UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DUKE POWER COMPANY, ET AL.	)	Docket Nos. 50-413
	)	50-414
(Catawba Nuclear Station,	)	
Units 1 and 2)	)	

NRC STAFF TESTIMONY OF RICHARD J. SERBU AND FRANCIS JAPE ON PALMETTO ALLIANCE CONTENTION 16 (SPENT FUEL HANDLING)

Q.1. Please state your name, position and business address.

A.1. My name is Richard J. Serbu. I am employed as a Health Physicist, Radiological Assessment Branch, Division of Systems Integration, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555. A statement of my professional qualifications is attached.

Q.2. What is the purpose of your testimony?

A.2. (Serbu) The purpose of my testimony is to address Palmetto Alliance Contention 16 insofar as it relates to the adequacy of radiation protection measures committed to by Applicants as they apply to workers involved in fuel handling operations.

Q.3. What are your responsibilities as they relate to the subject matter of your testimony?

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A.3. (Serbu) I review the Applicants' radiation protection design features, policies, and operational commitments for acceptability in accordance with the relevant requirements of 10 CFR Part 20, Part 50, and Section 70.24, and General Design Criteria 19 and 61, and in accordance with the guidance of Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will be As Low As is Reasonably Achievable."

Q.4. Please state your name, position and business address?

A.4. My name is Francis Jape. I am Chief of the Test Program Section, Engineering and Programs Branch, Division of Engineering and Operational Programs, Region II, U.S. Nuclear Regulatory Commission, 101 Marietta Street, Suite 3100, Atlanta, Georgia 30303. A statement of my professional qualifications is attached.

Q.5. (Jape) What is the purpose of your testimony?

A.5. The purpose of my testimony is to address the manner in which the NRC inspection program verifies that plant procedures relevant to radiation protection of plant workers in the fuel handling area have been implemented by Applicants.

Q.6. What are your responsibilities as they relate to the subject matter of your testimony?

A.6. (Jape) As Chief of TPS, I am responsible for ensuring that the NRC inspection of preoperational test programs and selected operational activities, including those in the spent fuel handling area, are properly inspected at all nuclear facilities within Region II, which includes Catawba Nuclear Station.

Q.7. Has the Staff reviewed Applicants' measures for assuring that in spent fuel handling operations plant workers are adequately protected from radiation exposure?

A.7. (Serbu) Yes.

Q.8. What types of measures have Applicants provided for protection of workers?

A.8. (Serbu) These measures fall into six areas: (1) design oriented toward radiological safety, (2) review of, and restrictions on, work tasks involving radiological hazards, (3) radiological safety training, (4) radiation monitoring equipment (5) availability on shift of radiation protection personnel, and (6) incorporation of ALARA principles in fuel handling procedures.

Q.9. In what way is the design of the spent fuel storage facility (SFSF) an important factor in providing radiation protection to workers?

A.9. (Serbu) The SFSF has been designed to receive, handle, and store fuel casks and spent fuel elements, (FSAR, Sections 9.1.2, 12.3). The general design process is oriented to three steps: (1) precluding radioactive source creation or buildup, (2) isolating sources which do exist, and (3) minimizing the personnel dose from the source. The systems and safety features are particularly oriented toward proper handling of recently discharged spent fuel elements with extremely high dose rates. The area has been designed with a dose rate limit of 2.5 mr/hr at the surface of the spent fuel pool. The design features (such as water and concrete shielding, mechanical restrictions on lifting and moving casks and fuel (FSAR, Sections 9.1.3, 9.1.4) and ventilation and water cleanup systems) provide an additional margin of safety in the handling of "older" spent fuel and spent fuel casks from other facilities. Water provides the principal shielding for fuel handling, with concrete walls of the spent fuel pool providing additional shielding. A variety of safety features (e.g., limited crane travel, pool water level control) assure that this shielding remains effective.

Q.10. How is the work performed in fuel handling operations reviewed and restricted for radiological safety?

A.10. (Serbu) Radiation Work Permits (RWPs) are required for performance of radiation work at Catawba (FSAR 12.5.3). This means that prior to issuance of a RWP it is required that the radiological hazards associated with a job are determined and evaluated prior to the start of work. Thus, for tasks such as spent fuel cask unloading, a radiological review of the operation would be conducted by radiation protection personnel, and specific protective and precautionary measures would be required to protect the workers and keep doses as low as reasonably achievable (ALARA). Personnel performing work are required to observe the precautions of the permit. The RWP system is especially effective in previewing potential radiological problems, formulating preventive and protective measures, and reinforcing on-the-job compliance with RWP and operational provisions. This would entail the worker's reading and following RWP instructions and precautions regarding protective clothing, stay time, dose control and job monitoring.

Q.11. Could you please describe the types of restrictions which would apply to fuel handling personnel?

A.11. (Serbu) Fuel handling personnel, working unescorted within the Restricted Area (which includes the spent fuel pool) are required by the Applicants to receive health physics training to instruct them in potential radiological health hazards on a periodic basis. They must also follow the provisions of the RWP (or similar document) governing the job. Additionally they must follow other posted and written instructions such as those on radiation warning signs, observe physical controls such as locked doors, radiation barriers and radiation alarms and warnings.

Q.12. What sort of training have Applicants provided for?

A.12. (Serbu) Applicants have committed to provide operational, procedural and radiation safety training which will help assure that personnel involved in fuel handling operation will understand their jobs, follow procedures, and observe safety precautions (FSAR 13.2.2). This includes radiological training in accordance with the requirements of 10 CFR 19.12 and the guidance of Regulatory Guides 8.13, 8.27, and 1.33. Such training has been effective at Oconee and McGuire and has been found to be consistent with the radiological health protection problems in the Restricted Area, including the spent fuel area (FSAR, Section 12.5.3).

Q.13. Please describe the monitoring equipment Applicants will provide.

A.13. (Serbu) Installed and portable radiation monitoring equipment will be used to monitor radiation levels in work areas (FSAR, Section 12.5.2.2). This includes area radiation monitors on the fuel handling bridge in the spent fuel area which can alarm in response to dose rate increases, such as might be caused by radiation from a spent fuel cask with an out-of-position lid. Portable radiation measuring instruments will also be utilized by radiation protection personnel to perform radiation surveys where radiological conditions may change.

Q.14. What is the function of radiation protection personnel?

A.14. (Serbu) Radiation protection personnel will be available on each operating shift to perform monitoring and exposure control work (FSAR 12.5.1). These personnel can provide radiation safety oversight of tasks, such as spent fuel cask transfer, and have the capability to stop work if an unsafe condition can or does develop.

Q.15. What is the significance of Applicants' commitment to incorporating ALARA principles in their procedures for fuel handling?

A.15. (Serbu) All Applicants' inplant procedures involving radiological conditions incorporate considerations to keep radiation exposures as low as is reasonably achievable (ALARA). The preparation and review of operating procedures utilizes guidance from Regulatory Guides 8.8 and 8.10 (ALARA guides). Applicants' formal commitment to ALARA principles and integration of the ALARA concept provides assurance that procedures and operations will closely evaluate dose reduction methods (FSAR, Sections 12.1.1, 12.5.3).

Q.16. What were the Staff's conclusions with respect to Applicants' foregoing commitments?

A.16. (Serbu) The Staff has evaluated the proposed radiation protection program in light of the relevant requirements and concluded that the radiation protection measures incorporated at Catawba will provide reasonable assurance that occupational doses will be maintained as low as is reasonably achievable and below the limits of 10 CFR Part 20. The Staff also found that Applicants' measures are consistent with the guidance of Regulatory Guide 8.8.

Q.17. In addition to Applicants' commitments and representations as have been described, how does the Staff assure that the training, procedures, staffing, etc., to which Applicants have committed, are in fact implemented in connection with fuel handling operations involving the receipt and storage of non-Catawba spent fuel?

A.17. (Jape) The NRC inspection program is the primary means by which the Staff will assure that Applicants have implemented their commitments and satisfy NRC requirements.

The inspection program begins with NRC review of Applicants' preoperational test program, and continues throughout the life of the facility with routine or special inspections, and is designed, among other things, to verify implementation of the measures identified in Answer 8.

Q.18. Could you describe in general how the NRC inspection program operates?

A.18. (Jape) Yes. The NRC inspection program is conducted on an internally determined schedule throughout the life of the facility. Inspections may be announced or unannounced. The inspection program utilizes detailed inspection procedures which are designed to examine Applicants' activities and programs to ensure that regulatory requirements and license conditions are being met. In addition, the use of inspection procedures establishes a uniform methodology and optimizes NRC inspection resources.

The inspection program does allow sufficient flexibility to permit the inspection efforts to be tailored to a particular activity.

Therefore if an applicant is to receive and handle irradiated fuel from off-site, the inspector will tailor his inspection efforts toward that activity. This tailoring is generally agreed upon with his supervisor during preparation for the inspection.

The NRC inspection program conducted prior to licensed operation is generally described in Regulatory Guide (RG) 1.68, Initial Test Programs for Water Cooled Nuclear Power Plants. Of particular applicability to the subject of radiation protection for workers involved in fuel handling are items k and m of Appendix A to RG 1.68. These items prescribe tests for the fuel storage facility and handling systems. Appropriate tests are conducted for the equipment used to handle irradiated fuel and for components used to monitor radiation levels for personnel protection.

In addition, the inspection program requires, prior to the issuance of an operating license, a sample of the plant procedures to be reviewed to determine if they are technically adequate for the planned license operations.

Suggested plant procedures are listed in Appendix A of RG 1.33. These include procedures for operating fuel handling equipment, the receipt and storage of new and irradiated fuel, and the use of radiation monitoring instrumentation.

Q.19. Have Applicants committed to providing these procedures?

A.19. (Jape) Yes. Applicants have committed to both Regulatory Guides 1.68 and 1.33 in the Catawba FSAR.

Specifically, plant procedures will be provided for equipment operation within the spent fuel pool storage facility, control of radioactivity to limit personnel exposure, and radiation protection procedures including (a) implementation of a radiation work permit system, (b) requirements for radiation surveys, (c) training in radiation protection and (d) implementation of an ALARA program.

Q.20. What specific NRC inspection procedures are used to assure that Applicants' plant procedures provide adequate radiological protection for workers in the SFSF?

A.20. (Jape) The following inspection procedures are directly applicable to the handling operations for irradiated fuel:

36301, Operational Staffing
41301, Operator Staff Training
41700, Training
86700, Spent Fuel Pool Activities
86718, Periodic Maintenance of Packaging
86702, Spent Fuel Packaging and Shipping
86740, Transportation Activities
83740, Operational Radiation Protection

These inspection procedures cover all fuel handling operations, including packaging, shipping and receiving of spent fuel. Although some of the requirements inspected by these procedures are pertinent to activities outside the recipient facility, such as minimum cooling time, maximum average burnup, contamination monitoring, and pressure test of a cask prior to off-site shipment, they also serve to protect workers in the SFSF once the cask reaches its destination.

The operability of radiation monitors, air sampling equipment, and the high efficiency particulate and charcoal filter system are verified by the inspector through use of these NRC inspection procedures. Applicants' performance will be inspected by direct observations, interviews, and a review of records during special inspections to address spent fuel handling or coincidental to routine inspections.

Q.21. Please describe how the NRC inspection procedures assure that fuel handling design features relevant to radiological safety will function properly.

A.21. (Jape) The design features of the fuel storage and handling systems are tested during the preoperational test programs. Included in these tests are such design features as: (1) spent fuel pool anti-siphon devices, (2) radiation alarms (3) low water level alarms (4) protective interlocks for power equipment, bridge and overhead cranes (5) dynamic and static load testing of cranes, hoists and rigging equipment (6) fuel transfer devices and (7) SFSF ventilation system tests.

Following the initial preoperational test program, Applicants will be required to establish a periodic surveillance program to ensure continued proper operation of these design features. These surveillance tests are reviewed periodically by the NRC inspection staff. These inspection activities are covered by inspection procedures 86700, 86740, 86702, and 86718.

Q.22. Please describe the NRC inspection procedures used to assure proper Applicant review of, and restrictions on, work tasks involving radiological hazards, including radiation monitoring equipment.

A.22. (Jape) The adequacy of the radiation protection program is verified through use of NRC inspection procedure 83740. This procedure is used to verify that Applicants have established and implemented a program to ensure worker safety in the receipt and handling of radioactive material, such as spent fuel. This inspection procedure would be used to review plant procedures for the movement of spent fuel in the SFSF with regard to minimizing occupational exposures. For example, plant procedures designed to provide a radiological safe sequence for receiving spent fuel storage casks, placing the casks in the decontamination pit, removing the cover, and transfer of the spent fuel from the cask to the storage pool would be reviewed. In addition, this program includes checks of alarm settings, calibrations and tests of monitoring instrumentation.

Q.23. Please describe the NRC inspection procedure for reviewing Applicants' radiological safety training program.

A.23. (Jape) Applicants' entire training program, including the radiological health and safety program, is examined during the preoperational program, using NRC inspection procedure 41301. Continued, periodic review of the training and retraining program is performed using NRC inspection procedure 41700. In addition, inspection procedures 83740 and 86740 also call for an examination of training records, including those of workers specifically performing spent fuel handling operations.

Q.24. Please describe the NRC inspection program to assure the availability of radiation protection personnel on shift and the implementation of ALARA principles.

A.24. (Jape) The Technical Specifications state the staffing requirements which include the requirement to have a radiation protection person on shift. Implementation of this license requirement is verified through NRC inspection procedure 36301.

NRC's review of the implementation of the ALARA program is performed through use of inspection procedure 83740. The inspector performs audits and appraisals of ALARA program implementation to determine the adequacy of implementation of Applicants' commitment to maintaining occupational exposures as low as is reasonably achievable. Interviews with workers are conducted to determine whether they understand the program and their role in it, and whether they are applying the principles of the program to their work.

Q.25. Will all of the procedures for handling spent fuel at Catawba be reviewed by the inspection procedures you have identified above prior to operation?

A.25. (Jape) Ordinarily, the inspection program is implemented on a sample basis, with some procedures in the spent fuel area being selected. This inspection program is currently underway at Catawba. However, since a question has been raised regarding handling of irradiated fuel received from outside facilities, these specific procedures will be reviewed. The inspection of these procedures will be scheduled to coincide with the initial receipt of these shipments to witness these activities.

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RICHARD JOHN SERBU

PROFESSIONAL QUALIFICATIONS

I am presently assigned as a Radiological Engineer with the Radiation Protection Section of the Radiological Assessment Branch, Division of Systems Integration, Office of Nuclear Reactor Regulation, U. S. Nuclear Regulatory Commission.

I graduated from the State University College of New York at Potsdam with a Bachelor of Arts Degree in Chemistry. I have work in a professional capacity in the field of radiation protection/health physics in association with nuclear power reactors since June 1973.

From June 1973 to April 1980, I held positions as Project Engineer, Dosimetry and Health Physics; Manager, Radiological Monitoring; Project Engineer, Radiological Training; Radiological Controls Supervisor; and Instructor, Chemistry and Radiological Controls at Knolls Atomic Power Laboratory. My responsibilities at KAPL included development, implementation, and management of radiological training programs, operational health physics/ALARA programs, and dosimetry programs. This includes broad experience in all aspects of reactor health physics/radiation protection; familiarity with reactor systems; radiation protection aspects of reactor startup; radiation protection for maintenance and refueling/overhaul; chemistry control programs; and compliance with established requirements. Since April of 1980, I have been with the Nuclear Regulatory Commission as a radiological engineer. In this capacity, I am responsible for the review and evaluation of radiation protection/ALARA (As Low As Reasonably Achievable) aspects of nuclear power reactor facility equipment and design, planning and procedure programs, and techniques and practices which are employed by nuclear reactor licensees and license applicants in meeting the standards for protection against radiation of 10 CFR Part 20.

PROFESSIONAL QUALIFICATIONS
FRANCIS JAPE

My name is Francis Jape, Section Chief, Test Program Section (TPS), Division of Engineering and Technical Program Branch, Region II. As Chief of TPS, I am responsible for ensuring that the NRC inspection of preoperational test programs and selected operational activities are properly inspected at all nuclear facilities within Region II, which includes Catawba Nuclear Station. I have been assigned as TPS Chief since October 1981, or 21 months. As the TPS Chief, I provide technical and policy guidance and direction to eight reactor inspectors. The majority of inspection procedures to be completed during performance of the preoperational - functional test program at a facility under construction within Region II are assigned to my section. In addition, complex and selected routine surveillance inspection procedures are assigned to TPS to be performed at facilities holding an operating license.

I graduated from the University of Southern California with a Bachelor of Chemical Engineering degree in June of 1951, and received a MBA from the University of Washington in 1974. In January 1977, I became a registered professional engineer in nuclear engineering. Following graduation from USC (in 1951) I began my professional career with General Electric Company at Hanford Atomic Works, Richland Washington. I worked at Hanford for approximately 18 years and, during this period I provided technical and engineering assistance for the various reactor production facilities at Hanford. During part of my career at Hanford I had responsibility for handling and inventory control of nuclear fuel, and development of nuclear fuel procedures and supervision of on and off site shipments of irradiated nuclear fuel. In 1971 I joined the AEC and later the NRC as a reactor inspector. During the first 10 years with the AEC/NRC I performed inspections on a variety of nuclear generating stations within Region II.

When the Resident Inspector Program was initially conceived, I was the first Senior Resident Inspector assigned to the Oconee Nuclear Station. This assignment lasted for 3 years, after which I returned to the Region II office as the TPS Chief.

In summary, I have 31 years experience in the nuclear industry and I currently am a registered professional nuclear engineer.