the Board must make two crucial sets of findings before it can issue a limited work authorization for the Clinch River Breeder Reactor. First, the Board must make all the environmental findings required by 10 CFR §§51.52(b) and (c) to be made prior to issuance of a construction

permit for the facility, including a detailed cost/benefit analysis. Second, the Board must determine that, "based upon all the available information and review to date" there is reasonable assurance that the proposed site is a suitable location for a reactor of the general size and type proposed from the standpoint of radiological health and safety considerations under the Atomic Energy Act, 10 CFR Part 100, and other Commission requirements. 10 CFR § 50.10(e)(2) (emphasis added).

The second issue--that of site suitability--has been described as "the most critical decision" facing the Commission. Union of Concerned Scientists v. Atomic Energy Commission, 499 F.2d 1069, 1090 (D.C. Cir. 1974). Under 10 CFR Part 100, the Applicants must, among other things, determine the radiological impact upon nearby residents of an assumed fission product release ("source term") from the CRBR core, based upon a major accident with consequences greater than those from any accident considered credible. 10 CFR § 100.11(a), n.1. The purpose of this site suitability source term ("SSST") analysis, as explained by the original Notice of Proposed Guides for 10 CFR Part 100, is to "avoid serious injury to individuals offsite if an unlikely, but still credible, accident should occur." 26 Fed. Reg. 1224 (Feb. 11, 1961).

In the case of the CRBR, unlike light water reactors ("LWR"s), the Commission has no standardized source term to plug into the analysis, since it has had no previous experience licensing LMFBRs under 10 CFR Part 100. Instead, each of the parties proposed a CRBR source term which it claimed bounds the consequences from any credible CRBR accident. The Board has two ways of determining which source term is appropriate.

First, the appropriate source term can be established on the basis of a full safety review determining which CRBR accidents are in fact credible. If

such a review, or any part of such a review, is available, this approach should be used, since 10 CFR § 50.10(e)(2) requires use of all available information and review to date in analyzing site suitability. If the safety review is not complete, or if the Board is unable to determine the credible accident issue with reasonable assurance, as is the case here, there must be a finding that the assumed source term is sufficiently conservative to bound the potential credible accidents still under review. In all cases Intervenor found where a site suitability issue remained unresolved at the LWA stage, Licensing Boards were careful to use the most conservative assumptions to ensure site suitability, no matter how the issue was ultimately resolved. See Union of Concerned Scientists, supra, 499 F.2d at 1099 ("The AEC has chosen to employ a most conservative (drastic) assumption in determining site suitability...."). Even more conservatism than usual is required in the case of a first-of-a-kind reactor such as the CRBR. 10 CFR § 100.2(b).

In the instant case, the Board has not yet resolved the question of whether core disruptive accidents ("CDAs") should in fact be considered credible, and thus included within the design basis of the CRBR.^{5/} After receiving several hundred pages of evidence on this issue, the Board stated that it "is not persuaded by evidence of record to date...that the CRBR will be built and operated in a manner that precludes the necessity for considering CDAs within the design basis." (Opinion, p. 22). The Board instead foresaw a heavy burden upon all parties at the construction permit hearings to provide sufficient evidence to resolve this question. (Id.). Without a resolution of this issue or a full safety review, however, the Board can have reasonable assurance that the source term is adequate only if it is set at a sufficiently

^{5/} Staff uses the terms "credible," and "design basis" interchangeably. (Tr. 2172; 2453).

conservative level. Yet the source term is clearly not bounding of CDA releases. (Tr. 3063-68). In fact, the Staff has candidly admitted that a finding by the Board that CDAs are credible would require a complete reworking of the site suitability source term analysis. (Tr. 2274). Without an SSST analysis, the site could hardly be found suitable under 10 CFR Part 100.

The Board has thus utterly failed to resolve the most crucial issue presented to it in this proceeding. Its claim that it does not need to resolve the CDA issue "at this juncture" is clearly in error. The Board has to have some basis for assurance that the site is suitable. In this case, the Board found that the evidence is insufficient for it to resolve this crucial issue. This absence of evidence requires a finding against site suitability, since the Applicants have the burden of proof. 5 U.S.C. § 556(d); 10 CFR § 2.732. See, e.g., Department of Water and Power of the City of Los Angeles (Malibu Nuclear Plant Unit No. 1), Docket No. 50-214, 3 AEC 179, 182-185 (1967); Tennessee Valley Authority (Hartsville Nuclear Plant, Units 1A, 2A, 1B and 2B), ALAB-463, 7 NRC 341, 356, 360 (1978). Moreover, the magnitude of the burden of proof depends upon the gravity of the matters in controversy Virginia Electric & Power Company (North Anna Power Station, Units 1, 2, 3, and 4) ALAB-256, 1 NRC 10, 17 n. 18 (1975), which, in this instance, makes it a very heavy burden of proof indeed. Applicants have simply failed to meet this burden.

The Board cannot duck the issue by claiming it will be resolved in the construction permit proceedings. The LWA-1 regulations require "reasonable assurance" that the site is suitable, a concept which "must be sensibly, though severely, applied." Power Reactor Development Company, Docket No. F-16, 1 AEC 128, 146 (1959). At least one Licensing Board has equated "reasonable assurance" with "a clear preponderance of the evidence"

standard. Virginia Electric and Power Company (North Anna Power Station, Units 1 and 2), LBP-74-49, 7 AEC 1183, 1190 (1974). That standard has simply not been met here, regardless of what transpires at the construction permit hearing.

Furthermore, while site suitability findings at the LWA stage are generally based on a reactor of the general size and type proposed, rather than on the proposed reactor, that distinction is meaningless in the case of CRBR because no reactor of the general size and type proposed has ever been licensed under 10 CFR Part 100. The Board has no experience whatsoever which provides reasonable assurance that its partial initial decision on site suitability will stand up after more thorough safety review. It cannot rely on standardized assumptions derived from LWR experience.

Finally, the Board's deliberate refusal to decide the source term issue runs counter to years of LWR licensing precedent, in which LWA findings are "based upon all the available information and review to date," as required by 10 CFR § 50.10(e)(2). Virtually every Licensing Board has endeavored to conduct the site suitability analysis at the LWA stage to the fullest extent possible in order to provide certainty to applicants, complete its environmental findings (with which many site issues are intertwined) and expedite the entire hearing process. See, e.g., Tennessee Valley Authority (Yellow Creek Nuclear Plant, Units 1 and 2), LBP-78-7, 7 NRC 215 (1978). In this case, by failing to resolve the issue of whether the source term is sufficient, the Board does not provide a sufficient basis for its finding of LWA site suitability, and its findings are not based upon all the available information and review to date. The site suitability finding must, therefore, be reversed.

Exceptions:

81. The Board erred in limiting the scope of Intervenor's Contention 1(a) at the LWA-1 stage. (Order Following Conference With Parties, April 22, 1982, at 2-4).

83. The Board erred in limiting the scope of Intervenor's Contention 3(b)-3(d) at the LWA-1 stage. (Order Following Conference With Parties, April 22, 1982, at 6-7).

90. The Board erred in denying Intervenor's July 29, 1982 "Motion to Reconsider Rulings on Contentions". (Order Following Conference With Parties, August 5, 1982, at 6).

In its April 22, 1982 Order, the Board severely limited the scope of consideration of Intervenor's Contentions 1(a) and 3(b)-3(d) at the LWA-1 stage. Contention 1(a) argues that neither Applicants nor Staff have produced sufficient reliable data to support exclusion of CDAs from the design basis. Contentions 3(b)-3(d) concern the Staff's and Applicants' inadequate analysis of CRBR potential accident initiators and sequences, including core melt, sodium-concrete interactions, and human error contributions. The Board, accepting in toto the arguments of Applicants, limited the scope of those contentions to a consideration of "whether it is feasible to design CRBR to make HCDAs sufficiently improbable that they can be excluded from the envelope of design basis accidents for a reactor of the general size and type proposed." April 22, 1982 Order at 2-3. The Board limited LWA-1 discovery to the following areas of concern:

1. The major classes of accident initiators potentially leading to HCDAs;
2. The relevant criteria to be imposed for the CRBRP;
3. The state of technology as it relates to applicable design characteristics or criteria; and
4. The general characteristics of the CRBRP design (e.g., redundant, diverse shutdown systems).

Id. The Board's Order does not explain why these four particular areas should delimit the scope of consideration of these issues at the LWA-1 stage. These four factors were simply taken verbatim from the Applicants, who also failed to explain their genesis. Applicants' Statement of Position in Regard to NRDC Contentions 1, 2, and 3, April 15, 1982, pp. 13-14.

These factors have only superficial relevance to the necessary determinations for an LWA. Consideration of "the major classes of accident initiators potentially leading to HCDAs" while necessary to determine CDA credibility, is far from sufficient. Whether CDAs are credible also depends on the frequency of occurrence of those accident initiators.

A list of "the relevant criteria to be imposed for the CRBRP," is relevant, but the ultimate question is whether CRBR is reasonably likely to satisfy whatever criteria are eventually adopted. Of course, if the criteria are "backfitted" to the plant, as appears likely,^{6/} then the satisfaction of them will not be a meaningful test.

Similarly, "the state of technology as it relates to applicable design characteristics or criteria," is not the real issue here, but rather whether a redundant, diverse shutdown system, together with other safety features, affords sufficient reliability that CDAs are not credible. Finally,

^{6/} The ACFS had not even completely reviewed the proposed CRBRP Principal Design Criteria at the conclusion of its construction permit review. Letter to Nunzio J. Palladino from Jesse C. Ebersole, Acting Chairman, ACFS CRBR Committee, April 19, 1983, at 4. As Commissioner Gilinsky recently noted:

[T]he NRC Staff is simultaneously reviewing the CRBR application and defining—in part through negotiation with the applicant—the criteria under which the application will be reviewed....

consideration of "the general characteristics of the CRBRP design," is insufficient to resolve the important questions in this proceeding. The kind of design issues which must be resolved in order to determine whether the CDAs are credible, what the source term should be for CRBR and whether the CRBR is likely to meet its programmatic objectives are much more concrete.

In effect, the Board's ruling contains the implicit presumption that general design characteristics, such as redundant, diverse shutdown systems, will effectively satisfy any criteria that might be adopted. That proposition has never been subjected to serious scrutiny, much less demonstrated with reasonable assurance.

Intervenors were precluded by this ruling from obtaining sufficient discovery to prepare their LWA-1 testimony. But, as shown below, the other parties were apparently not so constrained. As shown below, Applicants were able to introduce volumes of CRBR design details at the LWA-1 hearings to "illustrate" their position. (Exceptions 91 to 92 infra). Moreover, less than one month before the hearings, Staff issued an entirely new probabilistic risk assessment for the CRBR, FSFES Appendix J, based on CRBR design details and falling entirely within Intervenors' deferred Contention 3(a). The Board nonetheless denied Intervenors' July 29, 1982 Motion to Reconsider Rulings on Contentions on the basis of Appendix J, declaring that it was "not aware of any changes that would convince it to alter its previous decision." August 5, 1982 Order at 6.

Exception:

7. The Board erred in failing to rule that Applicants and Staff are unable to justify excluding CDAs as DEAs because a showing of design feasibility is not adequate to demonstrate that design intent will be achieved. (Findings of Fact, ¶ 13).

Consistent with the Board's April 22, 1982 Order, Applicants and Staff claim that the Board was correct in declining to rule on the issue

of whether CDAs should be considered credible for purposes of the LWA-1 site suitability analysis and NEPA analysis.^{7/} They claim that all that must be proven at this stage is that it is feasible to design the CRBR such that DBAs will not progress to CDAs, and further claim that such feasibility has been proven. (See Exceptions 81, 83, and 90, supra). This argument errs in several respects.

First, a finding that is feasible to design against certain accidents is not tantamount to a finding of reasonable assurance that such accidents are incredible. In a first-of-a-kind reactor, such as the CRBR, a substantial possibility exists that the design intent will not be achieved, or that further research or information will not yield the expected outcome. For this reason, the Commission properly requires the Board to apply the 10 CFR Part 100 criteria in a manner that takes into account the lack of licensing experience with this design. 10 CFR § 100.2(b). See, e.g., Public Service Company of New Hampshire (Seabrook Station, Units 1 & 2), ALAB-422, 6 NRC 33, 52 (1977).

The cautious approach is also supported by the Commission's ruling on another first-of-a-kind application in Offshore Power Systems (Floating Nuclear Power Plants), CLI-79-9, 10 NRC 257, 262 (1979):

We are not compelled to treat Class 9 accidents in precisely the same fashion in the floating plant application as we treat such accidents in connection with...land-based plants. Offshore's equal treatment argument applies only to parties similarly situated. Offshore's reactors will be afloat unlike any other electric power reactor we have ever licensed....Their

^{7/} Applicants' Answer Opposing Intervenors' Application for Stay of the Effectiveness of the ASLB Partial Initial Decision, March 28, 1983, at 3-8 ("Applicants' Answer"); NRC Staff's Answer Opposing Application of the NRDC/Sierra Club for Stay of the Effectiveness of the ASLB Partial Initial Decision (LWA) of February 28, 1983; March 28, 1983, at 3-5 ("Staff's Answer").

unique siting raises a host of issues, of which the Class 9 issue is only one, which clearly justify our treating Offshore's application differently than we treat an ordinary application. Therefore, our obligation, which we have fulfilled, is to treat Offshore in a fair and rational manner, but not necessarily in the same manner we treat applications which belong in different categories.

The CRBR represents an infinitely greater departure from land-based LWR experience than did the proposed Floating Nuclear Power Plants. By applying a "feasibility" standard rather than one of reasonable assurance, however, the Board is requiring even less conservatism in licensings the CRBR than is applied to LWRs.

Moreover, as shown below, the record is insufficient to permit even the limited finding of design feasibility. The Board excluded evidence on the crucial issues of systems reliability and failure rates, without which findings of design feasibility cannot be made with reasonable assurance. (Exceptions 78, 79, and 99 infra). Furthermore, the Board has prohibited intervenors from basing their arguments on the details of the CRBR design. (Exceptions 91-92 infra), so whether the CRBR has achieved or will in fact achieve what the Board claims to be "feasible" is very much an open question.

Finally, a finding that it is "feasible" to alter the design at a later date if necessary is not a sufficient basis under the National Environmental Policy Act of 1969, 42 U.S.C.A. § 4321 et seq. ("NEPA") for granting an LWA-1. Deferring the full consideration of whether CDAs are credible presents the very substantial possibility that major design changes will be required after a more thorough safety review. The Board has utterly failed to make the required finding for an LWA that:

it is unlikely that any costs incurred in modifying the plant to meet [the standards] would be so large as to seriously disturb the cost-benefit or plant-vs-alternatives balances reached in the environmental hearings.

Gulf States Utilities Company (River Bend Station, Units 1 and 2), LBP-75-50, 2 NRC 419, 461 (1975).

Moreover, the limited feasibility standard violates NEPA's requirements that agencies explore the environmental ramifications of their actions to the "fullest extent possible" (Scientists' Institute for Public Information v. Atomic Energy Commission, 481 F.2d 1079, 1092 (D.C. Cir. 1973)); that they factor uncertainty into their environmental reviews (40 CFR § 1502.22 (1981); Natural Resources Defense Council v. U.S. Nuclear Regulatory Commission, 685 F.2d 459, cert. granted sub nom. Balt. G. & E. Co. v. NRDC, 103 S. Ct. 443 (1982); Alaska v. Andrus 580 F.2d 465, 473 (1978)); and that they employ a worst case analysis where there are gaps in relevant information or scientific uncertainty (Sierra Club v. Sigler, 695 F.2d 957, 968-975 (5th Cir. 1983); North Slope Borough v. Andrus, 486 F. Supp. 332, 346-47 (D.D.C. 1980)). The Board thus erred in failing to rule explicitly that Applicants and Staff cannot justify excluding CDAs as DBAs, or excluding consideration of the effects of a CDA upon site suitability, merely on a showing of design feasibility.

Exceptions:

78. The Board erred in deferring Intervenor's Contention 1(b) for purposes of litigation and discovery until after the LWA-1 evidentiary hearing and partial initial decision. (Order Following Conference with Parties, April 22, 1982, at 5).

99. The Board was in error in excluding evidence on Applicants' Reliability Program (Appendix C of the PSAR). Tr. 1692.

9. The Board erred in relying in any way on the evidence that the Applicants have proposed, and the Staff will require, implementation of a reliability program for assurance that the reliability inherent in the CRBR design characteristics will be realized and will not be degraded by potential common cause failures. (Findings of Fact, ¶ 16).

10. The Board erred in relying in any way on the evidence that Applicants have undertaken a series of systems interaction studies, such as key systems reviews, as support for the conclusion that human error, system interdependencies and common cause failures will not affect the CRBR systems reliability. Findings of Fact, ¶ 16).

As far back as 1975, the Board admitted Intervenor's Contention 1(b), which argues that neither Applicants nor Staff have established that Applicants' "reliability program," even if implemented, is capable of eliminating CDAs as DBAs. This "reliability program", described in PSAR Appendix C, is the basic analytical tool used by Applicants to select CDA initiators for review, reveal common mode failures and systems interactions, and provide assurance that a CDA for CRBR is an exceedingly unlikely event. (Tr. 2840; 2862-65). In its April 14, 1982 Order, the Board again accepted Contention 1(b) for litigation, but, one week later, decided to completely exclude consideration of Contention 1(b) at the LWA-1 stage. Tracking the Applicants' language exactly, the Board held that Contention 1(b) "involves matters of detailed design review and safety evaluation which...is more appropriately considered at the CP stage." (Applicants' Statement of Position in Regard to NRDC Contentions 1, 2, and 3, April 15, 1982, at 15; April 22, 1982 Order at 5). The Board therefore prohibited Intervenor from conducting discovery on the adequacy of the reliability program, and cut off cross-examination by Intervenor on that program. (Id.; Tr. 1692). Intervenor were thus prevented from developing and arguing their case that the CRBR systems reliability has not been sufficiently proven to permit exclusion of CDAs from the design basis.

After completely tying the hands of Intervenor in this manner, and subsequently concluding that Intervenor have identified no "threshold matters" that would prevent excluding CDAs from the design basis (Opinion, p.

22), the Board performed a stunning about-face. In its Partial Initial Decision, the Board specifically relied on the fact that

The Applicants have proposed, and the Staff will require, implementation of a reliability program to assure that the reliability inherent in the CRBR design characteristics will be realized and will not be degraded by common cause failures,

and that

The Applicants have undertaken an extensive series of systems interaction studies, such as key systems reviews, to assure that human error, system interdependencies and common cause failures will not compromise the reliability inherent in the ... [CDA prevention] systems....

ASLB Finding of Fact ¶ 16. The Board thus relied upon the existence of the reliability program for its rejection of Intervenor's arguments regarding common cause failure and operator error, without even giving Intervenor a chance to contest the adequacy of the program. If the reliability program is relevant to an LWA-1 decision, as both common sense indicates and the PID belatedly acknowledges, Intervenor cannot lawfully be prohibited from mentioning it. This error in itself is sufficient cause to reverse the Board.

Exception:

79. The Board erred in deferring Intervenor's Contention 3(a) for purposes of litigation and discovery until after the LWA-1 evidentiary hearing and partial initial decision. (Order Following Conference With Parties, April 22, 1982, at 6).

90. The Board erred in denying Intervenor's July 29, 1982 "Motion to Reconsider Rulings on Contentions". (Order Following Conference With Parties, August 5, 1982, at 6).

In its April 22, 1982 Order, the Board also deferred consideration of Intervenor's Contention 3(a) until after the LWA-1 stage. This contention alleges that neither Applicants nor Staff have performed an adequate, comprehensive probabilistic analysis sufficient to identify CRBR accident possibilities other than the DBAs. In ruling out this contention, the Board prevented Intervenor from demonstrating that, for a complex, first-of-a-kind

design such as the CRBR, more detailed evidence on accident probabilities is needed at an early licensing stage to provide reasonable assurance regarding common cause failures and accident initiators. Intervenors were also unable to analyze Applicants' probabilistic risk analyses of CRBR accident probabilities, CRBRP-1, as support for its arguments on CRBR initiators and common cause failures. The Board refused to reconsider its ruling that probabilistic risk assessments are beyond the LWA-1 scope even after the Staff produced a CRBR-specific risk assessment in FSFES Appendix J. Order Following Conference with Parties, August 5, 1982 at 6. This ruling flies in the face of the Board's obligation to consider "all available information and review to date "in considering an LWA-1. (10 CFR § 50.10(e)), and makes a finding of reasonable assurance of site suitability virtually impossible.

Exceptions:

91. The Board erred in denying in large part Intervenors' August 23, 1982 "Motion to Strike Portions of the Testimony and Exhibits of Applicants". (Tr. 1295-1350).

92. The Board erred in denying Intervenors' September 9, 1982 "Motion to Strike and Motion to Amend Applicants' Exhibit 1 to Conform With the Licensing Board's April 22, 1982 Order." (Order, September 27, 1982).

In its April 22, 1982 Order Following Conference with Parties, the Licensing Board limited the extent to which Intervenors' Contentions 1-3 would be litigable at the LWA-1 stage. (Exceptions 78-79, 81-83). Accordingly, Intervenors were prevented at the LWA-1 stage from obtaining discovery on and discussing the sufficiency of the Applicants' Reliability Program and all details of the CRBR design. Yet in its pre-filed testimony and exhibits for the first phase of the hearing in August 1982, Applicants relied extensively on very specific CRBR design details and analyses thereof. These materials were used extensively in Applicants' testimony as the basis for general

conclusions that specific CRBR safety features are adequately designed and will perform as intended.

As those CRBR detailed, design specific passages were clearly beyond the scope of the LWA-1 proceeding as delineated by the Board's April 22, 1982 Order, Intervenor moved to strike those portions of the testimony and exhibits. (Tr. 1295 et seq.). On August 23, 1982 the Board denied the motion to strike, claiming for the first time that detailed, design-specific information is admissible "for the limited purpose of being illustrative of [a] reactor of the general size and type proposed." (Tr. 1349).

By leave of the Board (Tr. 1349-50; 1959; 2096; 2112), Intervenor on September 9, 1983 filed a written "Motion to Strike and Motion to Amend Applicants' Exhibit 1 to Conform with the Licensing Board's April 22, 1982 Order," covering the details of Intervenor's earlier motion.

The Motion to Strike sought to strike, as going far beyond the notion of being merely "illustrative," 13 specific passages from Applicants' Exhibit 1 which relied on the truth of conclusions about the adequacy of CRBR safety systems that were based on detailed, CRBR design-specific data. The Motion to Amend identified 14 passages in the same testimony which Intervenor contended still contained language not in accord with the Board's earlier ruling.

In a September 27, 1982 Order, the Board denied both of these motions in their entirety, stating that its previous rulings "sufficiently protect the Intervenor from being required to address the adequacy of proposed CRBR safety systems at this time." (Order at 2). Intervenor had in fact always wanted to address the adequacy (or lack thereof) of CRBR safety systems, but were prevented from doing so by the Board's April 22 Order. At that stage, what Intervenor sought protection from was Applicants' use of detailed information about the adequacy of CRBR safety systems. The result of the

Board's rulings is that Applicants were free to use copious detailed, CRBR design specifics to "illustrate" their assertions of environmental and safety adequacy, but Intervenorors were prevented from using detailed, CRBR design-specifics (e.g., the Reliability Program) in making a case that those systems were inadequate.

Exceptions:

2. The Board erred in failing to find that CDAs are credible events that should be included within the CRBR design basis.

4. The Board erred in concluding that Intervenorors have identified no threshold matters that would prevent CRBR from attaining the objective of preventing DBAs from progressing to CDAs. (Opinion, p. 22).

5. The Board erred in disregarding and failing to confront evidence demonstrating that, according to Staff and Applicants' own analysis, a core disruptive accident should be included within the CRBR design basis, since there is greater than one chance in a million (10^{-6}) per reactor year of a CRBR CDA radioactive release with potential consequences greater than the 10 CFR Part 100 dose guidelines.

In Exceptions 2, 4, and 5, Intervenorors submit that, even despite the Board's systematic throttling of Intervenorors' arguments, there is sufficient affirmative evidence in the record to prove that CDAs should in fact be considered credible design basis accidents, and that the Board failed adequately to confront that evidence. In fact, much of Intervenorors' evidence was not even mentioned in the Partial Initial Decision.

To begin with, both Staff and Applicants claim that accident risks at the CRBR are comparable to those at LWRs. In the LWR Standard Review Plan,

the list of design basis accidents is acceptable if it includes each accident for which the expected rate of occurrence of potential exposures in excess of the 10 CFR Part 100 guidelines is estimated to exceed the NRC staff objective of approximately 10^{-7} per year, [or] 10^{-6} per year if, when combined with reasonable qualitative argument, the realistic probability can be shown to be lower.

(Staff Exh. 6, p. 2.2.3-2). The Staff has applied a similar 10^{-6} probability objective to its analysis of the CRBR. (Staff Exh. 7, p. 7-2; Staff Exh. 8, p. 7-1, Tr. 2277-79).

In Appendix J of the CRBR Environmental Statement Supplement (Staff Exhibit 8, FSFES), the Staff sets out the only estimates anywhere in the record of the probability of various types of CRBR core disruptive accidents. If the Staff had included a calculation of the dose consequences at the LPZ boundary corresponding to each type of core disruptive accident, it would be rather simple to determine whether any accident had a probability greater than 10^{-6} per reactor year of exceeding 10 CFR Part 100 dose guidelines. The striking fact is that these dose consequences are completely missing from Appendix J. All one finds is conclusory statements, for example, that the "doses associated with Staff CDA Class 1 are not expected to exceed 10 CFR 100 guidelines." (Staff Exh. 8, p. J-11) (emphasis supplied).

The Staff relies heavily on these probability and consequences estimates elsewhere in its CRBR analysis, specifically, as a basis for excluding consideration of alternative sites (Exception 67 infra). Intervenors submit that these probability estimates, when combined with more concrete dose calculations elsewhere in the record, provide sufficient evidence that CDAs should be considered credible at this stage of the proceedings.^{8/}

In Appendix J, Staff estimated that the probability of a CDA Class 1, in which the containment system functions as designed, is less than 10^{-4} per reactor year (Staff Exh. 8 at pp. J-8, J-11). Given the Staff's probability estimate of 10^{-1} per reactor year that the wind will blow CDA releases in any

^{8/} Although Intervenors first analyzed this evidence and drew conclusions from it during closing argument, the evidence upon which the conclusion is based was provided by Staff's and Applicants' witnesses through direct evidence and responses to cross-examination.

particular direction, the probability that a CDA Class 1 accident sequence in which the releases are blown in the worst-case (LPZ) direction is approximately 10^{-5} per reactor year.^{9/}

The doses at the LPZ boundary from a CDA Class 1 accident can be found by analyzing the Staff and Applicants' estimates of the dose consequences from a CRBR CDA Class 1 for workers at the Oak Ridge Gaseous Diffusion Plant (ORGDP). The ORGDP is located just outside the outer boundary of the LPZ, (Staff Exh. 1, p. III-3), and a first-order approximation of the CDA Class 1 dose to the maximally exposed individual at the LPZ boundary can be calculated by adjusting the ORGDP dose to account for worst-case LPZ meteorological conditions, since the other dose parameters are the same. (App. Exh. 34, pp. 2.6-16, -52; App. Exh. 2, pp. 2.3-11, -12; Staff Exh. 1, p. III-11; Tr. 5688; see generally, Reg. Guide 1.109).

The Staff calculated a CDA Class 1 dose at ORGDP of 100 rem to the thyroid (Tr. 5689). The difference in 50% X/Q values for the ORGDP site and the 50% X/Q values for the LPZ boundary in the worst-case sector, according to Applicants' figures, results in a factor of 12-14 difference in thyroid dose. (Tr. 5410, 5425, 5433-34; Int. Proposed Finding ¶ 14).^{10/} Applying

^{9/} The 10 CFR 100 analysis requires calculation of the dose consequences to an individual at any point of the LPZ outer boundary, i.e., the worst-case direction and the maximally exposed individual. 10 CFR § 100.11(a)(2). Staff's claim that the probability of a CDA with releases in the worst case direction is 10^{-7} (Staff Proposed Opinion at 15), refers to CDAs more severe and less probable than CDA Class 1, which is the focus of Intervenor's argument.

^{10/} The difference in 95% X/Q meteorology between ORGDP and the LPZ worst case sector would also result in at least an order of magnitude difference in thyroid dose. (Tr. 5689; Staff Exh. 1, p. III-11). The Staff is incorrect when it argues that Intervenor's are confusing 50% X/Q meteorology doses with 95% X/Q doses at the two sites. (Staff Proposed Opinion at pp. 15-16). The comparisons are separate, although they reach similar results.

this dose factor ratio of 12 to Staff's CDA Class 1 thyroid dose of 100 rem at the ORGDP, the corresponding dose to the maximally exposed individual at the LPZ boundary is approximately 1200 rem. This dose greatly exceeds the 150 rem thyroid dose guideline value used by the Staff in its CP review. (Staff Exh. 1, p. III-9). Since the upper bound probability of this CDA Class 1 accident is 10^{-5} per reactor year, this accident exceeds the 10^{-6} safety objective and the LWR Standard Review Plan, and must be included as a credible accident sequence within the CRBR design basis.^{11/}

The Board erred in completely disregarding and failing to confront this evidence, which was presented by Staff's and Applicants' witnesses, pointed out by Intervenor in their closing argument, Proposed Findings of Fact and Conclusions of Law, but nowhere discussed in the Partial Initial Decision. The Board has an obligation to explain why it has not accepted evidence reasonable on its face and sponsored by well qualified witnesses. Public Service Company of New Hampshire (Seabrook Station, Units 1 & 2), ALAB-422, 6 NRC 33, 41 (1977).

Exception:

8. The Board erred in finding that the potential for, and actions to minimize, human error and common cause failures have been considered in the design to assure the likelihood that common cause failures or human error could cause a CDA is made extremely low. (Findings of Fact, ¶ 16).

^{11/} Applicants have estimated a thyroid dose of 85 rem at the LPZ boundary in the worst-case wind direction sector, based on their HCDA Case 2, which corresponds to Staff's CDA Class 1. (Tr. 2058; 5072-73; 5410). This difference between 85 and 1200 rems reflects differences in modeling assumptions based on independent calculations by Staff and Applicants, particularly differences in assumed filter efficiencies and height of radioactive release. (Tr. 5665-67; 5688-90, Int. Proposed Findings ¶¶ 21-23). Even if the mean value of 640 rem is taken as the "best estimate", this value is still greater than the 150 rem dose guideline value for thyroid exposure.

As shown above, the Board was only able to make this finding by severely restricting Intervenor's ability to present evidence on the issues of CRBR common mode failures, system reliability, and the effect of human error; and by subsequently relying upon the existence of Applicants' reliability program without allowing discussion of its adequacy. (Exceptions 78-79, 81, 83, 91-92, and 99 supra). Moreover, the record demonstrates that the Staff's analysis is inadequate, includes no systematic analysis of the potential for undetected system interdependence resulting from human error at the CRBR (Tr. 2235; 2243; 2420), and has no concrete basis for its conclusion that the potential for human error at the CRBR would not differ significantly from that at an LWR. (Tr. 2256-57; 2246; 2260-61).

Exception:

12. The Board erred in failing to require that loss of coolant accidents caused by a large primary coolant pipe break, which could lead to CDAs, be included within the CRBR design basis.

A double-ended pipe break LOCA is considered a design basis accident for light water reactors (Tr. 1509); insufficient justification has been presented for departing from this approach for the CRBR. The Staff claims that the physical properties of sodium coolant, implementation of an inspection program and leak detection program, and installation of guard vessels around the primary coolant are sufficient bases for its conclusion that CRBR large primary coolant pipe breaks, which could lead to CDAs, should not be considered credible. (Staff Exh. 1, p. II-9; Staff Exh. 8, p. J-4). These reasons are insufficient, since the same conditions exist in many LWRs. (Tr. 6215; 1538-41; 5010, 50; Int. Proposed Findings ¶¶ 45-54). The Board disregarded Intervenor's evidence that the CRBR pipe rupture frequency is comparable to that of a PWR (Tr. 6213-16; 6271-72), and thus both types of pipe ruptures should be treated similarly as DBAs.

B. Contention 2

Exceptions:

13. The Board erred in concluding that, based upon the available information and review to date, there is reasonable assurance that the proposed site is a suitable location for a reactor of the general size and type proposed in the application from the standpoint of radiological health and safety considerations. (Conclusions of Law, ¶ 4).

14. The Board erred in failing to resolve whether the designated site suitability source term (SSST) results in radiological consequences that envelope the spectrum of credible accidents.

26. The Board erred in failing to resolve whether the CRBR radiological source term chosen by the Staff would result in potential hazards not exceeded by those from any accident considered credible, as required by 10 CFR 100.11(a), fn. 1.

82. The Board erred in limiting the scope of Intervenor's Contentions 2(a)-2(d) at the LWA-1 stage. (Order Following Conference With Parties, April 22, 1982, at 5-6).

In Contention 2, Intervenor's argue that the analysis of CDAs and their consequences by Applicants and Staff are inadequate for purposes of licensing the CRBR, performing the NEPA cost/benefit analysis, or demonstrating that the radiological source term for CRBRP would result in potential hazards not exceeded by those from any accident considered credible, as required by 10 CFR 100.11(a), fn. 1. In its April 22, 1982 Order, the Board limited the scope of Contention 2(a)-2(d) to the question of whether it is "feasible" to design CRBR to make CDAs so improbable that they can be excluded from the design base envelope for a reactor of the general size and type as the CRBR. As explained in detail above, (Exceptions 1, 3, 7, 81, 83, and 90 supra), this finding is insufficient to provide reasonable assurance that the site is suitable for a 350-MWe breeder reactor.

Exceptions:

15. The Board erred in failing to resolve the issue of whether the proposed containment design will reduce off-site doses to levels within the dose guidelines values recommended for site suitability analysis.

16. The Board erred in giving significant weight to the Staff conclusion that feasible design concepts and remedial actions can be implemented to provide satisfactory containment system protective capability, as related to both environmental impacts and the health and safety of the public. (Findings of Fact, ¶ 30).

17. The Board erred in failing to determine whether the containment system "feasible design concepts and remedial actions" suggested by the Staff would, if implemented, result in a reactor of the general size and type as that proposed in the CRBR application. (Findings of Fact, ¶ 30).

Intervenors' Contention 2(d) argues that neither Applicants nor Staff have demonstrated that the design of the containment is adequate to reduce calculated offsite doses below the 10 CFR Part 100 dose guidelines. Nor does the Board disagree; it simply evades the issue, finding only that "possible design concepts and remedial actions can be implemented to provide satisfactory containment system protective capability," and remarking that "[t]he Staff's final position on the adequacy of the containment/confinement design will be presented when its SER is published." (ASLB Findings of Fact ¶¶ 26-30, Opinion p. 22).

With these vague conclusions, the Board has completely sidestepped Intervenors' arguments in support of Contention 2. Intervenors submitted extensive testimony by expert witnesses demonstrating that, given the proposed containment/confinement design and the site suitability source term chosen by the Staff, the resulting LPZ doses in fact greatly exceed the CRBR dose guideline values. (Tr. 3126-3142; 3056-78; 4852-91). Intervenors pointed to numerous errors in Staff's site suitability assumptions and calculations to support their arguments. (Exceptions 18 to 25 infra). Yet in the 200-page Partial Initial Decision, discussion of these crucial issues is simply nowhere

to be found. The Board apparently felt it unnecessary to determine whether the Staff's site suitability analysis was performed properly, as long as containment design "fixes" are potentially available. This reduces the entire 10 CFR Part 100 site suitability source term analysis to a solipsism—a determination whether the containment can be made more protective if necessary, without any findings on whether the present design is sufficient under 10 CFR Part 100, whether the required design changes would be so costly as to tip the NEPA cost/benefit analysis, or even whether the required design changes would result in a reactor no longer of the general size and type as the present design. The conclusions of the Board are thus clearly insufficient to resolve Contention 2(d), or provide reasonable assurance at the LWA-1 stage that the site is suitable under 10 CFR 100. Having posed the question thusly: can a mythical reactor possibly meet the 10 CFR Part 100 requirements, the answer could only be yes—anything is possible if you do not look too closely at specifics.

Exception:

18. The Board erred in disregarding and failing to confront substantial evidence demonstrating that the site suitability source term chosen by the Staff would result in bone doses at the LPZ boundary well in excess of the bone dose guideline value specified by the Staff for the CP (and LWA-1) review.

27. The Board erred in failing to find that the Staff and Applicants did not use appropriately conservative assumptions in their site suitability analysis, as required by 10 CFR § 100.2(b), in order to take into account the lack of experience with a reactor of the general size and type as the CRER, which is novel in design and unproven as a prototype or pilot plant.

Intervenors presented substantial evidence to demonstrate the errors in Staff's site suitability source term analysis: a failure to use current dosimetric and metabolic models, failure to use conservative plutonium isotopic concentrations, failure to consider the dose from the entire passage of the cloud, failure to consider releases via the containment vent/purge

system, failure to consider the integrated dose commitment beyond 50 years, and failure to assume a bounding fuel release fraction from the core (SSST). (Exceptions 19-26 infra). Correcting these errors would result in an SSST bone surface dose to an individual at the LPZ boundary of at least 7500 rems, which is orders of magnitude greater than the 150 rem bone surface dose guideline value specified by the Staff for its CP and LWA-1 review. The Board also erred in failing to find that the Staff and Applicants did not apply the basic 10 CFR Part 100 criteria in a manner that takes into account the lack of experience with the novel and unproven CRBR design, as required by 10 CFR § 100.2(b).

Exception:

19. The Board erred in failing to rule that the Staff's site suitability dose calculations for the LPZ are in error for failing to use current dosimetric and metabolic models.

As described in Intervenor's Findings ¶¶ 65-69, the Staff specified a CP (and LWA-1) LPZ bone surface dose guideline value of 150 rem (Staff Exh. 1, p. III-9), but failed to calculate the LPZ bone surface dose that would result from an SSST accident. Instead, the Staff calculated a LPZ bone dose of 9 rems (Staff Exh. 1, p. III-11), based upon the older dosimetric and metabolic models of ICRP Publications 2, 6, and 10. (Tr. 3134-35). The newer models used in ICRP-30, however, are more appropriate for calculating organ doses to the bone surface, thyroid and lung, (Tr. 1902-3, 1907), and are now used by both Applicants and Staff. (Tr. 2360-61, 2389-90, 5218-19, 5409.) Use of the newer ICRP models results in a bone surface dose 3 times higher than the 9 rem LPZ bone dose, or 27 rems. (Tr. 3128, 5157, Staff Exh. 8, p. J-2). The Board incorrectly failed to confront and resolve this issue in Intervenor's favor.

Exception:

20. The Board erred in failing to rule that the Staff's site

suitability dose calculations for the LPZ are in error for failing to use conservative plutonium isotopic concentrations.

As described in Intervenor's Findings ¶¶ 70-75, the Staff calculated the LPZ dose from a site suitability source term accident assuming that the CRBR core plutonium had the following isotopic concentrations (weight %): 1% Pu-238, 74% Pu-239, 20% Pu-240, and 5% Pu-241. (Tr. 3128). The isotopic concentrations of Pu-238 and Pu-241 are controlling in terms of SSST bone dose and bone surface dose. (Tr. 3129-30). Although Staff's choice of Pu isotopic concentrations is more conservative than Applicants', neither is conservative compared to high burnup fuel on the order of 33,000 Mwd/MT. (Tr. 3130-31; 4589-90; 1751; 5164). As demonstrated below (Exceptions 53 to 56), it is appropriate to assume that CRBR will be fueled at some point with plutonium recovered from higher burnup LWR spent fuel. This assumption would increase the Pu-238 and Pu-241 concentration by a factor of at least 2 to 4 (Tr. 4265), and would correspondingly increase the bone surface dose by a factor of up to 4.3 (Tr. 4590), or from 27 rems to 116 rems.

Exception:

21. The Board erred in failing to rule that the Staff's site suitability dose calculations for the LPZ are in error for failing to consider the dose from the entire passage of the cloud (10 CFR 100.11(a)(2)).

In the SSST analysis, the Staff is required to establish a low population zone (LPZ) such that "an individual located at any point on its outer boundary who is exposed to the radioactive cloud resulting from the postulated fission product release (during the entire period of its passage) would not receive a total radiation dose" in excess of certain dose guideline values. 10 CFR § 100.11(a)(2) (emphasis added). The emissions from a CRBR SSST accident would continue to pass over the LPZ boundary for a longer period of time than 30 days, with large significant dose consequences, (Tr. 2353), yet the Staff

truncated its calculations at the end of 30 days. (Tr. 3127, Staff Exh. 1, p. III-11). An appropriately conservative assumption for the CRBR SSST analysis is that at the end of 30 days, the emissions remaining in the containment are essentially instantaneously released, or "puffed" to the environment through the annulus filtration system. (Tr. 2356).^{12/} This assumption would increase the bone surface dose at the LPZ boundary by a factor of 4.3. (Tr. 3128; 2356), from 116 rem to 500 rem, well above the 150 rem CP LPZ bone surface dose guideline value. The Board completely failed to mention, much less resolve, this issue.

Exception:

22. The Board erred in failing to rule that the Staff's site suitability dose calculations for the LPZ are in error for failing to consider releases via the containment vent/purge system.

10 CFR § 100.11(a) requires the applicant, in evaluating a proposed site, to assume a fission product release from the core (the SSST), the expected demonstrable leak rate from the containment, and the meteorological conditions pertinent to the site to derive a low population zone. The assumed SSST fission product release for the CRBR consists of 100% of the noble gases, 50% of the iodines, 1% of the solid fission products, and 1% of the plutonium from the core. (Staff Exh. 1, p. III-11). In order to produce these sizeable releases, a core meltdown or an energetic CDA, involving the whole core or a substantial fraction, has to occur. (Tr. 3072-76). The Staff has admitted

^{12/} Applicants claim that the post-30 day releases are negligible. (Tr. 1831). This conclusion is based upon "realistic" assumptions regarding aerosol depletion, (Tr. 2553-62), assumptions that are not appropriately conservative for purposes of the SSST analysis. Staff's assumption that aerosol depletion occurs only during the first 24 hours (Tr. 2358-59; 3128) is more appropriately conservative than Applicants' assumption that aerosol depletion occurs for the full 30 days. (Tr. 1742).

that its proposed CRBR source term is based on the occurrence of a CDA. (Tr. 3073).

The Staff determined the expected containment leak rate from this SSST accident by looking only at bypass leakage from the annulus filtration system, not at the containment vent/purge system, which releases air through a radioactivity removal system directly to the atmosphere in certain circumstances. (Tr. 2039; 2506; 5664-65). Yet if the postulated SSST accident did occur, the CRBR containment vent/purge system, , would have to be activated in order to avoid containment failure due to pressure and thermal effects resulting from sodium releases. (Tr. 5408; 5420; 3075; 1880; 2054-58; 2044, Intervenor's Findings ¶¶ 81-85). Intervenor's submit that for a first-of-a-kind reactor such as the CRBR, the site suitability analysis must be conducted in a conservative manner that takes into account the operation of the containment vent/purge system to mitigate CDAs, the type of accident upon which the SSST was based.

Assuming activation of the containment vent/purge system would increase the SSST LPZ dose significantly, as can be seen by comparing Applicants' so-called "conservative" SSST dose calculations for nearby facilities with the supposedly more "realistic" CDA dose calculations for the same facilities. (Tr. 5688-89; 5428; 5437-37). The LPZ bone surface dose for the SSST, therefore, should be increased even further than the 500 rem dose calculated above. The Board erred by failing to discuss and resolve this issue.

Exception:

23. The Board erred in failing to rule that the Staff's site suitability dose calculations for the LPZ are in error for failing to consider the integrated dose commitment beyond 50 years.

The 10 CFR Part 100 regulations require that the dose from an SSST accident to an individual located at any point on the LPZ boundary not exceed

the specified dose guideline values. 10 CFR § 100.11(a)(2). This section thus requires analysis of the dose to the maximally exposed individual in order to ensure that no one individual receives a dose in excess of the guideline values.

The Staff's LPZ bone surface dose estimate assumes a person will die at age 50, if he were exposed at a very early age. (Tr. 3173). The record demonstrates that, although 50 years is an appropriate period of integration for doses involving occupational exposure, an 80-year period should be utilized in the SSST analysis to represent the maximally exposed individual. (Tr. 3174). This would increase the LPZ bone surface dose by a factor of 1.5 (Tr. 3170-71), which, when combined with the other factors noted above, would result in a LPZ bone dose of at least 750 rem, well above the dose guideline value. The Board erred in failing to even mention, much less confront, this argument.

Exceptions:

24. The Board erred in failing to rule that the Staff's site suitability dose calculations for the LPZ are in error for failing to assume a bounding fuel release fraction from the core (SSST).

25. The Board erred in failing to find that, at a minimum, the site suitability source term plutonium fraction should be set at a level high enough to bound CDAs, should the CDA be included in the CRBR design basis after a full safety review.

Although the Staff's site suitability source term was based upon a core disruptive accident (Tr. 3073) it does not bound the consequences of a major core disruptive accident. (Tr. 3063; Staff Exh. 8, p. J-10). Since core disruptive accidents should be considered credible (Exception 2, supra), the radiological source term should be increased to bound the consequences of CDAs. 10 CFR § 100.11(a), fn.1. This would require an increase to at least 10% in the assumed plutonium fraction released from the core. (Tr. 3072;

3063-64; 3072). Even if the Board was unable to resolve whether CDAs are credible at the LWA licensing stage, it erred in failing to require a plutonium source term fraction of at least 10%. This is necessary in order to reach a sufficient level of conservatism in the site suitability analysis, to account for uncertainties in the novel design of the CRBR, and to account for the substantial possibility that CDAs will be found credible after a full safety review. (Tr. 3068-72; Exceptions 1, 3, supra). The LPZ bone surface dose should therefore be increased by a factor of 10, from 750 rem to over 7500 rem, to account for release of up to 10% plutonium from the core during an SSST accident. This dose far exceeds the LPZ bone surface dose guideline value.

Exceptions:

28. The Board erred in finding that the DBA dose results are considered to be acceptable because they fall well below the dose guidelines of 10 CFR Part 100. (Opinion, p. 21).

29. The Board erred in failing to require that the CRBR dose guideline values be reduced by a factor of ten at the construction permit stage to take into account continuing uncertainty in plutonium dose and health effects models.

The Board concluded that "[t]he DBA dose results are considered to be acceptable because they fall well below the dose guidelines of 10 CFR Part 100." Opinion, p. 21. This conclusion is in error in two respects. First, as demonstrated above, (Exceptions 18-25 supra), the DBA (or SSST) dose results would be considerably above the CRBR dose guideline values had they been computed correctly. Secondly, the CRBR dose guideline values chosen by the Staff for the CP (and LWA-1) review are themselves insufficiently conservative. The Board erred in failing to require that the CRBR dose guideline values for bone surface and lung dose be reduced by a factor of ten at the construction permit stage to take into account continuing uncertainty in plutonium dose and health effects models. The Staff took this approach in

the 1977 Site Suitability Report, and its abandonment of this approach in 1982 is unwarranted by the record. (Tr. 2513-14; 3081).

Intervenors cited five sources of continued uncertainty in plutonium dose models which sufficiently support their arguments, including two the Board failed to address, namely, the evidence presented by Dr. John C. Cobb (Tr. 3101-09) and the evidence of Dr. Carl J. Johnson. (Tr. 6026-28; 5859; 5869-70; 5922-25).

Exception

30. The Board erred in finding that the Morgan hypothesis does not affect the validity of the Staff's recommended dose guideline values. (Findings of Fact, ¶ 24).

Morgan's hypothesis, if correct, would lower the maximum permissible plutonium body and bone burdens by a factor of 240 to achieve the level of protection implied by application of ICRP 2 methodology. (Tr. 3141). Similarly, one could retain the maximum permissible bone dose limit of 30 rem as a primary standard and introduce into the calculation of plutonium bone dose additional quality factors equal to 240, such that the calculated bone dose due to plutonium would be a factor of 240 times higher. (Tr. 3141; 3082). If one uses the newer ICRP 26 methodology, and calculated bone surface dose, instead of bone dose, additional quality factors equal to 80 (i.e. $240/3$) would be required since bone surface dose is a factor of 3 higher than bone dose. (Exception 19 supra). This hypothesis continues to raise uncertainty regarding permissible plutonium body burdens, which should be considered in establishing lower guideline values for bone surface dose at the CP licensing review.

Exception:

31. The Board erred in finding that "[t]he record presents no evidence of a logical nexus between the "warm particle" hypothesis and the validity of the 10 CFR 100 dose guideline values."

The nexus is presented in the record at Tr. 3082-85. As indicated there, the warm particle hypothesis implies that "the localized distribution of Pu-210, an alpha emitter in the bronchial region of the lung, now appears to be 1000 times more carcinogenic than gamma radiation -- as compared to the factor of 10-20 currently assumed." (Tr. 3083). The ICRP 2 methodology uses an overall "quality factor" of 10 for alpha emitters in the lung while the ICRP 26 methodology assumes an overall quality factor of 20. Id.^{13/}

The "warm particle" hypothesis implies an overall quality factor of 1000 in calculating lung dose from plutonium particulate exposure. (Tr. 3083). In order to account for the uncertainty in the lung dose distribution factor, the guideline values for plutonium lung exposure should be reduced by the difference in the assumed dose distribution factors; i.e., the difference between 50 and 1. (Tr. 3085).

Exception

32. The Board erred in failing to find that the dose guideline values selected by Staff for use in the site suitability review are inadequate to prevent serious injury to individuals offsite if an unlikely, but still credible, accident should occur, as required by 10 CFR Part 100.

35. The Board erred in finding that the 10 CFR Part 100 dose guideline values do not represent design or accident mitigation objectives. (Opinion, fn. 25).

As shown above, the CRBR dose guidelines selected by the Staff are insufficiently conservative, since they fail to take into account continued uncertainty in plutonium dose effects models. The Board thus erred in failing to find that the CRBR dose guidelines were not developed in a manner that takes into account the lack of LMFBR experience (10 CFR § 100.2(b)), and are inadequate to "prevent serious injury to individuals offsite if an unlikely,

^{13/} The meaning of the term "quality factor" is explained in the record at Tr. 2921-211, 2924-25.

but still credible, accident should occur." (26 Fed. Reg. 1224 (Feb. 11, 1961)). The above-mentioned objective refutes the conclusion of the Board that the 10 CFR Part 100 dose guideline values do not represent "design or accident mitigation objectives." Opinion, p. 21, fn. 25.

Exception:

37. The Board erred in failing to find that in light of all the deficiencies outlined above, the Staff's ultimate cost/benefit balancing under NEPA is arbitrary and capricious.

The Staff's site suitability source term is deficient in its failure to use correct and sufficiently conservative assumptions, its failure to use up-to-date dosimetric and metabolic models, and its failure to select dose guideline values that take into account continued uncertainty in plutonium health effects models. Correction of these deficiencies would inevitably lead to a finding that the site is not suitable for a reactor such as the CRBR without substantial additional analysis and design changes. The Board has not included the costs of such additional analysis and design changes in its cost/benefit analysis under NEPA, and, as such, the ultimate cost/benefit balancing is arbitrary and capricious. Sierra Club v. Sigler, 695 F.2d 957 (5th Cir. 1983); Chelsea Neighborhood Associations v. United States Postal Service, 516 F.2d 378 (2nd Cir. 1975).

II. Intervenors' Contention 5(b)

Intervenors' Exceptions 38-45.

ASLB Opinion, pp. 26-30.

ASLB Findings of Fact, paragraphs 41-54.

Intervenors' Proposed Findings of Fact, paragraphs 133-148.

Intervenors' Proposed Conclusions of Law, paragraphs 15-17.

Exception:

43. The Board erred in failing to find that the Applicants' and Staff's analyses of the effects of CRBR accidents upon the Y-12 plant and other nearby facilities are inadequate, since the

analyses fail to analyze adequately the risks of CDA accidents more severe than Staff's CDA Class 1 or Applicants' HCDA Case 2, which involve equal consideration of both probabilities and consequences.

Intervenors' Contention 5(b) argues that a severe accident at the CRBR could result in the evacuation of nearby national security and energy fuel cycle facilities, particularly the Y-12 nuclear weapons plant. It also argues that long-term evacuation of these facilities would result in unacceptable risks to the national security and national energy supply. (See Attachment A). This analysis does not comply with the requirements of NEPA.

First, Staff's and Applicants' analysis of accident effects upon nearby facilities failed to postulate and adequately analyze a range of severe CRBR accidents. The Commission's Statement of Interim Policy on Nuclear Power Plant Accident Considerations Under the National Environmental Policy Act of 1969 (45 Fed. Reg. 40101) (June 13, 1980) (the "Interim Policy Statement") requires detailed consideration in environmental impact statements of severe, low probability accidents,

including considerations of the site-specific environmental impacts attributable to accident sequences that lead to releases of radiation and/or radioactive materials, including sequences that can result in inadequate cooling of reactor fuel and to melting of the reactor core.

45 Fed. Reg. at 40101. Intervenors submit that in the case of the CRBR, the Staff and Applicants should consider the probabilities and consequences of a range of core disruptive accidents, not just those in which the containment functions as designed.

The Staff took this approach in the FSFES, analyzing the probability and consequences of four classes of CRBR core disruptive accidents, including accidents involving containment failure. (Staff Exh. 8, p. J-8). Yet in analyzing the impacts upon workers at the Y-12 Plant and the ORGDP, the Staff and Applicants postulated only two classes of accidents: a CDA in which the

containment system functions as designed, with controlled venting, and the SSST accident, in which no containment venting of radioactivity occurs at all. (Tr. 5664; 5234; 5425).

Applicants' claim that the consequences of only one type of CDA need be considered, since the "radiological risk", (probability multiplied by consequences) from each of Staff's four CDA classes is the same. (Tr. 5414-15). A CDA Class 2-4 accident, in contrast to a Class 1 accident, may require long-term evacuation. (Tr. 5690-91; 5192-93; 5195). Therefore, a threshold level for acceptable risks to national security apparently exists for the consequences of various CDA accidents. Applicants have failed to apply a risk aversion weighting factor to events with those consequences, in order to more accurately represent societal risk. (Tr. 5195-96).

Exception:

44. The Board erred in failing to find that the Applicants' and Staff's analyses of the effects of CRBR accidents upon the Y-12 plant and other nearby facilities are inadequate, since the analyses do not take into account the use in CRBR of plutonium recovered from LWR high burnup spent fuel, which has higher isotopic concentrations of Pu-238 and Pu-241 and, therefore, more serious dose consequences.

Even for the CDA accidents which were analyzed by the Staff and Applicants, the estimates of the dose consequences upon nearby facilities are inadequate in that they do not assume the use in CRBR of fuel with sufficiently high isotopic concentrations of Pu-238 and Pu-241. (Exceptions 53 to 56 supra.)

Exceptions:

40. The Board erred in failing to find that the Applicants' and Staff's analyses of a site suitability source term (SSST) accident upon the Y-12 plant and other nearby facilities are inadequate because they fail to take into account operation of the containment vent/purge system in the course of such an accident.

41. The Board erred in failing to determine whether short- or long-term evacuation of the Y-12 plant and other nearby facilities

would be required in the event of an SSST accident in which the CRBR containment vent/purge system is called into operation.

The Staff's and Applicants' calculations of doses at nearby facilities resulting from the SSST accident are themselves in error since they fail to include the radioactive releases to the environment through the containment vent/purge system, which would be called into operation if an accident releasing the quantity of plutonium and fission products specified in the SSST were to occur. (Exception 22 supra. The Board failed to determine whether short or long-term evacuation of the Y-12 plant or other nearby facilities would be required in the event of an SSST accident in which the CRBR containment vent/purge system is called into question.

Exception:

45. The Board erred in failing to find that Applicants' and Staff's analysis of whether long-term evacuation of nearby facilities would be required in the event of an SSST accident are inadequate, since these analyses rely solely on the EPA's Protective Action Guidelines.

Exception 45 concerns a determination whether the SSST doses discussed above would be likely to result in long-term evacuation of nearby facilities. In making this determination, the Staff relied solely on whether the whole body and thyroid doses from the SSST accident would exceed the Environmental Protection Agency's Protective Action Guidelines (PAGs). (Tr. 5689-90). This reliance is improper, since, as the Staff admitted, evacuation would likely occur at dose levels much lower than those contained in the EPA PAGs. (Tr. 5673-74; 5276-77; 5660-61). In addition, there are no EPA PAGs for bone dose or bone surface dose (Tr. 5296-97; 5663-64), even though bone surface dose may be controlling in terms of plutonium release. (Tr. 5297).

The Board was troubled by the lack of PAGs for bone dose or bone surface dose, (Opinion, pp. 29-30), and specifically instructed the parties to address at the CP hearing the question of

whether the PAGs currently in use for evacuation planning purposes should be revised for use at CRBR to take account of those possible radioactive releases unique to CRBR, especially the actinide elements involving plutonium.

Opinion, p. 30. In light of the glaring uncertainties regarding whether and when evacuation would occur at nearby facilities, the Board's finding of "reasonable assurance that the question of long-term evacuation of nearby facilities has been adequately analyzed" is arbitrary and capricious. Calvert Cliffs' Coordinating Committee, Inc. v. AEC, 449 F.2d 1109 (D.C. Cir. 1971); Izaak Walton League of America v. Marsh, 655 F.2d 346 (D.C. Cir. 1981); Strycker's Bay Neighborhood Council v. Karlen, 444 U.S. 223 (1980).

Exceptions:

38. The Board erred in failing to find that the Y-12 plant is vital to national security.

39. The Board erred in failing to find that the consequences of long-term evacuation of Y-12 would be unacceptable in terms of national security risk.

Exceptions 38 and 39 concern whether the consequences of long-term evacuation of the Y-12 plant and other nearby facilities would result in unacceptable risks to the national security and national energy supply. The Board's decision is curiously silent on the question of the national security implications of long-term evacuation at the Y-12 Plant, although the record is unequivocally clear. As Applicants' witnesses admitted, the Y-12 plant is "vital to national security" (Tr. 5243) (emphasis added), and the consequences of long-term evacuation of Y-12 would be "unacceptable in terms of national security risk". (Tr. 5193) (emphasis added). These conclusions, when combined with an adequate analysis of dose calculations and effects from a range of severe CRBR accidents, require an affirmative finding on Contention 5(b). The Board erred in failing to confront and discuss this evidence. Public Service Co. of New Hampshire, supra, 6 NRC at 41.

III. Intervenors' Contentions 4 and 6(b)(4)

Intervenors' Exceptions 46-52.

ASLB Opinion, pp. 35-46.

ASLB Findings of Fact, paragraphs 70-122.

ASLB Conclusions of Law, paragraphs 5-7.

Intervenors' Proposed Findings of Fact, paragraphs 223-288.

Intervenors' Proposed Conclusions of Law, paragraphs 26-27.

Exception:

46. The Board erred in failing to find that the three primary criteria utilized by the Staff in analyzing safeguards risks and consequences at the CRBR and its supporting fuel cycle facilities do not provide "high assurance" that safeguards objectives will be met and the Commission's safeguards regulations satisfied.

In assessing safeguards risks and consequences at the CRBR and its supporting fuel cycle facilities, the Staff adopted three criteria:

1. Do DOE's proposed safeguards systems provide a potential for deterring attempts at theft or diversion of plutonium or attempts at sabotage of materials to be used in the CRBR fuel cycle?

2. Are DOE's proposed safeguards systems likely to detect attempts at sabotage, theft or diversion?

3. Do DOE's proposed systems for responding to attempted theft, diversion, or sabotage provide reasonable assurance that such attempts would not be successful?

(Staff Exh. 8, p. E-1; Tr. 3644-45; 3739).

The Board concluded that these criteria satisfied the requirements of the Atomic Energy Act and NEPA. However, these criteria are insufficient as a matter of law, even if they are met, there is no assurance that the CRBR and its supporting fuel cycle facilities would have safeguards and physical security systems which would meet the Commission's own regulations. The objectives of both the Commission and DOE are to provide "high assurance" against the risks of theft, diversion, and sabotage. (App. Exh. 35, p. 5.7-37). But the evaluation criteria simply indicate that there is a "potential" for this goal to be achieved; whether it will in fact be achieved is far from

certain, and the Staff itself admitted that the three criteria do not provide "high assurance" that safeguards objectives will be met. (Tr. 3682-83).

The Staff's evaluation does not provide a sufficient basis for granting an LWA. The criteria simply leave too much uncertainty concerning the acceptability of safeguards and physical security risks at the CRBR and its supporting fuel cycle facilities.

Exception:

47. The Board erred in finding that there is no evidence to support Intervenor's argument that the safeguards requirements of DOE's Orders may not be enforced. (Finding of Fact, ¶ 120).

48. The Board erred in giving significant weight to the testimony of Applicants' witnesses that Applicants have committed to meet all DOE safeguards and security Orders. (Opinion, p. 45.)

There is no adequate assurance that there will be effective fuel cycle safeguards at non-licensed facilities in the future. The Board's determination on this issue is indeed ironic, for it excluded evidence with respect to the adequacy of current compliance by DOE with the safeguards requirements of its Orders on the grounds that such evidence was outside the scope of the proceeding. (Exceptions 84, 85, 97, and 98, infra; Tr. 3776-78). At the same time, the commitments of DOE to meet these orders are the purest gossamer.

Intervenor's sought to discover and offer testimony related to current enforcement of DOE Orders at non-licensed fuel cycle facilities. The Board could properly extrapolate from problems associated with current compliance to the likelihood that there would or would not be future compliance. The Board, however, ruled that such evidence represented a "challenge" to the adequacy of regulations (Tr. 3776-78) and excluded it from the hearing. The effect of the Board's ruling was to skew its analysis and to allow the making of Finding of

Fact No. 120, which could only be made because of the Board's erroneous procedural ruling.

DOE's commitments to meet safeguards and physical security Orders are essentially inconsequential, and the Board gave undue weight to them. While Applicants make certain commitments in the Environmental Report (App. Exh. 35) with respect to safeguards programs and their effectiveness at fuel cycle facilities, there are no additional written assurances that "commitments" will be honored. (Tr. 3307). Indeed, the Commission does not even have criteria for concluding that compliance with applicable safeguards regulations is likely. (Tr. 3917).

The commitment, moreover, is simply that Applicants will meet DOE safeguards and physical security Orders. But these Orders are general in nature; they do not indicate precisely which systems or technologies, for example, should be employed; they do not provide for incorporation of the "best available technology"; and they leave final decisions with respect to incorporation of particular technologies and systems up to the Operating Officer. (Tr. 3308-09). What systems will be incorporated in the future, or what measures will be taken, is, therefore, very much the subject of conjecture. (Tr. 3467; Tr. 3455).

Since the Staff undertook no analysis of the actual likelihood that Applicants' commitments will be met (Tr. 3684; 3692), the commitments themselves were all that the Board could rely upon for making judgments with respect to the effectiveness of safeguards and physical security in the future at fuel cycle facilities. But since the Orders are so general, they mean little in terms of safeguards effectiveness, and, in effect, the Board was giving weight to little more than a wish and a promise as regards future systems. Its finding, therefore, cannot be sustained.

Exception:

49. The Board erred in failing to find that the Staff's conclusion that risks associated with the CRBR's fuel cycle are not greater than risks associated with other, similar licensed and non-licensed facilities, is based upon an inadequate NEPA analysis.

At the heart of the Staff's approach to its assessment of safeguards risks and consequences was its basic conclusion that the risks associated with the CRBR fuel cycle were not greater than risks associated with other fuel cycles. (Staff Exh. 8, pp. 12-34, E-9). But that analysis involved nothing more than a comparison of regulations; there was no effort to look at actual risks. This approach does not provide an adequate basis for the judgments reached.

The CRBR and its supporting fuel cycle clearly present new and different kinds of risks. The quantities of plutonium associated with the CRBR fuel cycle are unique in the context of commercial power generation. (Tr. 3730; 3437, 3440). For purposes of constructing illicit weapons, fresh CRBR fuel is "preferable" to anything in the conventional LWR fuel cycle. (Tr. 3901). Because the safeguards risks associated with the CRBR fuel cycle are greater than the risks associated with the conventional LWR fuel cycle, (Tr. 3434-35) the Staff's conclusion that the risks are "comparable" is incomprehensible, but for the Staff's erroneous premise that all it need examine were regulations, not actual facilities.

The purpose of the NEPA analysis in this proceeding is not just to "license" DOE regulations; rather, it is to assess risks at the DOE fuel cycle facilities. The Staff, however, did not go beyond DOE Orders to examine actual risks at fuel cycle facilities to determine if they were comparable (Tr. 3605; 3604-05), nor did it take into account current critiques made by the General Accounting Office and others of the sufficiency of safeguards at DOE facilities. (Tr. 3601). Finally, the Staff did not examine or assess

actual safeguards systems now in place or planned for possible future installation at CRBR fuel cycle facilities. (Tr. 3601-02).

In short, the Staff's basic conclusion that the risks associated with the CRBR and its fuel cycle are not greater than other facilities is not supported by the record.

Exception:

50. The Board erred in failing to find that the Staff's analysis of CRBR safeguards risks and consequences is inadequate in that it lacks independent analysis of Applicants' submissions.

In carrying out its analysis, the Staff relied almost exclusively on representations made by Applicants with respect to the nature of fuel cycle facilities. (Tr. 3738; 3642-43; 3684). As noted above, it made no specific examination of the safeguards systems at either other DOE nuclear facilities or the specific facilities proposed to be part of the CRBR fuel cycle. (Tr. 3738; 3642-43; 3684). Basically, it took Applicants' assessment of effectiveness at face value. (Tr. 3642-43; 3684).

Contrary to the Staff's approach, it is not sufficient simply to rely upon the representations of Applicants. Independent analysis is required, and the failure of the Staff to carry out that analysis violates the requirements of NEPA. Greene County Planning Board v. Federal Power Commission, 455 F. 2d 412 (2d Cir.), cert. denied, 409 U.S. 849 (1972); Sierra Club v. Alexander, 484 F. Supp. 455, 466-67 (N.D.N.Y.), aff'd, 633 F.2d 206 (2d Cir. 1980).

Exception:

51. The Board erred in failing to find that the Staff's analysis of CRBR safeguards risks and consequences is inadequate in that it failed to take account of significant uncertainties with respect to the nature and scope of the safeguards systems, and their effectiveness, at facilities which will reprocess CRBR fuel.

Reprocessing is concededly the most sensitive part of the CRBR fuel cycle and is fraught with safeguards risks. Yet the future reprocessing of CRBR

fuel is beset with uncertainties, and the analysis of this part of the "back-end" of the CRBR fuel cycle is wholly deficient. There are at least three levels of problems: 1) problems relating to reprocessing at a proposed "Developmental Reprocessing Plant" (the "DRP"); 2) problems at other possible reprocessing plants; and 3) problems in achieving the needed R&D breakthroughs necessary to make the reprocessing systems effective.

(1) As to the DRP, there is virtually no basis at all for making safeguards judgments. That plant is now only in the "conceptual design" stage; there are no actual designs for the facility. (Tr. 3387; 3678-79). Further, Applicants have not quantified safeguards goals for the DRP in terms of errors in inventory balances (Tr. 3387), and they are not in a position even to state whether its design goals could actually be met. (Tr. 3379; 3381; 3387; 3407-08). Last of all, the DRP is a hypothetical facility, a "best case", which may or may not bear any relationship to reality.

(2) If indeed, the DRP is not built—and this is a clear possibility (Tr. 3389)—then reprocessing would take place elsewhere. However, the Staff, in analyzing reprocessing safeguards, only considered safeguards at the DRP; it did not look at alternative fuel cycle facilities or the capabilities of such facilities to meet safeguards objectives. (Tr. 3601; 3642-43; 3680). There is thus no basis at all for making any judgments with respect to safeguards risks and consequences at these facilities—facilities, one suspects, which are more likely candidates for reprocessing CRBR fuel than the DRP.

(3) Finally, even if the DRP is eventually built, certain R&D successes will be required to assure an effective safeguards system. (Tr. 3547). For example, the measurement capability of the safeguards systems proposed for reprocessing of CRBR fuel has not yet been demonstrated. (Tr. 3417; 3690-

91). Given the vagaries of the budget process, whether needed R&D monies will be provided is highly speculative at best. Moreover, even if they are provided, successful development payoffs cannot be guaranteed. (Tr. 3343).

Given all of these uncertainties, the Staff's blithe conclusion that it is reasonably likely that reprocessing safeguards will be effective (Staff Exh. 8, p. E-13) is unsupportable.

Exception:

52. The Board erred in failing to find that, given the lack of independent effectiveness of the material control and accounting and physical security systems, it cannot reasonably be concluded at this time that safeguards objectives, i.e., high assurance of deterrence, detection and apprehension of diversion or theft or formula quantities of special nuclear material, can or will be achieved at CRBR fuel cycle facilities.

The final deficiency in the Board's approach to safeguards risks and consequences lies in its failure to consider the lack of independent effectiveness of material control and accounting and physical security systems in determining the ability of Applicants to achieve safeguards objectives throughout the fuel cycle.

Material control and accounting systems and physical security systems, are not independently effective in deterring, detecting and thwarting safeguards threats. (Tr. 3363-64; 3432; 3695). They operate, in effect, in tandem, and one system standing alone is not sufficient to achieve safeguards objectives.

Intervenors contend that material accounting provides the only means for assuring that physical protection and material control systems are effective and that no significant losses or diversions have gone undetected. In other words, if M&EA is not operating effectively, the combined effectiveness of the system collapses. However, the Board excluded evidence with respect to this question of independent effectiveness. (Tr. 3779-80; 3920). As a result,

Intervenors were not able to present their case—a case of critical importance to assessing overall safeguards effectiveness. Consequently, the Board was in no position to determine whether the Staff's approach was acceptable, and its implicit determination that it was is unsupportable.

Exceptions:

84. The Board erred in granting the portion of Applicants' March 29, 1982 Motion for Protective Order regarding discovery requests related to Intervenors' Contention 4 (Order Following Conference with Parties, April 14, 1982, at 14, paragraph 2).

85. The Board erred in granting Applicants' April 2, 1982 Motion for a Protective Order. (Order Following Conference with Parties, April 14, 1982, at 14-15).

97. The Board erred in granting portions of Applicants' November 12, 1982 "Motion to Strike Portions of the Testimony of Dr. Thomas B. Cochran (Part V)." (Tr. 3767-88, 3887-3992).

98. The Board erred in granting portions of the Staff's motion to strike portions of Intervenors' Exhibit 12. (Tr. 3870-86).

In a series of procedural rulings, the Board cut off discovery and excluded evidence which it deemed to constitute a "challenge to the adequacy" of safeguards at DOE fuel cycle facilities. In so doing, it fundamentally misconstrued the requirements of NEPA and unjustifiably limited Intervenors' ability to make their case with respect to safeguards risks and consequences at the CRBR and supporting fuel cycle facilities.

During the course of this proceeding, Intervenors have sought to develop and introduce facts which would illuminate safeguards risks and consequences of safeguards failures at the CRBR and supporting fuel cycle facilities. Contrary to the arguments of Applicants and the Staff and the apparent understanding of the Board, they were not seeking to challenge "the adequacy of existing regulatory requirements." Intervenors' efforts emphatically did not represent an "attack on" or a "challenge to" anything outside the specific context of the CRBR and its supporting fuel cycle. Their efforts were simply

to get information with respect to experiences at other facilities which would be relevant to assessing, for NEPA cost/benefit purposes, safeguards issues at the CRBR and its supporting fuel cycle facilities.

In ruling out discovery and the submission of evidence on these matters, the Board appeared to take the view that such information went beyond Contentions 4 and 6(b)(4), because "adequacy" did not bear on "costs" of safeguards and physical security for purposes of the NEPA cost/benefit balancing. However, the distinction between "adequacy" and "costs" is wholly artificial. Whether or not particular safeguards are adequate necessarily bears upon costs which might be incurred—either costs if safeguards should fail, or costs needed to upgrade safeguards to satisfactory levels.

It is quite clear that, in conducting a NEPA cost/benefit analysis, all relevant costs—technical, economic, social and environmental—must be taken into account by the agency. See, e.g., Sierra Club v. Froehlke, 359 F .Supp. 1289, 1366 (W.D. Tex. 1973); Chelsea Neighborhood Association v. U.S. Postal Service, 516 F.2d 378, 386 (2d Cir. 1975); Boston Edison Co. (Pilgrim Nuclear Power Station, Unit 2), ALAB-632, 13 NRC 91 (1981). See also Sierra Club v. Sigler, 695 F.2d 957, 979 (5th Cir. 1983) ("There can be no 'hard look' at costs and benefits unless all costs are disclosed."). In order to get a proper understanding of such costs, it was plainly necessary to understand how safeguards have been applied at other facilities and how that experience may be appropriately transferred to the CRBR and its supporting fuel cycle facilities. The Board's rulings, both with respect to discovery and the submission of evidence, therefore, are inconsistent with the requirements of NEPA and cannot stand.

IV. Contentions 6(b)(1) and 6(b)(3)

ASLB Opinion, pp. 47-51.

ASLB Findings of Fact, paragraphs 123-140.

ASLB Conclusions of Law, paragraphs 5-7.

Intervenors' Proposed Findings of Fact, paragraphs 154-178.

Intervenors' Proposed Conclusions of Law, paragraphs 19-21.

Summary

Intervenors' Contentions 6(b)(1) and 6(b)(3) question the adequacy under NEPA of the Staff's and Applicants' analyses of the environmental impact of the fuel cycle associated with the CRBR, particularly the evaluation of the impacts of reprocessing CRBR spent fuel, plutonium separation, and disposal of CRBR wastes (See Attachment A). Intervenors' appeal of the PID is based on the Board's failure to find that the Staff's and Applicants' analysis (1) is based upon insufficiently conservative assumptions for CRBR plutonium fuel isotopic content; (2) does not adequately analyze the impacts of reasonably foreseeable alternatives to the Developmental Reprocessing Plant; and (3) fails to disclose and consider significant uncertainties regarding potential radiological releases from CRBR waste management activities.

Exceptions:

53. The Board erred in finding that the fuel composition used by the Applicants in their fuel cycle analyses is equivalent to LWR fuel with a burnup on the order of 20,000 megawatt days per metric ton. (Findings of Fact, ¶ 127).

54. The Board erred in concluding that there is an adequate supply of the lower burnup LWR spent fuel proposed for CRBR use. (Opinion, pp. 48-49).

55. The Board erred in disregarding and failing to confront substantial evidence that the plutonium isotopic concentrations assumed by the Staff and Applicants in their SSST and fuel cycle analyses are more reasonably associated with a burnup of 12,000-14,000 megawatt days per metric ton.

56. The Board erred in failing to find that for a reactor of the general size and type as the CRBR, the Staff and Applicants

should assume that it will be fueled at some point in its operating lifetime by plutonium recovered from LWR high burnup spent fuel, and should analyze the CRBR environmental impacts and site suitability based upon the use of such fuel.

Staff and Applicants failed to base their environmental fuel cycle impacts analysis upon sufficiently conservative estimates of CRBR plutonium fuel isotopic content. The origin and burnup of the plutonium used to fuel CRBR and the manner in which it has been, and is being, recycled determines the isotopic concentrations released to the environment, and, to a large extent, the resultant somatic risks, genetic risks, and other environmental effects associated with the CRBR fuel cycle. (Tr. 4378-79; 4263-64; 4573-74; 4585-87). One can generally assume that the higher the percentage of Pu-240, the higher the percentage of Pu-238 and Pu-241, which are controlling in terms of bone surface dose. (Tr. 4530; 4587).

Applicants' two estimates of CRBR fuel cycle impacts assumed 20% Pu-240 and 12% Pu-240, respectively. (App. Exh. 35, Sec. 5.7; App. Exh. 36, p. 14.4A-2). Staff's estimate of CRBR fuel cycle impacts assumed a plutonium composition of roughly 18% Pu-240. (Tr. 4588-89). Applicants' witnesses believed that the 20% Pu-240 plutonium used in their calculations had a burnup in the range of 25,000 Mwd/MT (Tr. 4259-61), whereas Staff's witness believed its analysis assumed plutonium with a burnup of 20,000-30,000 Mwd/MT, but did not know for sure. (Tr. 4370; 4383-84). Intervenors' evidence demonstrates that the plutonium isotopic concentrations assumed by Staff and Applicants are more reasonably associated with a lower burnup of 12,000-14,000 Mwd/MT. (Int. Exh. 14, Tr. 4617; 4531-33). There is insufficient evidence in the record to establish that there would be enough fuel with burnups of less than 12,000-14,000 Mwd/MT to fuel the CRBR for any length of time. This claim is based in part upon the Staff's assumption that the CRBR fuel cycle will be closed prior to expending the available low burnup fuel (Staff Exh. 8, p. D-35), an

assumption which is unsupported by the record. (See Tr. 4235-36; 4241; 4353-54).

The evidence indicates that, at some point, CRBR will probably utilize plutonium recovered from high burnup LWR spent fuel that has been reprocessed in the DRP or elsewhere, regardless of the availability of low-burnup LWR spent fuel. The DRP capacity is 150 metric tons, only 8% of which would be used to reprocess CRBR spent fuel. (Staff Exh. 8, p. D-12). The remainder of the DRP capacity would most likely be used to process LWR reactor fuel, which could be of high burnup. (Tr. 4305; 4308; 4262; 4263-64). There is no evidence in the record to indicate that LWR spent fuel, if reprocessed in the DRP, would not be recycled in LWRs, or used in CRBR after recycling in LWRs. (Tr. 4253). In addition, there is no assurance that if TVA purchases the CRBR following its 5-year demonstration period, it would not use its own higher burnup LWR spent fuel in the CRBR. (Tr. 4310; 4311).

Staff and Applicants were in error in failing to address the possibility that the CRBR will be fueled at some point with higher burnup (and thus higher Pu-240 content) LWR spent fuel, and in failing to analyze the impacts of such fuel use. Calvert Cliffs' Coordinating Committee, Inc. v. Atomic Energy Commission 449 F.2d 1109, 1128 (D.C. Cir. 1971); see also Sierra Club v. Sigler, 695 F.2d 957, 968-971 (5th Cir. 1983). This assumption would increase the Staff and Applicants' bone surface dose contribution in Appendix D by a factor of 2 to 4.3 (Tr. 4586-91), and would increase the plutonium source term in the two controlling isotopes by a factor of 2 to 4. (Tr. 4265). This correction would also increase Staff's SSST bone surface (and bone dose) estimates by a factor of up to 4.3 (Exception 20, supra), and would increase Staff's CDA bone surface estimates by the same factor. (Exception 44, supra).^{14/}

Exceptions:

57. The Board erred in finding that the analysis of the Developmental Reprocessing Plant with an assumed total release of tritium and carbon-14 bounds all potential and alternative reprocessing facilities. (Findings of Fact, ¶ 131).

59. The Board erred in failing to find that the Staff failed to perform an in-depth, searching analysis of the potential impacts of reprocessing CRBR spent fuel at plants other than the conceptual Developmental Reprocessing Plant.

63. The Board erred in failing to find that the Staff failed to perform an independent assessment of Applicants' submissions regarding the environmental effects of the CRBR fuel cycle as required by NEPA.

The Staff failed to perform an adequate, in-depth, and independent assessment of the environmental impacts of reprocessing CRBR spent fuel. It is undisputed that reprocessing poses the greatest environmental hazards of the CRBR fuel cycle. (Staff Exh. 8, p. D-34). The Applicants based their analysis of reprocessing impacts upon the Developmental Reprocessing Plant (DRP), which has not been constructed and which is, in fact, still in the conceptual design stage. (Staff Exh. 8, p. D-12). The Staff performed no independent assessment of reprocessing impacts at facilities other than the DRP—a distinct possibility—such as the construction of a "breeder head-end" facility at the existing Savannah River Plant (SRP) reprocessing facility. (Tr. 4194-95; 4204-12; Staff Exh. 8, pp. D-15 to D-17; App. Exh. 35, p. 5.7-7). Instead, the Staff relied on Applicants' conclusions that the DRP environmental impacts bound those from any alternative reprocessing plant. (Tr. 4389; 4402; 4573). This conclusion is unsupported by the record

14/ This increase in bone surface dose contribution would occur regardless of how the plutonium isotopic concentration would change after the fuel is placed in the CRBR. Even if the concentrations of Pu-238 and Pu-241 would slowly decrease as the fuel is burned in the CRBR over a 13 year period (Finding 155), the initial concentrations would be much higher than assumed by Staff and Applicants. (Tr. 4311-12; Int. Exh. 13, p. 25, Tr. 4591.)

(Exceptions 57 to 62 infra) and does not comply with NEPA. Independent analysis is required, and the failure of the Staff to carry out that analysis violates the requirements of NEPA. Greene County Planning Board v. Federal Power Commission, 455 F. 2d 412 (2d Cir.), cert. denied, 409 U.S. 849 (1972); Sierra Club v. Alexander, 484 F. Supp. 455, 466-67 (N.D.N.Y.), aff'd, 633 F.2d 206 (2d Cir. 1980).

The Staff agreed with Applicants' claim that the DRP releases are bounding since over 99% of the reprocessing whole body dose commitment would be due to releases of carbon-14 and tritium, (Tr. 4465; 4405-06), and the analysis assumed release of 100% of those isotopes. (Tr. 4405; 4408-09). The Staff thus reasoned that no greater releases, or dose consequences, could occur at other facilities. Id. This conclusion is erroneous in several respects.

First, the Staff's estimate that only 1% of the U.S. population dose commitment results from plutonium and other transuranics refers only to whole body dose. (Tr. 4465; 5930-33; Staff Exh. 8, p. D-34). The Staff failed to examine the plutonium contribution to bone surface dose from reprocessing, which would be much higher, since bone surface dose is controlling for plutonium release. (Tr. 5297; 6024). For this reason, it is important to compare plutonium and other transuranic releases at alternative facilities (Tr. 4594-4600), which the Staff has not done.

The combination of potential errors introduced by underestimating the plutonium isotopic concentrations of Pu-238 and Pu-241 (Exceptions 53 to 56, supra), the plutonium confinement factors at reprocessing plants (Exception 58, infra) and understating the quality factor for bone surface (and lung) dose calculations (Exception 30-31, supra) could lead to an underestimate of

several orders of magnitude of the health effects due to plutonium release.
(Tr. 4600).

Exception:

58. The Board erred in finding that Intervenor's contend that the containment factor for the CRBR fuel reprocessing facility will likely be a factor of ten greater than that claimed by the Staff and Applicants, based on operational experience at Hanford and Savannah River. (Findings of Fact, ¶ 133).

Intervenor's evidence demonstrated that the recent plutonium gaseous releases from the SRP are approximately a factor of 10 higher than those estimated for the DRP. (Tr. 4599). The Board failed to note, however, that the lifetime plutonium gaseous releases from the SRP, as calculated by Intervenor's, are approximately 4000 times higher than that estimated for the DRP. (Tr. 4597-99; see also Tr. 4220-21; 4397-98; 4490-10). There is no evidence that the DOE would make any changes in the SRP if it were used to reprocess CRBR fuel. (Tr. 4247-48; 4179; 4181-82; 6022-23). In any case, this vast difference in containment factors cannot be cured by the addition of another bank of HEPA filters, as claimed by the Staff. (Tr. 4436; 4430-31). Nor would this difference be reduced by construction of a "breeder head-end facility" at the SRP, since most of the transuranics would be released from the balance of the SRP, not the "head-end" facility. (Tr. 4409-10). Reprocessing at the SRP would thus result in much higher bone surface dose commitments than estimated for the DRP. The Staff did not take these factors into account in determining that DRP releases were bounding.

Exceptions:

60. The Board erred in failing to find that the Staff's and Applicants' analyses of the environmental impacts from reprocessing CRBR fuel are inadequate in that they fail to analyze liquid effluents at the Savannah River Plant or the Hanford PUREX plant.

61. The Board erred in failing to find that the Staff's and Applicants' analyses of the environmental impacts from reprocessing

CRBR fuel are inadequate in that they fail to analyze transuranic releases at the Savannah River Plant or the Hanford PUREX plant.

62. The Board erred in failing to find that the Staff's and Applicants' analyses of the environmental impacts from reprocessing CRBR fuel are inadequate in that they fail to analyze accidental or bypass leakage at the Savannah River Plant or the Hanford PUREX plant.

The Staff's conclusion that DRP impacts bound those from alternative reprocessing plants is also faulty because it fails to take account of liquid effluents (Tr. 4411-12), TRU releases (Tr. 4397-98; 4409-10), or accidental or bypass leakage (Tr. 4436; 4591; 4599-4600) from the SRP or the Hanford Purex Plant. The SRP releases liquid effluents, whereas the DRP would not (Tr. 4411-12; Staff Exh. 8, p. D.17); and, as mentioned above, TRU, accidental and bypass leakage would be much higher at the SRP than at the DRP. (Exception 58, supra). Without an analysis of these releases, the Board cannot be reasonably assured that the DRP releases are bounding, or that the environmental analysis is adequate.

Exceptions:

64. The Board erred in failing to find that the Staff's and Applicants' analyses of the environmental effects of the CRBR fuel cycle are inadequate in that they fail to disclose and consider significant uncertainties regarding potential radiological releases from CRBR waste management activities.

95. The Board erred in granting Applicants' November 12, 1982 "Motion to Strike Portions of the Testimony of Dr. Thomas B. Cochran (Part III)". (Intervenors' Exhibit 13) (Tr. 4478-4517; 4572-82; 4603-10).

Intervenors' testimony in support of Contention 6(b)(3) contained seven pages of evidence regarding the significant uncertainties surrounding the potential radiological releases from CRBR waste management activities. (Int. Exh. 13, Tr. 4603-10). The Board struck this evidence in response to a motion by Applicants, stating that the matters covered in that testimony are covered

by the generic "Table S-3 rule" and the pending "waste confidence" proceeding. (Tr. 4515-17). This ruling cannot stand.

First, Applicants' claim that the testimony constitutes an impermissible challenge to the validity of Table S-3 is simply incorrect. The Staff, in response to comments on the Draft Supplement to the CRBR Environmental Impact Statement, explicitly stated that "[t]he analysis performed in the Draft Supplement was not based on 10 CFR 51.20 and Table S-3." (Staff Exh. 8, p. 12-61 (emphasis added)). Since the Staff claims not to have applied Table S-3 to its CRBR analysis, Intervenor's fail to see how their testimony can constitute a challenge to that regulation. The testimony mentions Table S-3 only because some of the analyses performed in that Table are similar to those in FSFES Appendix D.

Nor is the excluded testimony covered by the Commission's "Waste Confidence" Proceeding. In the Matter of Proposed Rulemaking on the Storage and Disposal of Nuclear Waste (Waste Confidence Rulemaking), Docket No. PR-50, 51 (44 Fed. Reg. 61372). That proceeding was initiated to examine the impacts of disposal of LWR spent fuel from commercial nuclear reactors. The Licensing Board specifically excluded discussion of the impacts of disposal of reprocessed waste, at the request of the Department of Energy. Id.; First Prehearing Conference Order, Feb. 1, 1980; see also Cross Statement of the U.S. Dept. of Energy, Sept. 5, 1980, pp. 1-3 to 1-4. Since the issues raised in the stricken portions of Intervenor's Exhibit 13 are not the subject of NRC generic proceedings, the Board erred in striking the evidence, and in not taking into account in its NEPA cost/benefit analysis the significant uncertainties surrounding potential radiological releases from CRBR waste management activities.

V. Contentions 5(a) and 7(c)

Intervenors' Contentions 65-70.

ASLB Opinion, pp. 52-57.

ASLB Findings of Fact, paragraphs 141-179.

ASLB Conclusions of Law, paragraphs 5-7.

Intervenors' Proposed Findings of Fact, paragraphs 179-198.

Intervenors' Proposed Conclusions of Law, paragraphs 22-23.

Exceptions:

65. The Board erred in finding that none of the ten alternative sites is environmentally preferable to or substantially better than the CRBR site. (Findings of Fact, ¶ 146).

66. The Board erred in finding that the evidence of record does not indicate that substantial accident risk reductions would accrue with a change of site. (Opinion, p. 56).

The evidence shows that at least five of the alternative sites considered are, all other considerations being equal, environmentally preferable to the Clinch River site in any ordinary sense of the term "preferable." For example, the Hartsville TVA site has a projected radiological risk to the public from accidents which is about a factor of six lower than that for Clinch River. (Tr. 4878; 4884; 4886; 4803-04; 4806-07; 4801). All other environmental factors—plus utility participation—are either better at Hartsville or comparable, with the exception of socioeconomic effects. (Staff Exh. 8, pp. L-5, L-8, L-10 - L-12).

At the Yellow Creek TVA site the radiological risk varies from a factor of 3 better than Clinch River to a factor of 24 better (depending on the specific accident X/Q value used). (Tr. 4878, 4884, 4886, 4801, 4804, 4806-07). All other environmental considerations—plus utility participation—are either preferable at Yellow Creek or comparable, except for socioeconomic effects. (Staff Exh. 8, pp. L-26 - L-32).

The same pattern holds true for the three alternative DOE sites: Hanford (Tr. 4878-79, 4884, 4886; Staff Exh. 8, pp. L-33 - L-38), INEL (Tr. 4878-79, 4884, 4886; Staff Exh. 8, pp. L-39 - L-43), and Savannah River Plant (Tr.

4878-79, 4884, 4886; Staff Exh. 8, pp. L-43 - L-49.) The radiological doses to the public from an accident at those sites would be between a factor of 8 and a factor of 18 lower than those at Clinch River. (Int. Proposed Findings ¶¶ 183, 185, and 187.) Most of the other environmental considerations at the three DOE sites are better than or comparable to Clinch River (Int. Proposed Findings ¶¶ 184, 186, and 188.) By any ordinary standard of comparison, reductions in risk by factors of 3 to 24 are significant, even where the risk is preliminarily judged to be low.

The Board has erred in adopting the Staff's non-analysis, which treats all population densities below a certain level as "comparable" even when there are large actual differences, by treating substantial differences in atmospheric dispersion characteristics as "similar", by treating enormous differences in relative overall accident dose consequences as "insignificant", by treating terrestrial impact advantages of other already cleared and level sites (Hartsville and Yellow Creek) as unimportant, and by treating aquatic and water quality impact advantages of sites on larger rivers as unimportant. To avoid an inevitable conclusion that these alternative sites are environmentally substantially better than the Clinch River site, the Staff and Board have concluded that all of these real advantages are insignificant, thus altogether evading their responsibilities to engage in an actual comparison.

Exception:

67. The Board erred in relying upon the Staff's analysis of CRBR accident risks in FSFES Appendix J for its ruling that "the reduction in doses that are calculated at the alternative sites does not lead to the conclusions that the alternative sites are either substantially better or obviously superior." (Opinion, p. 54, Board Findings of Fact No. 174, 176.)

The Board's reliance on FSFES Appendix J for its conclusion that the reduction in doses that would result from moving to an alternative site is

insignificant makes a mockery of the alternative site analysis. That analysis reveals that five of the alternative sites considered would have radiological accident dose consequences which are lower than those at the Clinch River site by factors of 3 to 24. (Exceptions 65-66, supra).

The Board has improperly discounted these clear advantages of the alternatives by relying on the Staff's "first order" projection in the FSFES Appendix J that the risks from accidents at CRBR are very low. This finding, in effect, implies that the alternative siting analysis can be eviscerated by a sufficiently low probability of core disruptive accidents, and thus an overall risk comparable to that of LWRs. This position is unsupported by any Commission regulations or precedent.

As the Appeal Board stated in Boston Edison Company (Pilgrim Nuclear Power Station Unit 2), ALAB-479, 7 NRC 774, 79 (1978), [citing Public Service Company of New Hampshire (Seabrook Station, Units 1 & 2), CLI-77-8, 5 NRC 503, 23 (1977)], NEPA requires the Commission to consider whether reasonable alternatives less harmful to the environment exist before allowing a utility to proceed with construction. Simply following the requisite procedural steps will not guarantee a record or an alternative site review up to NEPA standards.

In Pilgrim, the Appeal Board affirmed the Licensing Board's denial of an LWA-1 because of the inadequacy of the alternative site analysis, in which the Staff had failed to look specifically at suggested alternative sites. The Appeal Board held that "[t]he litmus...is whether the environmental consequences of each reasonable alternative have been accorded a 'hard look,'" finding that standard was not met at Pilgrim, 7 NRC at 779.

In the instant case the deficiency in the alternative site analysis is different, but no less serious than that at Pilgrim. While the Applicants and

Staff did look with considerable specificity at the alternative TVA and DOE sites, the conclusions which are drawn from the data presented do not follow from those data. It is a classic case of "simply following the requisite procedural steps." The Staff's position makes the alternative site analysis meaningless in terms of radiological risks: by definition, the probability of class 9 accidents is always supposed to be low; therefore, reductions in consequences at better sites would never be significant, using the Staff's logic. The alternative site analysis is not an alternative to the plant safety analysis—it is separate and distinct and provides an additional layer of safety.

The Staff's is not a thoughtful hard look analysis. If the analysis of alternatives does not measure up to NEPA standards, the LWA-1 application currently in question must be denied. As the Appeal Board has stated, "[a]pproval may not be given to an FES which treats in such a cavalier and misleading fashion one of the most important questions which NEPA requires to be considered." Florida Power and Light Company (St. Lucie Unit No. 2), ALAB-335, 3 NRC 830, 840 (1976).

Exception:

68. The Board erred in relying upon the Staff's conclusion that, because the CRBR 0 to 30 mile population density projected at the time of plant startup is below the 500 person per square mile "trip" level of Regulatory Guide 4.7, the numerical differences in population between the Clinch River site and each of the alternative sites are not significant. (Board Finding of Fact No. 174).

The Board is incorrect when it states that Regulatory Guide 4.7 "does not make any distinction with regard to sites with population densities below the 'trip' levels, and defines 'low population densities' to be those which are below the 'trip' levels." In fact, Reg. Guide 4.7 in no way suggests that sites with population densities below the trip levels need not be compared as

to population. To the contrary, the Guide dictates that sites with population densities above the trip levels are "not acceptably low," and that special consideration must be given to alternative sites in that instance. In addition, there is no definition of "low population densities" in the Reg. Guide.

Moreover, the interpretation that sites with population densities below the 500 persons per square mile "trip" level have "low" population densities and need not be compared is flatly contradicted by the Proposed Rule on Alternative Sites, which, although not controlling, was used by both Applicants and Staff and set forth in the Staff's FSFES at Appendix K. The same trip levels from Reg. Guide 4.7 appear in the proposed rule as one of five acceptance criteria for candidate sites, thus implying that sites with population densities above the trip levels are not even acceptable as candidate sites. Also, the proposed rule requires consideration of population in the first part of its two-part test comparing candidate sites which have already met the threshold acceptance criteria; that is, under the Proposed Rule the Staff must analyze the population of various sites which are all below the 500 person per square mile trip level. In light of these facts, the Board's acceptance of the Staff's untenable argument that sites with population densities below the trip levels need not be compared should be reversed, and the clear preferability of all the alternative sites with respect to population density should be acknowledged.

Exception:

69. The Board erred in failing to find that each of the alternative sites within the TVA region would meet the CRBR programmatic objective of utility participation. (Board Finding of Fact No. 179.)

While the Board went out of its way in attempting to debunk the viability of the alternative DOE sites by pointing out that the CRBR programmatic

objective of utility participation would probably not be attainable at those sites, the Board conspicuously failed to acknowledge that all of the alternative TVA sites would meet that programmatic objective as readily as the Clinch River site. The omission is important because this fact, together with the clear environmental preferability of at least two of those TVA sites (Hartsville and Yellow Creek), makes possible a finding that those sites are, on balance, substantially better than the Clinch River site.

Exception:

70. The Board erred in finding that since no offsetting benefits were present at alternative sites, delays in moving to alternative sites would not be consistent with DOE's timing objective under the LMFBR program. (Board Finding of Fact No. 178.)

Contrary to the Board's assertion, the evidence shows that there are very substantial offsetting benefits which more than compensate for any timing disadvantage of alternative sites. As discussed above, Hartsville, Yellow Creek, and the three DOE sites would all result in substantial reductions in radiological dose consequences, and all those alternatives, except possibly INEL, are either preferable or comparable with respect to all other environmental impacts except socioeconomics.

The offsetting environmental benefits of these alternative sites outweigh any timing penalty associated with moving to these sites. The Board's finding that no offsetting benefits even existed is clearly incorrect.

VI. Contentions 7(a) and 7(b)

Exception:

71. The Board erred in failing to find that the alternative steam generator testing program suggested by the GAO would be a substantially better design approach since there is significant uncertainty concerning the ability of the steam generator to withstand sharp temperature transients.

The Board improperly discounted the GAO's conclusion that the proposed testing program for CRBR steam generators involved undue risk, observing that the GAO's technical consultant agreed with DOE that any steam generator tests that result in a delay in the construction of CRBR are not appropriate. (ASLB Finding ¶ 186.) This programmatic or policy issue of the wisdom of delay is manifestly not one for which the GAO consultant's technical expertise qualifies him to speak.

In the technical field for which GAO's consultant is qualified to comment, he concluded that the present testing program would not provide necessary information about the structural integrity and ability to withstand sharp thermal transients of the CRBR steam generators—two key considerations in steam generator performance. A prime contractor on the CRBR project, Westinghouse, agreed with this finding. (Tr. 6257). In addition, the Board completely ignored the fact that the designer and manufacturer of the prototype CRBR steam generator (Atomsics International) agreed with GAO's conclusion that more testing was called for. (Tr. 6257). Atomsics International also found that design differences between the prototype steam generator and the design which is now planned for CRBR are substantial, which flatly contradicts the Board's finding that those differences are "minor in nature and are not involved with any of the fundamental aspects of the steam generator concept or structure." (ASLB Finding ¶ 191.)

The Board acknowledges that the thermal shock issue is unresolved (ASLB Finding ¶ 198), but brushes it off with a promise to explore the issue at the construction permit phase. The Board fails to acknowledge that the structural integrity also will not be tested by the proposed testing program, as identified by GAO's technical consultant and the manufacturer of the prototype.

Exception

72. The Board erred in failing to find that the Staff's analysis of the CRBR programmatic objective of economic feasibility is inadequate in that it failed to include an examination of the actual and projected costs of the CRBRP.

73. The Board erred in finding that the CRBRP is reasonably likely to meet the objective of demonstrating economic feasibility. (ASLB Finding No. 207).

The Staff and the Board have interpreted the economic feasibility objective in a manner which conveniently allows them to ignore the skyrocketing actual costs of CRBR. Staff believes that achievement of the economic feasibility objective is determined merely by whether or not the project has a detailed cost accounting system (Tr. 6476, 6484), and does not consider the actual cost of CRBR to be relevant. (Tr. 6477, 6485.)

It is self-evident that a demonstration of the "economic feasibility of an LMFBR central station electric power plant in a utility environment" (DOE Supplement to the LMFBR Program Final EIS, DOE/EIS-0085-D, May 1982, at 57; ASLB Opinion, p. 59) depends largely on the economics of building and operating the plant. The existence of a cost accounting system demonstrates only that information will be generated, not that the concept is economically feasible.

There is absolutely no evidence in the record indicating that CRBR will demonstrate the economic feasibility of a central station LMFBR in a utility environment.

VII. Other Contentions

Exceptions:

76. The Board erred in refusing to admit for litigation Intervenor's Contention 17. (Order Following Conference With Parties, April 14, 1982, at 7-8).

95. The Board erred in granting Applicants' November 12, 1982 "Motion to Strike Portions of the Testimony of Dr. Thomas B. Cochran (Part III)". (Intervenors' Exhibit 13) (Tr. 4478-4517; 4572-82; 4603-10).

Intervenors' Contention 17 contends that in view of the increasing likelihood that fuel may not be available for CRBR, the project is not likely to be able to meet its programmatic objectives. (See Attachment A). The Commission has held that "the likelihood that the proposed CRBR project will meet its objectives within the LMFBR program—a "benefit" in the NEPA cost/benefit balance—is an issue relevant to this proceeding." U.S. Energy and Research Development Administration, Project Management Corporation, Tennessee Valley Authority (Clinch River Breeder Reactor Plant), CLI-76-13, 4 NRC 67, 92 (1976) (the "ERDA Decision"). In its April 14, 1982 Order Following Conference With Parties, the Board denied Contention 17 as a matter of law, stating that it concerns a "policy or programmatic issue" which is outside the permissible scope of this proceeding, citing the ERDA decision (April 14, 1982 Order at 8). This Conclusion is erroneous. Contention 17 does not question the "need" for the CRBR, which is outside the scope of the proceedings, but only whether the expected plutonium fuel availability is sufficient to permit CRBR operation and demonstration of LMFBR programmatic objectives. It should have been admitted. See Natural Resources Defense Council's Response to Objections to Contentions March 31, 1982 at 18-20.

The Board also erred in striking portions of Intervenors' Exhibit 13 which concerned the type of plutonium which would likely be available to fuel the CRBR, and its probable environmental impacts. (Tr. 4572-82). This evidence is relevant both to Contention 17, which should have been admitted, and to Contention 6, which was admitted. It also concerns the likely isotopic content of the plutonium used to fuel CRBR, which, as shown above, determines in large part the resultant somatic risks, genetic risks, and other

environmental effects from the CRBR fuel cycle. (Exception 20, supra). This testimony should have been admitted.

Exception:

77. The Board erred in refusing to admit for litigation Intervenor's Contention 22. (Order Following Conference With Parties, April 14, 1982, at 9-10).

Intervenor's Contention 22 questions whether accident exposures to the public and plant employees will be kept "as low as reasonably achievable" ("ALARA"). In its April 14 Order Following Conference With Parties, the Board denied Contention 22, holding that, as a matter of law, ALARA regulations do not apply to accidents, but only to normal reactor operations. Intervenor's contend that the ALARA principle, as recommended by the national and international radiation protection standards bodies, applies to all radiation exposures. Intervenor's admit that the ALARA principle has been explicitly incorporated into the Commission regulations governing routine releases (10 CFR 50.34a(a) and 50.36(a)), and that no explicit reference to ALARA is found in Commission regulations governing accidents. Nevertheless, Intervenor's position is that the ALARA principle must be applied to accidental exposures as well; otherwise the facility cannot be operated "without undue risk to the health and safety of the public." 10 CFR § 50.35(a). The basis of this view rests soundly on one of the fundamental tenets of the health physics profession. See Natural Resources Defense Council's Response to Objections to Contentions, March 31, 1982, at 34-37.

VIII. Other Procedural Errors

Exception:

88. The Board erred in denying Intervenor's motion to qualify Dr. Thomas B. Cochran as an expert interrogator. (Tr. 1244-46).

Contrary to the Board Chairman's assertion (Tr. 1244), there is no rule in NRC practice which prohibits cross-examination by an expert who is also a witness in a proceeding. Quite the contrary, 10 CFR § 2.733 explicitly permits such interrogation by an expert:

where it would serve the purpose of furthering the conduct of the proceeding, upon finding (a) that the individual is qualified..., (b) that the individual has read any written testimony..., and (c) that the individual has prepared himself to conduct a meaningful and expeditious examination or cross-examination.

Dr. Cochran has participated extensively in all prehearing proceedings—including questioning at depositions—without objection, and counsel for Intervenor were aware of numerous earlier NRC proceedings at which cross-examination by expert interrogators had been allowed, including proceedings chaired by the same Licensing Board Chairman (e.g., Comanche Peak).

The Board's ruling seriously prejudiced the effectiveness of Intervenor's participation in the early portion of the hearing, since counsel was not then prepared to question on many of the technical subjects. As a result, extensive conferring was necessary between expert and counsel which considerably slowed the proceeding. The Board subsequently ruled that counsel and expert for Intervenor could not confer at all without specially requesting permission, which would be but sparingly granted. (Tr. 2114). Together these rulings almost totally isolated the technical expertise from the attorney who alone was authorized to speak.

Exception:

89. The Board erred in denying Intervenor's October 20, 1982 "Motion for Qualification of an Expert Interrogator under 10 CFR § 2.733." (Order Regarding Procedural Motions, November 1, 1982, at 3.7).

Prior to the second phase of the hearings, Intervenor submitted a formal written motion to qualify Dr. Cochran as an expert interrogator under 10 CFR

§ 2.733. In denying the motion, the Board cited as grounds the pervasiveness of Dr. Cochran's involvement in the proceeding as an expert witness and consultant, observing that "it would be an act of supererogation to extend it to cross-examination of opposing experts." (November 1, 1982 Order, supra, at 7).

The extent of an expert's other involvement in a proceeding is not one of the considerations listed in § 2.733 as relevant to the question, and if anything, such extensive involvement strengthens the technical qualification to conduct effective questioning.

Exceptions:

93. The Board erred in striking portions of Intervenor's Exhibit 3 (Tr. 2810-71; 7094-7104).

94. The Board erred in striking portions of Intervenor's Exhibit 4 (Tr. 3051-99; 7094-7104).

The Board granted the Staff's motion to strike all those portions of Intervenor's testimony which referred to statements of, or testimony before, the Advisory Committee on Reactor Safeguards ("ACRS"). (Tr. 7094-7104). This ruling was purportedly based on the holding in Arkansas Power and Light Company (Arkansas Nuclear One Unit 2), ALAB-94, 6 AEC 25, 32 (1973), which rejected a Licensing Board finding that the ACRS letter required to be made a part of the record by 42 U.S.C. § 2232(b) is "further proof" that a construction permit was called for on the ground that the members of the ACRS were not subject to being examined by the parties or the Board and thus the letter could not be admitted for its truth.

ALAB-94 does not stand for the sweeping proposition, posited by the Staff and the Board, that anything which the ACRS touches is "off limits" in a licensing proceeding.^{15/} In Gulf States Utilities Company (River Bend

^{15/} For example, in striking all references to 1960 ACRS comments on site criteria for nuclear reactors, the Chairman stated:
(Footnote Contd)

Station, Units 1 and 2), ALAB-444, 6 NRC 760 (1977), the Appeal Board made it clear that the contents of ACRS reports are not out of bounds at licensing proceedings:

The PSAR, SER, and the ACRS report are made part of the record in the adjudicatory proceeding. The participants therein may raise issues on the basis of disclosures in those documents and, under the Rules of Practice, have extensive discovery rights with respect to any such issues.¹⁰

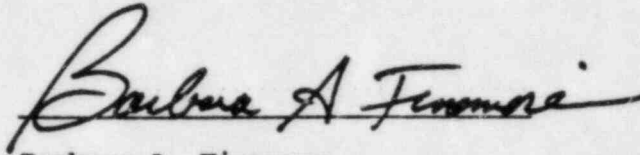
¹⁰The members of the ACRS are not, however, subject to examination in an adjudicatory proceeding with regard to the contents of an ACRS report. [Citing ALAB-94.]

6 NRC at 766 (emphasis added).

In short, no Commission rule prohibits Intervenor's witnesses' use of information from ACRS reports or meeting transcripts (all of which are public information available in the NRC's Public Document Room) as a basis for opinions and testimony. Intervenor's witnesses were placed on the stand and subject to cross-examination on their use of ACRS information just the same as on use of information from other secondary sources (e.g., the General Accounting Office or DOE). The strict hearsay rules of evidence which would exclude such secondary sources in a judicial forum do not apply in the administrative context of NRC proceedings.

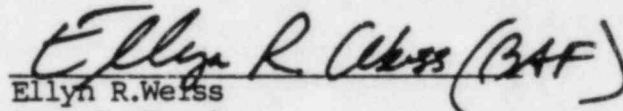
Well, the fact that it was submitted [to the ACRS] wouldn't mean anything. The question would be was there any result therefrom. If the ACRS commented anyway, that is out. If the action taken depended in whole or in part on ACRS action, it is out. If, on the other hand, you can show a clear line of descent wholly apart from ACRS, it would remain in. (Tr. 7100) (Emphasis added).

Respectfully submitted,



Barbara A. Finamore
S. Jacob Scherr

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



Ellyn R. Weiss
Dean R. Tousley

HARMON & WEISS
1725 I Street, NW, #506
Washington, D.C. 20006
(202) 833-9070

Attorneys for Natural Resources
Defense Council, Inc., and the
Sierra Club

Dated: May 18, 1983

ATTACHMENT A

INTERVENORS' CONTENTIONS^{*/}

1. The envelope of DBAs should include the CDA.
 - a) Neither Applicants nor Staff have demonstrated through reliable data that the probability of anticipated transients without scram or other CDA initiators is sufficiently low to enable CDAs to be excluded from the envelope of DBAs.
 - b) Neither Applicants nor Staff have established that Applicants' "reliability program" even if implemented is capable of eliminating CDAs as DBAs.
 - (1) The methodology described in the PSAR places reliance upon fault tree and event tree analysis. Applicants have not established that it is possible to obtain sufficient failure mode data pertinent to CRBR systems to validly employ these techniques in predicting the probability of CDAs.
 - (2) Applicants' projected data base to be used in the reliability program is inadequate. Applicants have not established that the projected data base encompasses all credible failure modes and human elements.
 - (3) Even if all of the data described in Applicants' projected data base is obtained, Applicants have not established that CDAs have a sufficiently low probability that they may be excluded from the CRBR design bases.
 - (4) Applicants have not established that the test program used for their reliability program will be completed prior to Applicants' projected date for completion of construction of the CRBR.
2. The analyses of CDAs and their consequences by Applicants and Staff are inadequate for purposes of licensing the CRBR, performing the NEPA cost/benefit analysis, or demonstrating that the radiological source term for CRBRP would result in potential hazards not exceeded by those from any accident considered credible, as required by 10 CFR §100.1(a), fn. 1.
 - a) The radiological source term analysis used in CRBRP site suitability should be derived through a mechanistic analysis. Neither Applicants nor Staff have based the radiological source term on such an analysis.

^{*/} The status and/or disposition of each of these contentions is set forth in United States Department of Energy, Project Management Corporation, Tennessee Valley Authority (Clinch River Breeder Reactor Plant), LBP-83-
, NRC, Partial Initial Decision (Limited Work Authorization)
(February 28, 1983).

- b) The radiological source term analysis should be based on the assumption that CDAs (failure to scram with substantial core disruption) are credible accidents within the DBA envelope, should place an upper bound on the explosive potential of a CDA, and should then derive a conservative estimate of the fission product release from such an accident. Neither Applicants nor Staff have performed such an analysis.
 - c) The radiological source term analysis has not adequately considered either the release of fission products and core materials, e.g. halogens, iodine and plutonium, or the environmental conditions in the reactor containment building created by the release of substantial quantities of sodium. Neither Applicants nor Staff have established the maximum credible sodium release following a CDA or included the environmental conditions caused by such a sodium release as part of the radiological source term pathway analysis.
 - d) Neither Applicants nor Staff have demonstrated that the design of the containment is adequate to reduce calculated offsite doses to an acceptable level.
 - e) As set forth in Contention 11(d), neither Applicants nor Staff have adequately calculated the guideline values for radiation doses from postulated CRBRP releases.
 - f) Applicants have not established that the computer models (including computer codes) referenced in Applicants' CDA safety analysis reports, including the PSAR, and referenced in the Staff CDA safety analyses are valid. The models and computer codes used in the PSAR and the Staff safety analyses of CDAs and their consequences have not been adequately documented, verified or validated by comparison with applicable experimental data. Applicants' and Staff's safety analyses do not establish that the models accurately represent the physical phenomena and principles which control the response of CRBR to CDAs.
 - g) Neither Applicants nor Staff have established that the input data and assumptions for the computer models and codes are adequately documented or verified.
 - h) Since neither Applicants nor Staff have established that the models, computer codes, input data and assumptions are adequately documented, verified and validated, they have also been unable to establish the energetics of a CDA and thus have also not established the adequacy of the containment of the source term for post accident radiological analysis.
3. Neither Applicants nor Staff have given sufficient attention to CRBR accidents other than the DBAs for the following reasons:

- a) Neither Applicants nor Staff have done an adequate, comprehensive analysis comparable to the Reactor Safety Study ("Rasmussen Report") that could identify other CRBR accident possibilities of greater frequency or consequence than the accident scenarios analyzed by Applicants and Staff.
 - b) Neither Applicants' nor Staff's analyses of potential accident initiators, sequences, and events are sufficiently comprehensive to assure that analysis of the DBAs will envelope the entire spectrum of credible accident initiators, sequences, and events.
 - c) Accidents associated with core meltthrough following loss of core geometry and sodium-concrete interactions have not been adequately analyzed.
 - d) Neither Applicants nor Staff have adequately identified and analyzed the ways in which human error can initiate, exacerbate, or interfere with the mitigation of CRBR accidents.
5. Neither Applicants nor Staff have established that the site selected for the CRBR provides adequate protection for public health and safety, the environment, national security, and national energy supplies; and an alternative site would be preferable for the following reasons:
- a) The site meteorology and population density are less favorable than most sites used for LWRs.
 - (1) The wind speed and inversion conditions at the Clinch River site are less favorable than most sites used for light-water reactors.
 - (2) The population density of the CRBR site is less favorable than that of several alternative sites.
 - (3) Alternative sites with more favorable meteorology and population characteristics have not been adequately identified and analyzed by Applicants and Staff. The analysis of alternative sites in the ER and the Staff Site Suitability Report gave insufficient weight to the meteorological and population disadvantages of the Clinch River site and did not attempt to identify a site or sites with more favorable characteristics.
 - b) Since the gaseous diffusion plant, other proposed energy fuel cycle facilities, the Y-12 plant, and the Oak Ridge National Laboratory are in close proximity to the site, an accident at the CRBR could result in the long term evacuation of those facilities. Long term evacuation of those facilities would result in unacceptable risks to the national security and the national energy supply.
6. The ER and FES do not include an adequate analysis of the environmental impact of the fuel cycle associated with the CRBR for the following reasons:

- b) The analysis of fuel cycle impacts must be done for the particular circumstances applicable to the CRBR. The analyses of fuel cycle impacts in the ER and FES are inadequate since:
 - 1) The impact of reprocessing of spent fuel and plutonium separation required for the CRBR is inadequately assessed;
 - 3) The impact of disposal of wastes from the CRBR spent fuel is inadequately assessed;
 - 4) The impact of an act of sabotage, terrorism or theft directed against the plutonium in the CRBR fuel cycle, including the plant, is inadequately assessed, nor is the impact of various measures intended to be used to prevent sabotage, theft or diversion.
- 7. Neither Applicants nor Staff have adequately analyzed the alternatives to the CRBR for the following reasons:
 - a) Neither Applicants nor Staff have adequately demonstrated that the CRBR as now planned will achieve the objectives established for it in the LMFBR Program Impact Statement and Supplement.
 - 1) It has not been established how the CRBR will achieve the objectives there listed in a timely fashion.
 - 2) In order to do this it must be shown that the specific design of the CRBR, particularly core design and engineering safety features, is sufficiently similar to a practical commercial size LMFBR that building and operating the CRBR will demonstrate anything relevant with respect to an economic, reliable and licensable LMFBR.
 - 3) The CRBR is not reasonably likely to demonstrate the reliability, maintainability, economic feasibility, technical performance, environmental acceptability or safety of a relevant commercial LMFBR central station electric plant.
 - b) No adequate analysis has been made by Applicants or Staff to determine whether the information requirements of the LMFBR program or of a demonstration-scale facility might be substantially better satisfied by alternative design features such as are embodied in certain foreign breeder reactors.
 - c) Alternative sites with more favorable environmental and safety features were not analyzed adequately and insufficient weight was given to environmental and safety values in site selection.
 - (1) Alternatives which were inadequately analyzed include Hanford Reservation, Idaho Reservation (INEL), Nevada Test Site, the TVA Hartsville and Yellow Creek sites, co-location with an LMFBR fuel reprocessing plant (e.g., the Development Reprocessing Plant), an LMFBR fuel fabricating plant, and underground sites.

9. Neither Applicants nor Staff have demonstrated that Applicants' plans for coping with emergencies are adequate to meet NRC requirements.

- a) The PSAR contains insufficient information regarding Applicants' ability to identify the seriousness and potential scope of radiological consequences of emergency situations within and outside the site boundary, including capabilities for dose projection using real-time meteorological information and for dispatch of radiological monitoring teams within the Emergency Planning Zones.
- b) Applicants and Staff have failed to account properly for local emergency response needs and capabilities in establishing boundaries for the plume exposure pathway and ingestion pathway EPZs for the CRBR.
- c) The PSAR contains insufficient analysis of the time required to evacuate various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations, nor does it note major impediments to the evacuation or taking of protective actions.
- d) The PSAR contains insufficient information to ensure the compatibility of proposed emergency plans for both onsite areas and the EPZs, with facility design features, site layout, and site location.
- e) The PSAR contains insufficient information concerning the procedures by which protective actions will be carried out, including authorization, notification, and instruction procedures for evacuations.
- f) Applicants' proposed emergency plans fail to take into account the special measures necessary to cope with a CDA, including the need for increased protective, evacuation and monitoring measures, reduced response time and special protective action levels.
- g) Applicants and Staff have failed to provide adequate assurance that the proposed emergency plans will meet the requirements and standards of 10 CFR §50.47(b).

11. The health and safety consequences to the public and plant employees which may occur if the CRBR merely complies with current NRC standards for radiation protection of the public health and safety have not been adequately analyzed by Applicants or Staff.

- a) Neither Applicants nor Staff have shown that exposures to the public and plant employees will be as low as practicable (reasonably achievable).
- b) Neither Applicants nor Staff have adequately assessed the genetic effects from radiation exposure including genetic effects to the general population from plant employee exposure.
- c) Neither Applicants nor Staff have adequately assessed the induction of cancer from the exposure of plant employees and the public.

- d) Guideline values for permissible organ doses used by Applicants and Staff have not been shown to have a valid basis.

(1) The approach utilized by Applicants and Staff in establishing 10 CFR § 100.11 organ dose equivalent limits corresponding to a whole body dose of 25 rems is inappropriate because it fails to consider important organs, e.g. the liver, and because it fails to consider new knowledge, e.g., recommendations of the ICRP in Reports 26 and 30.

(2) Neither Applicants nor Staff have given adequate consideration to the plutonium "hot particle" hypothesis advanced by Arthur R. Tamplin and Thomas B. Cochran, or to the Karl Z. Morgan hypothesis described in "Suggested Reduction of Permissible Exposure to Plutonium and Other Transuranium Elements," Journal of American Industrial Hygiene (August 1975).

17. Neither Applicants nor Staff have demonstrated that sufficient fuel would be available for CRBR operation to enable the CRBR to demonstrate the objectives of the LMFBR program and remain in operation for a sufficient length of time to justify the project.

a) According to DOE policy, the need for plutonium for the U.S. nuclear weapons program must take precedence over the need for plutonium for the LMFBR program.

b) The U.S. weapons program is currently depleting existing DOE stocks of fuel-grade plutonium for the LMFBR program.

c) Neither Applicants nor Staff have demonstrated that alternative sources of fuel for the CRBR will be available when needed for CRBR operation.

22. Neither Applicants nor Staff have demonstrated that the design of the containment reduces offsite doses during accidents to a level that is as low as reasonably achievable.