

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
CONSUMERS POWER COMPANY	)	Docket Nos. 50-329 OM & OL
(Midland Plant, Units 1 and 2)	)	50-330 OM & OL

TESTIMONY OF JOSEPH D. KANE WITH RESPECT TO THE QUALITY  
QUALITY ASSURANCE PROGRAM IMPLEMENTATION PRIOR TO DECEMBER 6, 1979

Q.1. Please state your name and position with the NRC.

A. My name is Joseph D. Kane. My position with the U.S. Nuclear Regulatory Commission is Principal Geotechnical Engineer and I am assigned to the Geotechnical Engineering Section of the Hydrologic and Geotechnical Engineering Branch, Division of Engineering, Office of Nuclear Reactor Regulation.

Q.2. Have you prepared a statement of professional qualifications?

A. Yes. A copy of this statement is attached.

Q.3. Please state the nature of the responsibilities that you have had with respect to the Midland Plant, Units 1 & 2.

A. My review involvement with the Midland project essentially began in November 1979 when I was assigned the responsibility of serving as technical monitor for the interagency contract between the NRC and the U.S. Army Corps of Engineers, Detroit District (hereafter the Corps). The purpose of this interagency contract was to obtain the

service of expert technical personnel from the Corps to assist the NRC in the safety review of the Midland project in the field of geotechnical engineering. My responsibilities as contract technical monitor include assisting the Corps in their review efforts, examining and commenting on their evaluation reports and coordinating the Corps review efforts with other NRC Branches in technical areas of overlapping safety concern. In addition I have assisted in preparation of interrogatories and responses to interrogatories with regards to the soil settlement problem at the Midland plant. Since November 1979 my involvement in the review of the Midland project has steadily increased to the point that it is now the major portion of my work at NRC. In addition to responding to Consumers appeal actions (e.g., the appeal of the June 30, 1980 request for additional borings and laboratory testing) and participation in discovery deposition proceedings, I am extensively involved in the assessment of the adequacy of the remedial measures proposed by Consumers. These remedial fixes are necessary to address the many problems caused by the unanticipated settlement of safety related structures and piping due to the improperly compacted plant fill.

Q.4. Please state the purpose of this testimony.

A. The purpose of this testimony is to supplement the testimony prepared by Eugene J. Gallagher. In response to question 32, Mr. Gallagher stated that quality assurance deficiencies resulted in the plant

fill being insufficiently compacted. My testimony demonstrates that if the original compaction control requirements set forth in the PSAR had been followed, the plant fill settlement problem would not have occurred.

Q.5. What is the basis for your response to Question 4?

A. As indicated in Mr. Gallagher's testimony in response to Question 22, the NRC at the PSAR licensing stage considered the designated minimum compaction criteria and recommended moisture content placement control to be design and construction commitments by CPC. (The compaction criteria and moisture control requirement at the PSAR stage are summarized in Table 2.5.4, sheet 3 of the FSAR in response to NRC question 362.15). The significance of these commitments is extremely important to the expected performance of the plant fill. The engineering profession widely recognizes the importance of adequate controls on compaction and moisture content for soils which are intended to satisfactorily support structures. This wide recognition comes about because of the acknowledged relationship between the state of a soil's compactness and the soil's accepted behavior as an engineering material. CPC, when they indicated that soils which were to support structures would be compacted to a stated percentage of a laboratory established maximum density at a moisture content near optimum, were, in effect, convincing the NRC Staff at the CP Stage that engineering properties of compressibility and shear strength would be acceptable. What has been experienced at Midland (i.e., the plant fill significantly

settling under its own weight; foundation supporting safety related structures having very low penetration resistance to spoon samplers; and extensive cracking of structures founded on compacted fill) proves that soils were not compacted to the designated minimum compaction criteria established at the PSAR stage.

Q.6. Do other engineers share your conclusion that the cause of the plant fill settlement problem resulted from inadequate compaction or construction of an unsatisfactory plant fill?

A. Yes. Engineers from both the Corps and the NRC staff have the opinion that inadequate compaction and failure to attain the minimum compaction criteria designated at the PSAR stage are the major reasons for the settlement problem at Midland. In addition, in my opinion, statements obtained in the discovery depositions from Bechtel and their consultants support this conclusion. The following is from lines 7-10 at page 97 of the deposition of Sherif Afifi (Bechtel employee) taken on October 29, 1980;

BY MR.PATON:

Q. Doctor, do you have any opinion as to what caused the extensive settlement problem in the plant fill at Midland?

A. Inadequate compaction.

The following is from lines 13-25 at page 15 and lines 1-3 at page 16 of the deposition of Dr. Ralph B. Peck (Bechtel consultant) taken on January 13, 1981;

Q. All right. What is your opinion of the quality of the soils placement that had taken place prior to your being hired on the Midland project?

MR. FARNELL: Are you talking about the whole power plant? Or are you talking about specific parts of it?

MR. JONES: The soils portions of the project with which he was closely associated.

- A. My opinion, or perhaps you could say it was my conclusion was that the fill beneath the diesel generator building area and some neighboring areas was not a satisfactory fill.

The following is from lines 5-16 at page 41 of the deposition of Dr.

Alfred J. Hendron (Bechtel consultant) taken on January 27, 1981;

- Q. With respect to your construction of the fill do you have any opinion as to the quality of that work?

Were you going to speak?

MS. BLOOM: Yes, I was going to -- I think we have outlined what kind of work we are talking about here.

MR. JONES: Construction of fill?

THE WITNESS: I think when a fill is settle two to four inches under its own weight, and some places have a very low slow [sic] count which obviously something went wrong and I cannot say whose fault or what it might have been, but, there were some bad fills there, not as good as it should have been. I shouldn't say bad fills, there is a difference.

## PROFESSIONAL QUALIFICATIONS AND EXPERIENCE

NAME: Joseph D. Kane

ADDRESS: 7421 Miller Fall Road  
Derwood, MD 20855

EDUCATION: B.S. Civil Engineering 1961  
Villanova University

M.S. Civil Engineering 1973  
Villanova University

Post-degree studies, Soils and Foundation Engineering  
University of California 1972  
University of Maryland 1978

PROFESSIONAL REGISTRATION:

Registered Professional Engineer (1966) - Pennsylvania 12032E

PROFESSIONAL SOCIETY:

American Society of Civil Engineers

EMPLOYMENT POSITIONS:

February 1980 - Present	Principal Geotechnical Engineer U.S. Nuclear Regulatory Commission
May 1977 - February 1980	Geotechnical Engineer U.S. Nuclear Regulatory Commission
October 1975 - May 1977	Soils Engineer U.S. Nuclear Regulatory Commission
August 1973 - October 1975	Supervisory Civil Engineer Chief, Soils Design Section U.S. Army Corps of Engineers Philadelphia District
January 1963 - August 1973	Civil Engineer Soils Design Section U.S. Army Corps of Engineers Philadelphia District
January 1962 - January 1963	Design Engineer McCormick - Taylor Associates Philadelphia, Pa.

PROFESSIONAL EXPERIENCE SUMMARY:

1975 to Present

In NRC Division of Engineering, Geotechnical Engineering Section, Mr. Kane has specialized in soil mechanics and foundation engineering. Experiences in this position have included the following:

- a. Evaluation of the foundation adequacy of proposed sites for nuclear facilities with respect to design and operational safety. This work has included evaluation of geotechnical, soils and rock mechanics, foundation and earthquake engineering related aspects. The results of this review effort are summarized in a safety evaluation report for each of the proposed facilities which have included nuclear power plants, nuclear fuel reprocessing plants and uranium mill tailings waste systems.
- b. Serving as a technical adviser for soil and foundation engineering related aspects in the development of regulatory guides, acceptance and performance criteria that are intended to assure construction and operational safety of nuclear facilities.
- c. Serving as a technical representative for the Office of Nuclear Reactor Regulation on the NRC Advisory Group concerned with federal dam safety.
- d. Serving as an instructor for the Office of State Programs in the training of state personnel who are responsible for construction and operational inspections of uranium mill tailings embankment retention systems.

1963 to 1975

During this period Mr. Kane was employed with the U.S. Army Corps of Engineers, Philadelphia District and attained the position, Chief, Soils Design Section, Foundations and Materials Branch, in 1973. Professional experiences with the Corps of Engineers have included the following:

- a. The embankment and foundation design of four large multi-purpose earth and rockfill dams with appurtenant structures (spillways, inlet and outlet structures, control towers, flood protection facilities, etc.). Responsibilities ranged from the initial planning of

Professional Qualifications  
and Experience  
Joseph D. Kane

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subsurface investigations to select the most feasible sites through all design stages which were culminated in the final preparation of construction plans and specifications. This work included planning and evaluation of laboratory testing programs, studies on slope stability, seepage control and dewatering systems, settlement, bearing capacity, liquefaction, embankment safety instrumentation and slope protection.

- b. Served as a technical consultant to field offices charged with construction inspections for assuring completion of structures in compliance with design analysis and contract specifications. Participated in the development of needed modifications during construction whenever significant changed site conditions were uncovered.
- c. Directed the efforts of engineers in the Soils Design Section in other fields of civil work projects that included the embankment and foundation design of levees, waterfront pile supported structures and disposal basins for the retention of hydraulic dredge waste.

1962 to 1963

Served as design and project engineer for private consulting firm. This work included the design of large federally funded highways, a race track and various structures constructed to provide a Pennsylvania State park marina.