UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of Commonwealth Edison Company (Dresden Station, Units 2 and 3)	)))	Docket Nos. 50-237 50-249

TESTIMONY OF JAMES D. GILCREST

Contention 8:

Criteria to Prohibit Use Of Spent Fuel Storage Racks

My name is James D. Gilcrest. I am the Manager of Mechanical Engineering for the Nuclear Services Corporation Division of Quadrex Corporation, and I am the project manager for the engineering services related to provision of high density spent fuel racks for the Dresden Nuclear Power Plant Units 1 and 2. A statement of my qualifications is attached.

The purpose of this testimony is to respond to Contention 8 which was stated as follows:

> The applicant should develop criteria for the racks defining when their use to store fuel would be proscribed. These criteria should be the acceptable amount of corrosion, limits on dimensional changes and strength tolerance.

Although no significant deterioration of the Dresden fuel racks is anticipated during their lifetime, surveillance testing is planned to ensure the safe operation of this equipment. Both testing and actual fuel pool operation have shown the materials used in these fuel racks to be acceptable for this application. The surveillance testing to be performed consists of immersing samples of the fuel rack structural material and neutron absorber in the fuel pool along with the fuel racks. These samples will be removed and examined on a periodic basis to identify any deterioration. The specific acceptance criteria for the surveillance samples will be:

1. Any corrosion which penetrates the aluminum cladding of the boral is unacceptable.

2. Any loss of Boron 10 below .02 gm/cm2 is unacceptable.

3. Any evidence of cracking in structural components is unacceptable.

If any of the unacceptable results defined above are observed in the samples, the NRC will be notified and further investigation will be made immediately. The further investigation may involve any or all of the following:

- Further examination of the sample
- Examination of additional samples
- Examination of fuel racks
- Analysis of the impact of the findings on the adequacy of the fuel racks

Based on the above review, a solution to the problem will be developed and submitted to the NRC for its review. The methods described above will ensure that the fuel racks are maintained in a safe condition.

Contention 8, in demanding that further criteria for the racks be developed defining when their use to store fuel would be proscribed, is a departure from standard practice in the nuclear industry. For example, the in-service inspection provisions of the American Society of

Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section 11, made applicable to all nuclear power plants by 10 CFR §50.55a, define in detail how various nuclear power plant components and piping shall be examined and what results are acceptable. Section 11 also specifically states that examination results which exceed the acceptance criteria shall be evaluated to determine the disposition of the equipment. In general, the purpose of surveillance, inspection and testing requirements in the nuclear industry is to provide warning signals rather than to prescribe solutions to all possible problems which may be detected. The definition of acceptance criteria and evaluation of results presented above for the Dresden racks follow the same approach of examination and evaluation presented in ASME Section 11.

There are a number of substantial practical difficulties in attempting to define criteria proscribing use of the racks as demanded by Contention 8:

1. Any evidence of deterioration in the samples will require further examination to determine the actual extent of deterioration in the fuel racks.

2. It is not possible to define all possible modes of deterioration at this time. In fact, that is the primary reason for the surveillance samples. No mode of deterioration is expected, but some type may exist unknown to us at this time.

3. A large amount of conservatism is inherent in the assumptions and types of analyses used to design the racks. If some deterioration does occur, it may be advantageous to modify the analyses to take credit for some of this conservatism. There are two types of conservatism inherent in the fuel racks. The first is that imposed by the NRC and the various regulations applying to the racks. This includes things such as a maximum k_{eff} of 0.95 and allowable material stress limits. This conservatism will not be reduced. The second type of conservatism in the racks is that which results from the analysis methods and assumptions used. At times in designing nuclear components it is advantageous to use conservative assumptions in order to simplify the analysis. This will often result in significant cost and schedule savings. For example, in nuclear physics calculations for the Dresden racks, Quadrex used diffusion theory rather than the more expensive, more accurate Monte Carlo theory, even though diffusion theory gives a higher value for k_{eff}. Resorting to such conservatism results in racks which exceed the minimum NRC requirements. Obviously if unanticipated deterioration occurs requiring a decision whether replacement of the racks is necessary, it will be appropriate to base this decision on a more accurate assessment of the true

strengths of the rack design and materials, subject of course to NRC review and approval. Taking credit for the conservatism in the design of the racks would probably require the performance of more sophisticated, more expensive analyses or the utilization of state-of-the-art methods at the time that a problem is defined. The development of criteria defining when the racks could no longer be used to store fuel, as demanded in Contention 8, would also require that these more sophisticated analyses be done, and the associated conservatism reduced. But these extra analyses would have to be done in advance of any real need for them, and not for a single defined problem but for an undefined range of hypothetical problems. In our view, this would be wasteful and unnecessary, even if it were practicable to anticipate all possible problems which might arise during the lifetime of the racks.

For the reasons stated above, I believe the surveillance program and associated acceptance criteria proposed by Commonwealth Edison will assure that the racks are maintained in a safe operating condition throughout their lifetime. I do not think that it is necessary or desirable to attempt to develop in advance criteria defining when use of the racks would be proscribed.

PROFESSIONAL QUALIFICATIONS

JAMES D. GILCREST

Mr. Gilcrest is the Manager of Mechanical Engineering for Nuclear Services Corporation. His business address is: Nuclear Services Corporation, A Division of Quadrex Corporation, 1700 Dell Avenue, Campbell, California 95008. His group is responsible for all spent fuel rack projects done by NSC.

Mr. Gilcrest has been involved in spent fuel rack design, analysis and fabrication for more than five years. He has been the project engineer for the design of spent fuel racks for nine projects in the United States, Europe and Asia. He has presented papers on spent fuel storage to the American Nuclear Society and to the American Power Conference. He also holds two patents on spent fuel storage rack designs.

Mr. Gilcrest has been employed at NSC for six years, and prior to that he was employed in General Electric Company's Nuclear Energy Division. During his six years employment at General Electric, he worked in the Fuel Mechanical Design Group and in the Auxiliary Systems Group which was responsible for emergency core cooling systems and other systems, including the spent fuel pool cooling systems.

His education consists of a BSME from California State University at San Luis Obispo in 1967, and additional post graduate courses in thermal hydraulic and structural analysis.