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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

NRC STAFF TESTIMONY OF PAUL LEECH
ON CONTENTION 7(c)

Q.1. By whom are you employed and what is your position?

A.1. I am employed by the U.S. Nuclear Regulatory Commission ("NRC") as a Senior Project Manager in the Clinch River Breeder Reactor Program Office of the Office of Nuclear Reactor Regulation ("NRR"). A statement of my professional qualifications is attached to this testimony.

Q.2. What is the nature of the responsibilities you have regarding the Clinch River Breeder Reactor Plant ("CRBR")?

A.2. I am responsible for managing the NRC environmental review of the pending application by the Department of Energy ("DOE"), The Project Management Corporation ("PMC"), and the Tennessee Valley Authority ("TVA") for a permit to construct the CRBR. That responsibility has included the preparation of the NRC Staff's ("Staff's") Final Environmental Statement ("FES") (NUREG-0139, 1977) for CRBR, and preparation of the 1982 Supplement to that FES (Supplement No. 1 to NUREG-0139). In addition to directing and

coordinating the work of various Staff specialists who contributed to those documents, I also participated in the preparation of several chapters, including Section 9.2 of the FES and the Supplement and Appendix L of the Supplement, concerning alternative sites.

Q.3. What is the subject matter of your affidavit?

A.3. My affidavit addresses Contention 7(c), which states:

> 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), and LMFBR fuel fabricating plant, and underground sites.

Q.4. Did the Applicants identify and assess alternative sites for siting the LMFBR demonstration plant?

A.4. Yes. In Section 9.2.4 and Appendix A of the Applicants' 1975 Environmental Report ("ER"), the Applicants described eleven sites for siting a LMFBR demonstration plant. The eleven sites were screened from 109 potential sites that had been identified by TVA throughout its power service area. The eleven sites identified by TVA were Spring Creek, Blythe Ferry, Caney Creek, Clinch River, Taylor Bend, Buck Hollow, Phipps Bend, Murphy Hill, Johntown (Hartsville) and Rieves Bend. From these eleven alternative sites, the proposed Clinch River site was selected for construction of a LMFBR demonstration plant.

The Applicants also considered the "hook-on" option, in which turbine-generators at existing conventionally-fired electric generation plants would receive steam from the LMFBR nuclear steam supply system instead of the existing boilers. As discussed in Section 9.2.2 and 9.2.3 of the 1975 ER, the Applicants reviewed all TVA steam power plants which were expected to be operational on a time schedule consistent with the initially planned operation of the LMFBR demonstration plant on the TVA power system. As a result of this review, the Applicants identified the John Sevier and Widows Creek steam plants as suitable for the "hook-on" option.

Thus, three TVA alternative (candidate) sites were initially selected by the Applicants in their 1975 ER - John Sevier and Widows Creek for the hook-on option and Clinch River for a complete plant. The NRC Staff reviewed the Applicants' site selection procedure and identified two additional candidate sites - Murphy Hill and Phipps Bend - which had been selected by TVA as potential sites for commercial nuclear power plants. Those five sites, all located in the eastern part of the TVA power service area, were assessed and compared in Section 9.2 of the 1977 FES.

Following the resumption of NRC's licensing review in September 1981, the Applicants reconsidered the 13 TVA alternative (candidate) sites (two hook-on and eleven original sites, including Clinch River) in the context of NRC's Proposed Rule on Alternative Sites (45 Fed. Reg. 24168, April 9, 1980 ("Proposed Rule")). They

concluded that 12 of the 13 TVA sites identified met the threshold criteria stated in Section VI.2.b. of the Proposed Rule. The one exception was the Rieves Bend site, which would not meet criteria one, four and eight concerning consumptive water use, discharge of effluents and excessive project costs. ER Appendix G, page G-12.

Q.5. Does the Staff agree with Applicants' conclusion that the 13 TVA alternative (candidate) sites, with the exception of Rieves Bend, meet the criteria of Section IV.2.b of the Proposed Rule?

A.5. Yes.

Q.6. Were any TVA sites previously rejected for consideration by Applicants considered in the 1981-82 alternative site evaluation process?

A.6. Yes. The Yellow Creek site, which was not selected as an alternative (candidate) site in the 1975 alternate site evaluation process because of seismic uncertainties, was judged in 1981-82 to meet the Proposed Rule's threshold criteria. Therefore, Yellow Creek was added to the list of 12 TVA alternative (candidate) sites to represent the western part of the TVA power service area. Thus, Applicants identified a total of thirteen alternative TVA sites, including the Clinch River site, for siting the LMFBR demonstration plant.

Q.7. What TVA alternative (candidate) sites were finally selected by Applicants for comparison with the proposed Clinch River site?

A.7. Ten of the thirteen TVA sites discussed above were selected by the Applicants as candidate alternatives to the Clinch River site in Section 4, Appendix G, of the Applicants' ER. Those alternative sites are Spring Creek, Blythe Ferry, Caney Creek, Taylor Bend, Buck Hollow, Phipps Bend, Lee Valley, Murphy Hill, Hartsville and Yellow Creek. Although the Applicants updated the information on all of those sites and compared them to Clinch River, they also noted (in Amendment G, p. G-13) that a smaller number of sites could have been chosen which would fully represent the environmental diversity of the region of interest (the TVA power service area. The Applicants proposed that the Clinch River, Hartsville, Murphy Hill, Phipps Bend and Yellow Creek sites would form such an acceptable set of five candidate sites for Staff review, in accordance with the Proposed Rule.

Q.8. Did the Staff find that the five candidate sites identified by Applicants constitute an appropriate set of alternative sites, consistent with the Proposed Rule?

A.8. Yes. The Staff concluded that the Clinch River, Hartsville, Murphy Hill, Phipps Bend and Yellow Creek sites provide reasonable representation of the diversity of land and water resources within the TVA region of interest, as specified in Section VI.2.a. of NRC's Proposed Rule, with the possible exception of the aquatic ecological characteristics of small river headwaters. Also lacking was a candidate site on the Clinch River other than the proposed site, as called for in Section IV.2.a. of the Proposed Rule. However, the

Staff found that neither of these deficiencies is important because the aquatic impacts of the siting the plant on the headwaters of a small river or at another location on the Clinch River are unlikely to be less than at the proposed site. Further, from its review of the information available on the other six TVA alternative sites identified by the Applicants, the Staff found no reason to believe that any of them would be environmentally preferable to the proposed site. The Staff therefore regards the Clinch River, Hartsville, Murphy Hill, Phipps Bend and Yellow Creek sites as an appropriate slate of alternative (candidate) TVA sites for the LMFBR demonstration plant. The Staff's evaluation of those sites is presented in Section 9.2.5 and Appendix L of the FES Supplement.

Q.9. Did the Staff consider the two TVA sites that would allow use of the "hook-on" option in the 1982 FES Supplement?

A.9. No. The Staff did not consider the two sites because the Applicants rejected the "hook-on" option.

Q.10. Why was the "hook-on" option rejected by the Applicants?

A.10. In Appendix G of the ER, Applicants stated that the potential dollar savings for the hook-on plant (compared to building a complete new plant) no longer exist and, in fact, substantial economic and schedular penalties would result if this option were pursued. Site-specific engineering for the CRBR is at an advanced stage of completion and some of the balance-of-plant (BOP) equipment has already been delivered. Furthermore, the existing BOP

equipment at the John Sevier and Widows Creek fossil fuel-fired plants have aged another six years since the FES was issued, resulting in decreased reliability and remaining life. For these reasons, the hook-on option is no longer considered a viable alternative.

Q.11. Does the Staff agree with the Applicants' reasons for rejecting the hook-on option?

A.11. Yes. As stated in Section 9.2.5 of the FES Supplement, the Staff concluded that the potential do'lar savings for the hook-on option no longer exist, substantial schedular and economic penalties would result if this option were pursued, and that the benefits of a stand-along plant design are significantly greater than a hook-on plant design.

Q.12. What were the Applicant's conclusions regarding the environmental preferability of the TVA alternative sites?

A.12. The Clinch River site was found to be the preferred site in the Applicants' 1977 siting analysis described in ER Section 9.2 and Appendix A. That determination was made from a comparison of the original 13 candidate sites in terms of environmental factors and site engineering considerations (i.e., seismology, foundation conditions, flooding, meteorology, access and transmission facilities).

In their recent reanalysis of the fourteen TVA alternative (candidate) sites, the Applicants again concluded that Clinch River is the preferred site and none of the alternate sites is environmentally preferred to the Clinch River site. That analysis was done in accordance with the first part of the Proposed Rule's sequential two-part analytical test giving primary consideration to hydrology, water quality, aquatic biological resources, terrestrial resources, water and land use, socioeconomics and population. (See ER Appendix G, p. G-15.)

Q.13. Did the Applicants identify alternate sites outside of the TVA power service area for siting the LMFBR demonstration plant?

A.13. Yes. Applicants screened two properties owned by TVA in Kentucky and numerous DOE properties elsewhere in the United States as potential alternative sites for a LMFBR demonstration plant. As indicated in Section 9.2.6 of the 1977 FES, most of the properties were rejected because they were too small (less than 300 acres). Others were rejected for one or more of the following reasons: insufficient cooling water, excessive seismic ground motion, interference with projects under the Division of Military Applications weapons program, relatively high population density, insufficient space, or location in close proximity (½ mile) to existing DOE facilities.

The Applicants identified the Hanford Reservation, the Idaho National Engineering Laboratory (INEL), and the Savannah River

Plant (SRP) as alternate (candidate) sites for the LMFBR demonstration plant. All three sites are DOE properties.

The Applicants reassessed the 1977 screening process following the resumption of the licensing proceeding, and reviewed all DOE properties which were not considered in the 1977 screening. The Applicants nonetheless concluded that Hanford, INEL, and Savannah River still remain the best DOE alternative (candidate) sites for siting of a LMFBR demonstration plant.

Q.14. Did the Staff independently review the Applicants' identification of Hanford, INEL, and Savannah River as suitable alternative sites outside of the TVA power service area for siting the LMFBR demonstration plant?

A.14. Yes. As discussed in Section 9.2.6 of the 1977 FES the Staff concluded that with the exception of Hanford, INEL and Savannah River, the DOE properties rejected by the Applicants were unsuitable candidates for siting an LMFBR demonstration plant. The Staff's review of Applicants' reanalysis and assessment of DOE properties not previously evaluated does not alter the Staff's conclusion.

Q.15. Was the Nevada Test Site ("NTS") considered by Applicants for siting the LMFBR demonstration plant?

A.15. Yes. The NTS is described and assessed in Section 2.1.1.8 of ER Appendix D. The reasons given by the Applicants for screening out the NTS as a potential site for the LMFBR demonstration plant are

summarized in FES Section 9.2.6. As indicated therein, the NTS was not considered suitable because of the estimated 0.75g design requirement for seismic ground motion, lack of surface water and limited groundwater (use for the demonstration plant woud conflict with other uses of Nevada's limited supply) and relatively high transmission line costs. Potential interference with activities associated with research, development, and testing nuclear weapons was also indicated.

Q.16. Did the Staff independently review the desirability of including NTS as an alternative (candidate) site for the LMFBR plant?

A.16. Yes. The Staff concluded that the factors identified by Applicants were good cause to reject the NTS from further consideration.

Q.17. Was the environmental preferability of the three DOE alternative sites evaluated by Applicants for siting of the LMFBR demonstration plant.

A.17. Yes. The Hanford, INEL and SRP sites were assessed by the Applicants in ER Appendices D and E and that assessment has recently been updated by Applicants in ER Appendix F.

Q.18. What were the Applicants' conclusions with respect the environmental preferability of the alternate DOE sites?

A.18. The Applicants concluded that "neither Hanford, Savannah River nor INEL is environmentally superior or preferable to the Clinch

River sites and that none of the three alternate sites is a substantially better alternative for satisfying the program and project objectives for this demonstration plant." ER, Appendix F.

In reaching that conclusion the Applicants confirmed that the previous findings in ER Appendix D remain valid, i.e.:

1. Atmospheric dispersion and site isolation factors (minimum exclusion boundary distance, surrounding population density) are somewhat more favorable at Hanford, Savannah River, or INEL than the Clinch River site. However, it must be emphasized that the Clinch River site is still a completely acceptable site for construction of a nuclear facility.

2. A comparison of other siting parameters would not lead one to select the Hanford, Savannah River, or INEL areas as preferable to the Clinch River site.

3. A cooperative arrangement between utilities and DOE for the design, construction, and operation of the LMFBR Demonstration Plant in a utility system is not likely if the LMFBR plant were to be located at either the Hanford, Savannah River, or INEL sites. This would preclude satisfaction of a primary LMFBR Demonstration Plant objective.

Q.19. Did the Staff independently evaluate the environmental preferability of the five TVA sites?

A.19. Yes. The Staff's initial review of those sites was summarized in Section 9.2.5 of the 1977 FES; that assessment has been updated in Section 9.2.5 of the 1982 FES Supplement. It has also been augmented by the Staff's assessment in Appendix L of the Supplement.

Q.20. Did the Staff independently evaluate the environmental preferability of the three DOE sites?

A.20. Yes. The Staff's initial review of those sites was summarized in Section 9.2.6 of the 1977 FES; that assessment has been updated in Section 9.2.6 of the 1982 FES Supplement. It has also been augmented by the Staff's assessment in Appendix L of the Supplement.

Q.21. How did the Staff independently assess the environmental and socioeconomic characteristics of the alternate TVA and DOE (candidate) sites?

A.21. In addition to making their own evaluations of data and analyses provided by the Applicants, the Staff independently assessed the environmental and socioeconomic characteristics of the TVA and DOE alternative sites. In their review, the Staff evaluated the analyses in environmental statements or reports that had been prepared by the Staff for the facilities existing or planned at each candidate site. Other Federal and State agencies were consulted by the Staff to obtain additional information, or to update older information. Finally, Staff members inspected the alternate sites, as necessary.

A discussion of the parameters and characteristics that were considered in the Staff's assessment is provided in the Introduction to Appendix L in the FES Supplement and the Staff's current assessments of those factors for each of the alternative sites are found in Sections 1 and 2 of Appendix L.

Q.22. Is the information regarding the TVA and DOE alternate (candidate) sites sufficient for the Staff to assess whether any of the alternate (candidate) sites would clearly be environmentally preferable to the Clinch River?

A.22. Yes. Available reconnaissance-level information is normally adequate for this purpose (see Part III.2 of the Proposed Rule). In this case, the Applicants provided much more information than is required by supplying various reference materials, which are listed in the Bibliography for Appendix L of the FES Supplement, and including more detailed information in ER Appendices A, D, E, F and G.

Q.23. Are any of the alternative TVA or DOE sites environmentally preferable to the Clinch River site?

A.23. No. The Staff concluded that none of TVA or DOE's alternate sites considered would be environmentally preferable to or substantially better than the proposed Clinch River site for construction and operation of the LMFBR demonstration plant. This conclusion is based upon the Staff's analysis in Appendix L of the FES Supplement and the composite ratings of these sites which are shown in Table L.1.

Q.24. Would there be a delay in completing construction and beginning operation of a LMFBR demonstration plant if an alternative site to the Clinch River site were selected at this time?

A.24. Yes.

Q.25. What would the delay be attributable to?

A.25. As stated in ER Appendix G, at p. G-25, the two basic sources of this delay are:

1. the impact upon existing project arragemenents and authorizing legislation, and

2. the impact upon schedules for the preparation of design and licensing information and issuance by NRC of an environmental statement and a site suitability report to reach today's state of the CRBR licensing process.

Q.26. How long would the construction and completion of the LMFBR demonstration plant be delayed if an alternative site were selected instead of the Clinch River site?

A.26. As stated in Section 9.2.6.1 of the FES Supplement, a delay of approximately 36 months is a reasonably optimistic estimate. In arriving at that estimate, the Staff reviewed the basis of the Applicants' estimate that a decision to locate the LMFBR demonstration plant at another site would cause a minimum delay of 33 months and a more probable delay of 43 months starting from the time a decision was made to change sites. The 33-month and 43-month delay schedules are discussed in detail in ER Appendix E and they are summarized in FES Section 9.2.6.1.

Q.27. Would the selection of an alternative site to the Clinch River site affect the ability of the LMFBR demonstration plant to achieve its objectives under the DOE LMFBR program?

A.27. Yes. Since the Staff's environmental and site suitability reviews of the CRBR application indicate that the proposed Clinch River site would be acceptable for the LMFBR demonstration plant, it is the Staff's position that an avoidable delay resulting from a decision to relocate the plant is not consistent with DOE's timing objective under the LMFBR program - i.e., to construct and operate the demonstration plant as expeditiously as possible. DOE/EIS-0085-FS, May 1982, p. 7.

The Staff believes it is reasonable to assume, as did the Applicants (see ER Appendix G, p. G-34), that TVA would agree to continue in the same role it has with respect to the Clinch River site if the LMFBR demonstration plant were built elsewhere on the TVA power system. However, the Applicants recently contacted the utility groups in the Hanford, INEL and Savannah River Plant areas and found that they are currently unwilling to take on the role of operating the plant at those locations. Thus, it appears that demonstrating the project objectives "in a utility environment" at the DOE alternative sites is not possible at the present time.

Q.28. What are the economic costs attributable to any delays in completing the project because of selecting a different site?

A.28. As stated in Section 9.26 of the FES Supplement, the Staff currently estimates that relocation to another TVA site would result in an increase in the cost of the project of $39-303 million on a 1982 present worth basis and considerably more on an appropriations basis.

The costs of delay attribute to selection of a new site for an LMFBR plant, on a present-worth basis, are $94 million for relocation to Hanford, $259 million for relocation to INEL, and $61 million for relocation to Savannah River.

Q.29. What was the Staff's conclusion regarding the selection of an alternative site to Clinch River for the LMFBR demonstration plant?

A.29. As stated in Section 9.2.7 of the FES:

> The Staff's judgement is that the Applicant's preferred proposal, utilizing the Clinch River site, is reasonable and that no substantially better alternative is available.

PAUL H. LEECH

PROFESSIONAL QUALIFICATIONS

I am presently employed by the U. S. Nuclear Regulatory Commission as a Project Manager in the Clinch River Breeder Reactor Program Office of the Office of Nuclear Reactor Regulation. My specific responsibility is to manage the NRC's environmental review of the application to the Commission for a permit to construct the Clinch River Breeder Reactor Plant near Oak Ridge, Tennessee. I had that same responsibility during 1975-1977.

Beginning in 1971, I have served the Commission primarily as an environmental project manager for preparation of environmental statements on various applications for construction permits and operating licenses for nuclear power plants, including: Fort Calhoun Station near Omaha, Nebraska; Millstone Power Station at Waterford, Connecticut; Surry Power Station and North Anna Power Station in Virginia; Skagit Nuclear Power Station in Washington; and the Sundesert Nuclear Plant near Blythe, California. I was also the environmental project manager for preparation of the Programmatic Environmental Impact Statement related to decontamination and disposal of radioactive wastes resulting from the March 28, 1979 accident at Three Mile Island Nuclear Station Unit 2. In addition, I served briefly as the project manager for review of the Pebble Springs Nuclear Plant in the State of Oregon.

My formal education was obtained at: San Jose (California) State College (pre-engineering, 1939-40); University of Colorado, Boulder, Colorado (B.S. degree in Electrical Engineering, 1943); and Columbia University, New York City (courses in psychology, world trade, literature). Short courses sponsored by various employers included the following subjects: electrical design; management, underground power transmission; ecosystems; nuclear power and environmental assessment.

After graduation from the University of Colorado, my initial experience was predominantly in the application and sale of electrical apparatus, analyzing and reporting technical developments and experience in the electric utility industry, and analysis of the environmental effects of all types of power plants and power transmission and distribution systems.

Beginning in 1945, I was employed for 13 years by the General Electric Company in various assignments related to the design of electrical products and their applications in industry.

Beginning in 1959, I was employed for eleven years as the Western Editor of Electrical World, a technical trade magazine published by McGraw-Hill for the electric utility industry. In this capacity I specialized in the fields of electric power transmission and distribution, system engineering and power generation.

During 1971, I was employed for eight months in the Bechtel Corporation Power and Industrial Division as a senior engineer concerned primarily with environmental effects of nuclear power plants. In September of that year I left Bechtel to accept a position with the Atomic Energy Commission's Office of Regulation (now the Nuclear Regulatory Commission).