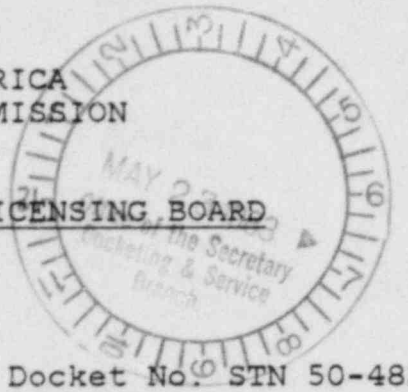
UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION



BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
UNION ELECTRIC COMPANY	)	Docket No. STN 50-483 OL
	)	
(Callaway Plant, Unit 1)	)	

AFFIDAVIT OF NEAL G. SLATEN
ON REED CONTENTIONS 6 AND 16
(PROTECTIVE ACTIONS AGAINST RADIOIODINES & MESSAGES
WITH INSTRUCTIONS FOR LONG-TERM SHELTERING)

City of St. Louis	)	
	)	ss.
State of Missouri	)	

NEAL G. SLATEN, being duly sworn, deposes and says as follows:

1. I am the Supervising Engineer - Environmental for Union Electric Company. In the event of a Site or General Emergency at the Callaway Plant, I will serve as the Radiological Assessment Coordinator. My business address is Union Electric Company, P.O. Box 149, St. Louis, Missouri 63121. A summary of my professional qualifications and experience is attached hereto as Exhibit "A". I have personal knowledge of the matters stated herein and believe them to be true and correct. I make this affidavit in response to Reed Contentions 6 and 16 (Protective Actions Against Radioiodines & Messages with Instructions for Long-Term Sheltering).

2. As the Supervising Engineer - Environmental, my normal responsibility is to direct the corporate Environmental and Health Physics Group, which at present consists of two health physicists and two engineers. My duties include: supporting federal, state and local licensing activities; reviewing radwaste, shielding and radiation monitoring system engineering design work; establishing and evaluating off-site radiological environmental monitoring programs; establishing corporate ALARA policy; reviewing conformance to radiological technical specifications; and other duties related to health physics and environmental assessment.

3. During a Site or General Emergency at the Callaway Plant my duties as the Radiological Assessment Coordinator would include: evaluating and relaying radiological information to the Union Electric Recovery Manager concerning the need to make protective action recommendations to off-site authorities; ensuring the coordination of Union Electric's off-site field monitoring activities with the off-site monitoring conducted by State and Federal officials; and ensuring the Recovery Manager is kept appraised of field monitoring results and off-site dose assessment.

4. The purpose of this affidavit is to explain the effectiveness of sheltering as a protective action in the event of a release of radioactive material, including radioiodine, from the Callaway Plant.

5. As a result of a reactor accident which results in a significant atmospheric release of radioactive material, the public may receive radiation doses from three exposure modes. These include: (1) exposure to external radiation as the plume passes; (2) exposure to external radiation from radionuclides deposited on the ground and other surfaces during and after cloud passage; and, (3) internal exposure due to radionuclides inhaled from the passing cloud. Thus, protective actions to reduce exposure should be considered for the direct external exposure and inhalation exposure pathways during cloud passage, and for external exposure pathways after cloud passage. (Of course, with respect to radioiodines, the inhalation pathway would be most important.)

6. Sheltering may be defined as a deliberate action by the public to take advantage of the inherent radiation shielding available in normally inhabited structures by remaining indoors, away from doors and windows, during and after the passage of the cloud of released radioactive material. Inherent structural shielding can afford protection against exposure to external sources. Furthermore, the exclusion of a significant amount of airborne radioactive material from the interior of a structure, either by natural effects or certain ventilation strategies, can reduce the amount of inhaled radionuclides as well. Actions taken to effectively shelter would not vary according to the duration of time one expected to stay indoors.

7. The shielding effectiveness of a structure is expressed in terms of a shielding factor, which is the ratio of the dose received inside the structure to the dose that would be received outside the structure. Estimates have been made of shielding for several distinct building types using currently available shielding technology. These include shielding factors for external exposure from cloud passage and external exposure from radionuclides deposited on the ground and other surfaces. The estimates indicate both that a wide range of potential shielding factors is afforded by normally inhabited structures and that basements of both homes and larger buildings offer very effective shielding against radiation. In general, shielding factors from a passing cloud range from a low of 0.1 for a basement to a high of 0.9 for a wood-frame house with no basement. For example, a projected dose of 900 mrem would most likely result in a sheltering recommendation. Sheltering oneself in a wood frame house would reduce this dose to 810 mrem. By moving to the basement, one could reduce this dose to as low as 90 mrem. Shielding factors for surface deposited radionuclides range from a low of 0.001 for a basement of a large building to 0.5 for a wood-frame house with no basement. The average shielding factors for the midwest region are 0.5 for a passing cloud and 0.09 for surface deposited radionuclides.

8. The effectiveness of sheltering as a protective action over time depends on many factors such as meteorological

parameters, plume deposition, type of structure, magnitude of release and duration of cloud passage. Since the release (or cloud passage) duration would generally be within the range of 0.5 to 10 hours, any subsequent protective action taken in addition to sheltering, such as evacuation, would not affect the dose received through inhalation (i.e., after plume passage there is no longer an inhalation pathway of significance). Past this time, deposited radionuclides continue to expose the sheltered individual, although exposure is reduced through structural shielding. Consequently, depending upon the magnitude of the release, the half-lives of released radionuclides, and the plume deposition, evacuation protective action guides could eventually be exceeded at some time after plume passage. In such a case, evacuation would be accomplished prior to release or, if not possible, sheltering would be recommended until passage of the plume followed by evacuation as soon as possible.

9. The reduction of inhaled radionuclides lessens the risk of health effects from a passing radioactive plume, the duration of which occurs within the range of 0.5 to 10 hours following release. Studies indicate that sheltered individuals receive a reduction of approximately 35% in the dose from inhaled radionuclides. (See Aldrich & Ericson, Public Protection Strategies in the Event of a Nuclear Reactor Accident: Multicompartment Ventilation Model for Shelters, SAND 77-1555, Jan. 1978; and Aldrich, Ericson & Johnson, Public

Protection Strategies for Potential Nuclear Reactor Accidents: Sheltering Concepts with Existing Public and Private Structures, SAND 77-1725, Feb. 1978.)

10. Larger reductions would be possible if the ventilation rate was further reduced by tighter building construction, emergency sealing of openings in the structure or by the use of basements. Additional protection against dose from inhalation of radionuclides may be provided by employing a variety of common household items such as towels or handkerchiefs as respiratory filters during cloud passage, as discussed by Mr. Saul Harris in his affidavit in response to Reed Contentions 6 and 16.

Neal G. Slaten

Subscribed and sworn to before me
this 16th day of May, 1983.

Barbara J. Pfaff
Notary Public

BARBARA J. PFAFF
NOTARY PUBLIC, STATE OF MISSOURI
MY COMMISSION EXPIRES APRIL 22, 1985
ST. LOUIS COUNTY

My Commission expires 4/22/85.

EXHIBIT A
PROFESSIONAL QUALIFICATIONS & EXPERIENCE

Neal G. Slaten - Supervising Engineer, Nuclear Environmental

Education - Bachelor of Science, Aerospace Engineering, St. Louis University

Master of Science, Nuclear Engineering, University of Missouri - Columbia

Related Training -

Westinghouse International School for Environmental Management Colorado State University, 1973

Westinghouse "Head Start" Program, 1973

Westinghouse "Head Start" Program Simulator, 1973

AIF Seminar, "Preparing Environmental Technical Specifications for Nuclear Power Plants", 1974

Course in "Environmental Analysis and Environmental Monitoring for Nuclear Power Generation" University of California - Berkeley, 1974

Course in "Environmental Radiation Surveillance for Nuclear Power" Harvard School of Public Health, 1976

AIF Seminar, "Current Issues on Environmental Regulation of Nuclear Power Facilities", 1977

Bechtel Auditor Training, 1978

NRC Seminar, Model Radiological Effluent Technical Specifications for Nuclear Power Plants, 1979

ASME/EPRI Radwaste Workshop, 1979

AIF Seminar, Standard Emergency Response Plan, 1979

NRC Seminar, Emergency Planning, 1980

INPO Radiological Protection Seminar, 1982

Hazardous Waste Management Summer Institute
University of Missouri, Columbia, 1982

Seminar on Medical Management of Radiation Injuries, 1982

Applied Health Physics Course
Oak Ridge Associated Universities, 1982

EEI Health Physics Committee Representative, 1977 to present

Professional Societies - Health Physics Society

Experience - 1972-1978, Engineer. Responsibilities included Licensing and NSSS design review.

1978-1980, Nuclear Environmentl Engineer. Responsibilities included Radwaste Systems design review, Environmental Assessment and monitoring programs, Environmental Report & general Licensing activities.

1980-Present, Supervising Engineer, Environmental. Responsibilities include: directing the corporate Environmental and Health Physics Group; Licensing support; reviewing radwaste, shielding and radiation monitoring system engineering design work; evaluating off-site radiological and non-radiological environmental monitoring programs; establishing corporate ALARA policy; reviewing conformance to provisions contained within technical specifications and applicable license provisions pertaining to radiological matters; providing technical expertise to QA audit teams; reviewing design modifications to assure compliance with ALARA philosophy; acting as Radiological Assessment Coordinator during a site or General Emergency at Callaway Plant.