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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 PORJECT MANAGEMENT CORPORATION TENNESSEE VALLEY AUTHORITY (Clinch River Breeder Reactor Plant)	)))))	Docket No. 50-537

NRC STAFF TESTIMONY OF ROBERT J. DUBE,
ROBERT DAVIS HURT, JOHN W. HOCKERT, CHARLES E. GASKIN
AND HARVEY B. JONES, JR. REGARDING CONTENTIONS 4 AND 6(b)(4)

Q1: Mr. Dube, please state your name and present occupation.

A1: My name is Robert J. Dube, Section Leader of the Regulatory Activities and Analysis Section, Fuel Facility Safeguards Licensing Branch, Division of Safeguards, Office of Nuclear Material Safety and Safeguards. A copy of my qualifications statement is attached to this testimony.

Q2: Please describe the extent of your participation in the Staff's CRBR environmental impact review.

A2: I have had the principal responsibility for updating the safeguards portions of the CRBR Environmental Statement and responding to CRBR discovery items in connection with the environmental impact review.

Q3: Mr. Hurt, please state your name and present occupation.

A3: My name is Robert Davis Hurt, Process Licensing Engineer, Advanced Fuel and Spent Fuel Licensing Branch, Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety and Safeguards. A copy of my qualifications statement is attached to this testimony.

Q4: Please describe the extent of your participation in the Staff's CRBR environmental impact review.

A4: Under Mr. Dube's direction, I have been responsible for the overall coordination of the safeguards portions of the CRBR Final Environmental Statement Supplement (FESS) and to the CRBR discovery process.

Q5: Mr. Hockert, please state your name and present occupation.

A5: My name is John W. Hockert, Senior Safeguards Technical Analyst, Power Reactor Safeguards Licensing Branch, Division of Safeguards, Office of Nuclear Material Safety and Safeguards. A copy of my qualifications statement is attached to this testimony.

Q6: Please describe the extent of your participation in the staff's CRBR environmental impact review.

A6: I have been responsible for providing technical support in areas related to clandestine fission explosives, plutonium dispersal, and reactor sabotage.

Q7: Mr. Gaskin, please state your name and present occupation.

A7: My name is Charles E. Gaskin, Plant Protection Analyst, Power Reactor Safeguards Licensing Branch, Division of Safeguards, Office of Nuclear Material Safety and Safeguards. A copy of my qualifications statement is attached to this testimony.

Q8. Please describe the extent of your participation in the Staff's CRBR environmental impact review.

A8: I have been responsible for providing technical assistance in areas related to reactor safeguards.

Q9: Mr. Jones, please state your name and present occupation.

A9: My name is Harvey B. Jones, Jr., Security Specialist, Power Reactor Safeguards Licensing Branch, Division of Safeguards, Office of Nuclear Material Safety and Safeguards. A copy of my qualifications statement is attached to this testimony.

Q10: Please describe the extent of your participation in the Staff's CRBR environmental impact review.

A10: I have been responsible for providing technical support in areas related to the safeguards design basis threat.

Q11: What is the purpose of this testimony?

O11: The purpose of this testimony is to address contentions 4 and 6(b)(4), which state:

"4. The Applicant does not analyze the health and safety consequences of acts of sabotage, terrorism or theft directed against the CRBR or supporting facilities nor does it adequately analyze the programs to prevent such acts or disadvantages of any measures to be used to prevent such acts.

"a) Small quantities of plutonium can be converted into a nuclear bomb or plutonium dispersion device which if used could cause widespread death and destruction.

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

"c) Analyses of the potential threat from terrorists, saboteurs and thieves conducted by the Federal Government demonstrate several credible scenarios which could result in plutonium diversion or releases of radiation (both purposeful and accidental) and against which no adequate safeguards have been proposed by the Applicant.

"d) Acts of sabotage or terrorism could be the initiating cause for CDA's or other severe CRBR accidents and the probability of such acts occurring has not been analyzed in predicting the probability of a CDA."

and,

"6. The ER does not include an adequate analysis of the environmental impact of the fuel cycle associated with the CRBR for the following reasons:..."

"b) The impacts of the actual fuel cycle associated with CRBR will differ from the model LMFBR and fuel cycle analyzed in the LMFBR Program Environmental Statement. The analysis of fuel cycle impacts in the ER must be done for the particular circumstances applicable to CRBR. The analysis of fuel cycle impacts in the ER is inadequate since:..."

"4) The impact of an act of sabotage, terrorism or theft directed against the plutonium in the CRBR fuel cycle, including the plant, is not included nor is the impact of various measures intended to be used to prevent sabotage, theft or diversion."

Q12: How has the Staff analyzed the health and safety consequences of acts of sabotage, terrorism, or theft directed against the CRBR or supporting facilities?

A12: The Staff believes that the health and safety consequences of a successful act of sabotage or theft of plutonium could be severe. The NRC's safeguards objective is to deter, prevent, or respond to such acts in a way that insures against a significant risk of death, injury, or property damage to the public. This objective was the basis for the three criteria listed on page E.1 of FESS. The Staff's approach to this environmental review has accordingly been to focus on the likely effectiveness of the

A12: (con't)

Applicants' proposed safeguards system and to determine that a successful act of theft or sabotage is unlikely, rather than to perform a detailed analysis of consequences.

Q13: How has the Staff analyzed the programs designed to prevent acts of theft and sabotage?

A13: The basis for the Staff's analysis was the Applicants' supplement to the CRBR Environmental Report, Amendment No. XIV to the Environmental Report for the Clinch River Breeder Reactor Plant, Docket No. 50-537, June 1982. This supplement provided a description of the safeguards systems that the Applicant proposes to employ. The safeguards systems for the CRBRP will be required to be designed to satisfy the NRC requirements of 10 CFR 50, 70, and 73. The safeguards system for the mixed-oxide fuel fabrication facility, the reprocessing facility, and transportation activities would comply with the requirements of DOE Orders 5630, 5631, and 5632.

The systems described in Amendment No. XIV cover each activity in the proposed CRBR fuel cycle, including material transportation. The descriptions include both physical protection and nuclear material control and accounting (MC&A) capabilities, thus providing defense in depth. For all the CRBR fuel cycle activities the Staff considered the combined effectiveness of physical protection and MC&A. The physical protection systems would include such features as security zones, facility architectural and design features, personnel and vehicle access controls, intrusion detection and assessment systems, automated alarm reporting, surveillance, communications, and computer security. Material control and

accounting systems would include both passive and active features. Passive material control would be accomplished by placing barriers or impediments between special nuclear material and an inside adversary. Active material control would be accomplished by using the latest advances in remotely-controlled automated processing and rapid accounting techniques, in addition to traditional longer-term physical inventories. PuO_2 and fresh fuel in transit would be protected by the DOE Safe Secure Transport System.

Q14: How detailed was the Staff's review?

A14: The Staff's assessments were performed on a systems level. Operating procedures, equipment specifications, and other details have not been considered at this time. The Applicants' proposals have been judged in terms of whether the safeguards systems would cover all necessary fuel cycle activities, are appropriate for the types of activities to which they would be applied, and are likely to be able to protect against theft, diversion and sabotage. The Staff believes that the systems level assessment is appropriate for an environmental impact review. A detailed review of a safeguards and security plan is not required until the operating license stage. See 10 C.F.R. § 50.34(c)(d).

The Staff's assessment method was to evaluate DOE's proposed safeguards systems against three general performance criteria. The evaluation took account of the safeguards design basis threats and, when necessary, depended on comparisons between DOE's proposals and specific NRC regulations. The Staff's assessment is discussed in more detail in the CRBR Final Environmental Statement Supplement (FESS), Section 7.8 and Appendix E.

Q15: Has the Staff analyzed the disadvantages, such as environmental impacts and dollar costs, of preventative programs?

A15: The Staff believes that the environmental impact of the safeguards measures necessary to minimize the risk of a successful act of theft or sabotage will be negligible compared to the overall environmental impact of the CRBR fuel cycle. The safeguards systems that DOE proposes to employ for the CRBR fuel cycle will involve minimal construction beyond that required for the operation of the fuel cycle facilities themselves. No new construction will be required for transportation safeguards. The number of operating personnel required for safeguards and the amount of equipment required for their support will be small compared to the overall personnel and equipment requirements of the CRBR fuel cycle. The operation of the safeguards system will not impact the environment beyond the immediate vicinity of the fuel cycle activities. The Staff also believes that the dollar cost of safeguards for the CRBR fuel cycle will be insignificant compared to the overall fuel cycle costs. An assessment of the expected costs of safeguards at each facility is contained in Appendix E of the FESS. The Staff believes that these costs are generally comparable to safeguards costs at NRC-licensed facilities.

Q16: What is the Staff's position on clandestine fission explosives and plutonium disperal devices?

A16: As discussed in Section 2.3 of Appendix E of the CRBR FESS, the Staff policy has been to make the conservative assumption "that a small non-national group of people could design and build a crude nuclear explosive device which would produce signficant nuclear yield, that is, a yield much greater than the yield of an equal mass of high explosive. To accomplish this, they would need an amount of special nuclear material which is at least equal to the five-kilogram formula quantity (two kilograms of plutonium), and they would have to possess the appropriate technical capabilities." The basis for the choice of two kilograms of plutonium as the assumed minimum quantity for fabrication of a crude nuclear explosive device is information supplied from the DOE and its contractors, upon whom the NRC relies for determinations on technical matters associated primarily with nuclear weapons technology.

Plutonium can also be fabricated into a dispersal device that could cause serious public health consequences. However, it should be noted that disperal of "small quantities" of plutonium would not be expected to cause significantly more "widespread death" than dispersal of "small quantities" of a number of other radiological, chemical, or biological agents that are safeguarded to a lesser degree than plutonium and are not extremely difficult to acquire. In any case, the staff believes that plutonium dispersal would have public health consequences orders of magnitude less

than the consequences of the detonation of a nuclear explosive device. If the safeguards for the CRBR fuel cycle are required to be adequate to protect against the risks associated with clandestine fission explosives, the Staff believes that they would also be adequate to protect against the risks associated with plutonium dispersal.

Q17: How much plutonium would be present in the CRBR fuel cycle?

A17: The CRBR and several of its supporting facilities would contain quantities of plutonium that are of safeguards signficance. The plutonium throughput of the CRBR fuel cycle would be slightly more than 1,000 kg per year. The average plutonium inventory in the reactor, the reprocessing plant, and the fuel fabrication facility would be many formula quantities at each location.

Much of the plutonium in the CRBR fuel cycle would be contained in highly radioactive media such as irradiated fuel. Irradiated fuel would be found in the reactor core, stored on the reactor site, stored at the reprocessing plant, and in transit between the reactor and reprocessing sites. This material would be protected against sabotage but is not considered a theft target for non-national groups.

Plutonium in the form of moderately radioactive liquids or powders, or contained in unirradiated fuel, would be found in other parts of the CRBR fuel cycle, including the later stages of reprocessing, the fuel fabrication

plant, the reactor site, and in transit to and from the fuel fabrication plant. This material is considered a potential theft target and would be heavily safeguarded against both theft and sabotage. The measures proposed by the Applicants to safeguard the CRBR fuel cycle are described and assessed in Appendix E of the FESS.

Q18: How has the Staff addressed the issue of the potential threat from terrorists, saboteurs, and thieves?

A18: In accordance with NRC's safeguards mandate, the NRC Staff has conducted analyses of the potential theft and sabotage threat to licensed nuclear activities. Because the incidence of nuclear sabotage and theft is very low, such analyses have relied primarily on the study of events in non-nuclear, high value, or high risk environments. Some nuclear events have also been included in the analyses. These studies have attempted to analyze the characteristics of potential adversaries to nuclear programs, including their degree of motivation, equipment, tactics, and organization. The design basis threats contained in 10 CFR Part 73.1(a) represent the Staff's best judgment of the characteristics of potential adversaries nuclear activities.

Q19: Has the Staff considered whether the Applicants' proposed safeguards would provide adequate protection against a design basis threat?

A19: As a licensed operating facility, the CRBRP would have to satisfy the safeguards requirements of 10 CFR Part 70 and 73, and would thus have to protect against the NRC design basis threats. The details of compliance with the regulations will be reviewed at a later stage in the licensing process for the CRBRP. As part of the environmental review, the Staff has assessed the general reactor safeguards systems proposed by the Applicants and has concluded that it is likely that the Applicants will be able to satisfy the safeguards regulations. This assessment is contained in Appendix E of the CRBR FESS.

For non-licensed fuel cycle facilities that would support the CRBRP, the safeguards systems would be designed in accordance with the DOE's 1976 threat guidance, which is similar to the NRC's design basis threat. The Staff believes that safeguards programs designed in accordance with the DOE's guidance will provide a level of protection at least as high as that provided by programs designed in accordance with the NRC's design basis threat.

In Amendment XIV to its Environmental Report, the DOE provided descriptions of its proposed safeguards for the CRBR fuel cycle. Appendix E of the NRC's FESS discusses the design basis threats and assesses the DOE's proposed safeguards. The Staff concluded that the proposed safeguards systems would be likely to be able to protect against the design basis

threats and that the safeguards risks associated with the CRBR fuel cycle would be no greater than the risks associated with other similar nuclear activities.

Q20: Has the Staff addressed the issue of whether the acts of sabotage could initiate severe accidents at the CRBR?

A20: Yes. The Rasmussen Report (WASH-1400) and the Lewis Panel, in its Risk Assessment Review Group Report to the U.S. Nuclear Regulatory Commission (NUREG/CR-0400), recognized that the probability of sabotage of a nuclear power plant cannot be estimated with sufficient confidence to be included in current risk assessments. The Staff's position is that radiological sabotage, by a single insider or as a result of a determined violent external assault by several persons, is possible and could have severe consequences. The NRC has promulgated regulations requiring the design of safeguards programs to protect against acts of radiological sabotage (10 CFR 73.55). We also note that design features to protect against accidents increase the inherent sabotage resistance of the plant. The safeguards design features of the CRBRP will be required to be responsive to the requirements of 10 CFR Part 73. A preliminary assessment of the Applicant's proposed CRBRP physical security system is contained in Appendix E of the FESS. The Staff's conclusion was that the CRBRP safeguards systems appear reasonable for meeting the regulatory requirements.

Q21: Have the Staff's conclusions in the FESS differed significantly from those in the FES?

A21: In both reviews the Staff concluded that is is possible to provide adequate safeguards for the CRBRP and its fuel cycle. In the previous review it was assumed that all of the CRBR fuel cycle activities would be licer d by the NRC. In the present review it has been assumed that only the reactor will be licensed and that the DOE will conduct the other fuel cycle functions in unlicensed facilities. The Staff has also assumed that transportation activities related to the CRBR will be unlicensed. This change in the expected status of the supporting fuel cycle activities has prompted the Staff to change the scope of its environmental review so that the unlicensed activities are explicitly considered. In the previous review the fuel cycle activities were not considered as extensively since it was reasonable to expect that each of them would be subject to its own NRC environmental review. Despite this change in scope the Staff's conclusion remains the same: that it is possible to provide adequate safeguards for the CRBR fuel cycle and that the Applicants' proposed systems have the potential for doing so. The Staff has also concluded that the costs of safeguards for the CRBR fuel cycle will be a small fraction of the overall costs.

EDUCATIONAL AND PROFESSIONAL QUALIFICATIONS

Robert J. Dube
Division of Safeguards
U. S. Nuclear Regulatory Commission

My name is Robert J. Dube. I am the Section Chief, Regulatory Activities and Analysis Section, Fuel Facilities Safeguards LIcensing Branch, Division of Safeguards. I have had 19 years experience in nuclear regulation and policy with the Atomic Energy Commission, the Federal Energy Administration, and the Nuclear Regulatory Commission. This has included 13 years of experience in safety, environmental, and safeguards aspects of fuel cycle facilities. I am currently responsible for the development of regulations, guidance, and acceptance criteria for nuclear fuel facilities, spent fuel storage installations, and non-power reactors. My responsibilities also include monitoring and analyzing data submitted by licensees for safeguards implications.

Since joining the Division of Safeguards in 1976 I have been involved in the resolution of technical safeguards issues, and in the development of regulations related to material control and accounting and physical security for nuclear materials, physical security for power and non-power reactors, physical security for storage and transportation of spent fuel, and safeguards for reprocessing facilities.

Educational and Professional Qualifications

R. Davis Hurt
Division of Safeguards
U.S. Nuclear Regulatory Commission

My name is R. Davis Hurt. I am a MC&A program analyst for the Fuel Facility Safeguards Licensing Branch of the Division of Safeguards. I am responsible for the development of safeguards guidelines for reprocessing plants and the evaluation of advanced MC&A techniques for licensed fuel cycle facilities. My recent projects have included work on the Material Control and Accounting Requirements for Facilities Possessing Formula Quantities of SSNM and experimental work on the application of rapid alarm resolution methods to scrap recovery processes.

I received a Bachelor of Engineering degree in engineering physics from the University of Illinois in 1976 and a Master of Engineering degree in nuclear engineering from the University of Washington in 1978.

From 1977 to 1981 I worked as a nuclear engineer at the Oak Ridge National Laboratory. My duties included the design of advanced MC&A systems for reprocessing plants and the supervision of experiments in the use of computerized process data for reprocessing safeguards.

EDUCATIONAL AND PROFESSIONAL QUALIFICATIONS

John W. Hockert
Division of Safeguards
U.S. Nuclear Regulatory Commission

My name is John W. Hockert. I am a Senior Safeguards Scientist in the Regulatory Effectiveness Section, Power Reactor Safeguards Licensing Branch, Division of Safeguards, U.S. Nuclear Regulatory Commission. I am responsible for developing and recommending NRC policies associated with malevolent use of nuclear materials in fission explosive devices and for planning, development and conduct of regulatory effectiveness reviews of NRC licensees to determine the adequacy of existing safeguards programs. My recent projects have included the following: a technical review, performed in conjunction with the Department of Energy, of the NRC Operating Assumption Covering the Relative Ease of Fabricating Clandestine Fission Explosives; development of techniques to assess the sabotage vulnerability of light water reactors; and completion of a safeguards case study of the NUMEC Apollo Uranium facility.

I received a Bachelor of Science in Physics, with honors, from California Institute of Technology in 1969 and a Master of Arts and Doctorate of Philosophy in theoretical nuclear physics from the State University of New York at Stony Brook in 1970 and 1975, respectively.

From 1975 to 1976, I served as a postdoctoral research associate at the State University of New York at Stony Brook working in the area of medium energy theoratical nuclear physics with emphasis on mesonic effects on the nucleon-nuclear interaction.

My experience includes review of statistical practices in nuclear material control and accounting, development and implementation of safeguards vulnerability assessment techniques applicable to nuclear fuel cycle facilities - and light water reactors, and review and analyses, in conjunction with DOE, of scientific and technical bases for requirements for safeguards against fabrication of clandestine fission explosives.

I am co-author of technical articles entitled "Meson Exchange Currents in Deuteron Electrodisintegration: and "A New Method for Determining the Energy Independent Effective Interaction" published in Nuclear Physics and Physics Letters, respectively.

EDUCATIONAL AND PROFESSIONAL QUALIFICATIONS

Charles E. Gaskin
Division of Safeguards
U.S. Nuclear Regulatory Commission

My name is Charles E. Gaskin. I am a Plant Protection Analyst in the Power Reactor Safeguards Licensing Branch, Division of Safeguards. I have had 22 years experience in the security and law enforcement fields with the U.S. Navy, the Central Intelligence Agency, the Department of Justice and the Nuclear Regulatory Commission. In the capacity of a Plant Protection Analyst, I am responsible for performing reviews and assessments of the adequacy of site physical security plans developed to protect against radiological sabotage and against theft of special nuclear materials. I am currently responsible for the 10 CFR 73.55 review of the Clinch River Breeder Reactor Physical Security Plan.

Prior to transferring to the Nuclear Regulatory Commission, I provided technical operational support in law enforcement for the Drug Enforcement Administration (DEA). While in the position of project manager with that organization, I gained experience in the positive operational side of security and participated in the establishment of security regulations for the DEA. I also developed equipment and techniques for surveillance purposes.

While at the CIA I was a technical security officer with overseas experience in both physical as well as technical security. I developed and implemented security systems and programs.

While in the U.S. Navy, I was with the Naval Security Group and was involved in communciations security.

My educational qualifications consist of a B. S. in Electronics Engineering from the South Dakota School of Mines and Technology with additional technical and management training related to my professional career. I am a member of the IEEE and participate in the writing of engineering standards for the industry. I am also associated with a law enforcement organization which endeavors to bring an increased professionalism to law enforcement through training and the application of technology.

EDUCATIONAL AND PROFESSIONAL QUALIFICATIONS

Harvey B. Jones, Jr. (Brant)
Division of Safeguards
U.S. Nuclear Regulatory Commission

My name is Harvey B. Jones, Jr. (Brant). I am a Safeguards Analyst in the Division of Safeguards, U.S. Nuclear Regulatory Commission. As a safeguards analyst I am responsible for the analysis and assessment of complex safeguards threat information and the evaluation of the credibility, seriousness and immediacy of any hazards associated with threats to nuclear facilities and/or the transportation of SNM. I am responsible for maintaining regular liaison with other federal agencies to provide timely and coordinated responses to time sensitive threats and to obtain threat related data for use in rule-making, import/export review, and safeguards system design. Also, I am an alternate member of NRC's Information Assessment Team (IAT). As a result of these efforts I participate in the development of new or updated safeguards policy.

I received a Bachelor of Arts in Psychology, with a minor in nuclear physics, in 1972 from Emory University and continued on there in 1973 for one year of graduate work in applied nuclear physics. In 1976 I received a Master of Science degree in Criminology from Georgia State University.

Since November of 1976 I have been employed in my present position with the U.S. Nuclear Regulatory Commission. During this period, a significant amount of my time has been involved in the development and maintenance of several nuclear related threat data bases and co-authorship of two major studies utilizing data from at least two of these data bases. These studies are the "Generic Adversary Characteristics" study and the "Potential Threat to Licensed Nuclear Activities from Insiders (Insider Study)."