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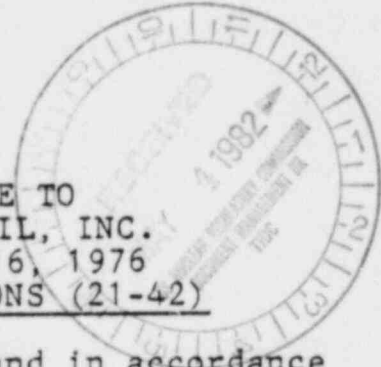
UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION



In the Matter of )  
 )  
UNITED STATES DEPARTMENT OF ENERGY )  
 )  
PROJECT MANAGEMENT CORPORATION )  
 )  
TENNESSEE VALLEY AUTHORITY )  
 )  
(Clinch River Breeder Reactor Plant) )

Docket No. 50-537

APPLICANTS' UPDATED RESPONSE TO  
NATURAL RESOURCES DEFENSE COUNCIL, INC.  
AND THE SIERRA CLUB SEPTEMBER 16, 1976  
REQUEST TO APPLICANTS FOR ADMISSIONS (21-42)



Pursuant to 10 C.F.R. § 2.742, and in accordance with the Board's Prehearing Conference Order of February 11, 1982, the Department of Energy, Project Management Corporation, and the Tennessee Valley Authority (the Applicants), hereby submit their updated Responses to Intervenors, Natural Resources Defense Council, Inc. and the Sierra Club, September 16, 1976 Request to Applicants for Admissions (21-42).<sup>1/</sup>

1/ The Applicants previously responded to Admissions 21-42 on September 29, 1976, and supplemented certain responses (21, 30, 31, 38, 39) on January 21, 1977.

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ADMISSION.

21. Mutations, which are heritable changes in the germ plasm, occur in all living organisms. They can be induced, or they may occur spontaneously, apart from any known alteration in the physical or chemical environment. Whatever their origin, most mutations are detrimental, and every individual carries a "load" of defective genes which collectively tends to reduce his fitness to some degree.

RESPONSE.

21. The Applicants admit the first two sentences but deny the last sentence since many genetic changes may be neutral in their effects. See the Applicants' response to No. 5 supra. See also Roman, Lewontin, 1973, "Population Genetics," Annual Review of Genetics, Vol. 7, pp. 1-17; Singh, Lewontin, Felton, 1976, "Genetic Heterogeneity Within Electrophoretic 'Alleles' of Kanthine Dehydrogenase in Drosophila - Psuedo Obscura," Genetics, Vol. 84, pp. 509-629.

ADMISSION.

22. Concern over radiation exposure arises from the fact that radiation is a mutagenic agent. Each new mutant added may result in harm to some descendant, and any additional number of defective individuals, of course, constitutes a greater burden to society.

RESPONSE.

22. The Applicants admit this statement if it is understood that "may" implies that in accordance with the laws of probability a mutation may also not be transmitted to a descendant.

ADMISSION.

23. For genetic effects of radiation there is no direct evidence of human effects, even at high doses. Nevertheless, the animal evidence is so overwhelming that the Applicant/Staff (to each as appropriate) has no doubt that humans are affected in much the same way.

RESPONSE.

23. The Applicants admit that for genetic effects of radiation there is no direct evidence of human effects even at high doses. The Applicants deny that there is "No doubt that humans are effected in much the same way," although for health protection purposes, it is prudent to assume that this is the case.

ADMISSION.

24. In every species studied by geneticists, the overwhelming majority of mutations that have effects large enough to be readily observed are deleterious.

RESPONSE.

24. The Applicants admit this statement, with the reservations concerning "neutral" effects as noted in the response to Admission 21, supra.

ADMISSION.

25. A major concern relative to estimating genetic effects in man is the possible existence of a class of radiation induced genetic damage that has been left out of the estimates. By relying so heavily on experimental data in the mouse we may have overlooked important effects that are not readily detected in mice, or the mouse may not be a proper laboratory model for the study of man.

RESPONSE.

25. The Applicants can neither admit nor deny this statement without further definition of what is meant by "a class of radiation induced genetic damage."

ADMISSION.

26. There is some theoretical and logical basis for use of the linear hypothesis at low dose levels. If the dose and dose rate are small (e.g., at maximal permissible levels of low-LET radiation), the spatial and temporal separation of ionizations is sufficiently large so that one would expect effects to be caused principally by "single track" radiation, and that interactions of radiation tracks

within cells would be so improbable as to be negligible. This argument implies a linear dose-effect relationship for molecular and cellular effects at low dose levels, even though larger doses, which may cause "multi-track" interactions at the cellular level or at the tissue level, may be associated with a nonlinear relationship.

RESPONSE.

26. The Applicants admit this statement.

ADMISSION.

27. Changes affecting the genes include point and chromosome mutations, the effects of which are usually detrimental.

RESPONSE.

27. The Applicants admit this statement, however, see response to No. 21.

ADMISSION.

28. Where the genic changes occur in germ cells, hereditary consequences are to be expected among the descendants of irradiated individuals. The mutated genes or chromosomes are distributed through a population by the mating of exposed individuals or their descendants with other members of the population.

RESPONSE.

28. The Applicants admit this statement.

ADMISSION.

29. A hereditary defect may be of any degree of severity from inconspicuous to lethal. A defect causing slight physical or functional impairment will tend to continue in the descendants for many generations, whereas a severe defect will be eliminated rapidly through the early death of the zygote or individual carrying the defective gene.

RESPONSE.

29. The Applicants admit this statement.

ADMISSION.

30. The main consideration in the control of hereditary damage, in addition to the occurrence of individual misfortune, is the burden to society in future generations that is imposed by an increase in the proportion of individuals with deleterious mutated genes.

RESPONSE.

30. The Applicants admit this statement since the occurrence of individual misfortune and the burden to society should both be considered in the control of hereditary damage.

ADMISSION.

31. In the control of hereditary damage, it is immaterial in the long run whether the defective genes are introduced into the population by many individuals who have received small doses of radiation, or by a few individuals who have received correspondingly larger doses.

RESPONSE.

31. The Applicants deny this statement. This statement presumes that defective genes will be introduced into the population by persons who receive any radiation dose regardless of the size of the dose. See response to No. 26.

ADMISSION.

32. The control of hereditary damage will be effected by limiting the genetically effective population dose. Additionally, to minimize the risk of a dominant mutation -- genic or chromosomal -- in an individual's children or grandchildren, it is desirable to limit the dose received by an individual.

RESPONSE.

32. The Applicants admit this statement.

ADMISSION.

33. It seems unlikely that the dose-response for any kind of genetic effect has any sort of threshold; the underlying mechanism for genetic change is molecular.

RESPONSE.

33. The Applicants deny this statement. See response to No. 26.

ADMISSION.

34. There is no sufficient theory of radiation carcinogenesis from which the concept of a threshold or safe dose may be deduced, and an empirical demonstration has not been made.

RESPONSE.

34. The Applicants can neither admit nor deny this statement since it is not clear what is meant by "sufficient theory."

ADMISSION.

35. If the intent of authorities is to minimize the loss of life that radiation exposure may entail, they must not rely on notions of a threshold.

RESPONSE.

35. The Applicants can neither admit nor deny this statement since it is not clear which "authorities"



NRDC is referring to. However, the intent of most recognized authorities goes beyond merely minimizing the loss of life, rather it encompasses other aspects of protecting the public health and safety as well.

ADMISSION.

36. From the standpoint of occupational ALARA, each new facility presents different problems and/or solutions.

RESPONSE.

36. The Applicants admit this statement to the extent that specific problems and/or solutions are dependent on the specific details of the facility; however, each facility should employ the same general ALARA considerations.

ADMISSION.

37. Speaking to the ACRS on occupational ALARA, Mr. Kreger correctly stated that in present day LWR's, so far as occupational ALARA is concerned, there are some very bad practices, some bad procedures and some bad designs.

RESPONSE.

37. The Applicants can neither admit nor deny this statement because we are unaware of the context in which Mr. Kreger's remarks were made nor at which ACRS

meeting they were made. However, the CR3RP will utilize those ALARA practices, procedures and design features which have been demonstrated to be effective, efficient, and practical.

ADMISSION.

38. At the present time, occupational ALARA is not inspected against or enforced.

ADMISSION.

39. At the present time, occupational ALARA cannot be inspected against or enforced beyond the specific conditions or requirements of the license of an LWR.

RESPONSE.

38-39. The Applicants deny these statements. As stated in the NRC response to admission requests 38-39 on Contention 8a: Applications for construction or operation of nuclear power plants submitted to NRC subsequent to issuance of Regulatory Guide 8.8, July 1973, have been reviewed against the provisions of that Guide. The Applicants are required to commit in the SAR to the ALARA principle, and to spell out specific design, procedural, and operational details to be used in the implementation of that principle. These SAR commitments are, in effect, part of the license and can be inspected against and enforced.

ADMISSION.

40. Showing that occupational exposures at the CRBR will be no more than that at an average LWR is not a demonstration that exposures are ALARA because occupational exposures at LWR's have not been demonstrated to be ALARA.

RESPONSE.

40. The Applicants deny this statement based on Reg. Guide 8.8, Section B.

ADMISSION.

41. There is no empirical evidence which suggests that man is less sensitive to the genetic effects of radiation than is the mouse.

RESPONSE.

41. The Applicants admit this statement.

ADMISSION.

42. There is no sufficient theory related to the genetic effects of radiation from which the concept of a safe or threshold dose can be deduced.

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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

AFFIDAVIT OF R. JULIAN PRESTON, Ph.D.

R. Julian Preston, Ph.D., being duly sworn, deposes and says as follows:

1. That he is employed as Senior Research Scientist, Biology Division, Oak Ridge National Laboratory, and that he is duly authorized to execute the response on behalf of the Applicants to the NRDC's

September 16, 1975, Request for Admissions, regarding Contention 6a.

2. That the above-mentioned and attached response to NRDC's Request for Admissions is true and correct to the best of his knowledge and belief.

*R. Julian Preston*

R. Julian Preston, Ph.D.

SUBSCRIBED and SWORN to before me  
this 29<sup>th</sup> day of April, 1982.

*Angela H. Minor*  
Notary Public

Date/Time  
Opt Ind

*Wickley*  
*29/4/82*  
*JC*


My Commission Expires April 29, 1984



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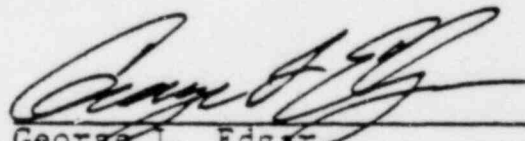
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DATED: April 30, 1982

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