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RELATED CORRESPONDENCE

NRC STAFF TESTIMONY OF JAMES W. CLIFFORD, JOSEPH J. BUZY,
AND RICHARD J. ECKENRODE

DOCKETED

'85 FEB 19 P2:46

Q.1. What is your name and occupation?

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PROD & UTIL. FAC.

A.1. (Clifford) My name is James W. Clifford. I am employed as an Operational Safety Engineer (Nuclear) in the Procedures and Systems Review Branch, Division of Human Factors Safety, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission.

Q.2. What are your qualifications and experience relevant to your testimony?

A.2. (Clifford) I have a Bachelor of Science degree in Systems Engineering. I have experience in the operation, maintenance, event analysis, and testing of naval nuclear propulsion plants and prototypes. During my employment with the U.S. NRC, I have been involved in numerous evaluations of licensee and applicant emergency operating procedures and procedure programs, including evaluations for licensing and for actual operating events. A further statement of my professional qualifications is attached to this testimony.

Q.3. What is your name and occupation?

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A.3. (Eckenrode) My name is Richard J. Eckenrode. I am employed as a Human Factors Engineer in the Human Factors Engineering Branch, Division of Human Factors Safety, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission.

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Q.4. What are your qualifications and experience relevant to your testimony?

A.4. (Eckenrode) I have a Bachelor of Science degree in Aeronautical Engineering. I have been active in the application of the Human Factors discipline to manned systems since 1960. During my employment by the U.S. NRC, I have participated in numerous evaluations of control room designs and design reviews for applicant and operating reactors. A further statement of my professional qualifications is attached to this testimony.

Q.5. What is your name and occupation?

A.5. (Buzy) My name is Joseph J. Buzy. I am employed as a Senior Reactor Engineer (Training and Assessment) in the Licensee Qualifications Branch, Division of Human Factors Safety, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission.

Q.6. What are your qualifications and experience relevant to your testimony?

A.6. (Buzy) I have a Bachelor of Science degree in Marine Engineering. I have over 28 years experience in the design, operation, maintenance,

event analysis, and training for military and commercial nuclear power plants, including 17 years as an Operator License Examiner for the U.S. NRC. My current responsibilities include evaluation of training and requalification programs for licensed operators and Shift Advisors. A further statement of my professional qualifications is attached to this testimony.

Q.7. What is the nature of your testimony?

A.7. (All) We are providing testimony to address the question of whether the procedures and training proposed by the licensee will provide additional assurance that the TDI emergency diesel generators (EDGs) will be operated within the specified loading capacity.

Q.8. What part do the procedures and training play in the TDI EDG design issue at Shoreham?

A.8. (All) In response to an NRC staff question, the licensee stated in November 1984, that they were relying on procedures and training (i.e., the operators) to keep from overloading the EDGs above a level identified as a "qualified load" during specified conditions. This qualified load we understood to be 3300KW. The specified conditions were a Loss of Offsite Power (LOOP) or a Loss of Offsite Power in.

conjunction with a Loss of Coolant Accident (LOOP/LOCA). Without the assurance that operators would keep EDG loading less than 3300KW, the NRC staff ~~could not certify the reliability of the EDGs~~ would not, at the time of the December 18, 1984 SER, make the determination that the EDGs met GDC-17.

~~In evaluating the EDGs, the design review resulted in a finding that the EDGs were capable of operating at 3500KW, as indicated in the portion of the testimony provided by the consultants to the NRC staff. Assuming the loads and associated loadings that are identified in the FSAR (Table 6.3.1-1) are accurate, and the reliability of the EDGs is acceptable to at least 3500KW, as determined by the NRC staff and its consultants, the operators are no longer required to keep EDG loading less than 3300KW, and the procedures and training are acceptable to be used, as at other plants, to provide additional assurance that the EDGs will be operated within the loading capacity of the machines.~~

This position, previously taken by the NRC staff, did not, however, specifically address the relationship between the 3300KW "qualified load," GDC 17, and operator action. The staff has conducted a further technical evaluation of the EDGs.

This technical evaluation is discussed in other parts of the testimony.

In evaluating the role of procedures and training, we started with the assumption that the EDGs meet, or would meet, the design criteria of GDC 17, which assumes that the EDG design at Shoreham was adequate. With this assumption, we evaluated the procedures and training to address three specific questions.

Old Question 9 moved to be Question 12.

Q.9. What were these specific questions?

A.9. The first question was whether or not the procedures and training call for an operator action that would cause the EDG load to exceed 3300KW.

The second question was if a situation were to occur that would, for some unspecified failure, cause the EDG to exceed 3300KW, do the procedures and training provide the necessary guidance to reduce the load below 3300KW within one hour?

The third question was whether or not the training program adequately addressed the technical concerns associated with the 3300KW load limit on the EDGs.

These specific questions were documented by a memo from Carl Berlinger to Dennis L. Ziemann dated February 14, 1985.

Q.10. Describe the review performed to date.

A.10. (A11) In early December 1984, we were asked by our Division of Licensing to evaluate the procedures related to EDG operation. We evaluated the following letters to determine the role the licensee intended for the procedures and training.

- a. J. D. Leonard to H. R. Denton, dated July 3, 1984
- b. J. D. Leonard to H. R. Denton, dated August 22, 1984
- c. J. D. Leonard to H. R. Denton, dated September 11, 1984
- d. J. D. Leonard to H. R. Denton, dated November 19, 1984 (SNRC-1104)
- e. J. D. Leonard to H. R. Denton, dated November 29, 1984

We received the following procedures during the first week of January 1985:

- a. Level Control SP29.023.01, Rev. 4, dated 12/20/84
- b. Loss of Offsite Power SP29.015.01, Rev. 7, dated 12/20/84
- c. Loss of Coolant Accident
Coincident with a
Loss of Offsite Power SP29.015.04, Rev. 0, dated 12/20/84

d. Emergency Diesel

Generators SP23.307.01, Rev. 12, dated 12/14/84

e. Main Control Room -

Conduct of Personnel SP21.004.01, Rev. 7, dated 9/27/84

We conducted a review of these procedures for useability and technical accuracy. We had numerous comments on the procedures.

In addition to these procedures, we visited the site January 16-17 to evaluate the location and adequacy of the instrumentation and controls to be used during the execution of the procedures, to obtain information on the training program necessary to complete our evaluation, and to obtain additional procedures that would be used during the assumed LOOP or LOOP/LOCA conditions. The following additional procedures were obtained:

f. Emergency Shutdown SP29.010.01, Rev. 4, dated 8/16/84

g. Loss of Instrument Air SP29.016.01, Rev. 4, dated 10/7/83

Q.11. Describe how the information evaluated has led to your current position.

A.11. (Buzy) The most significant finding was that at the time of our site visit, the training department had not yet started to develop a

training program to address the integration of the numerous issues that would have to be addressed to operate the plant with the limitation on EDG loading. We therefore had no basis for evaluating the adequacy of the training, or the bases for the training program.

(Clifford) There were a number of concerns regarding the procedures. In several instances, the procedures would have either directed the operators to take actions that would have overloaded the EDGs, or required the operator to decide between various options, without either specifying the options themselves or providing the criteria for choosing between the options.

(Clifford) The number of procedures that were required to be used by the operators simultaneously raised a concern regarding the manageability of the procedures, and the large number of interrelated actions during their execution.

(Eckenrode and Clifford) There was also a concern that the actions that would have to take place outside the control room to determine if a number of non-safety loads were operating may add an unacceptable level of confusion and delay while the operators were trying to mitigate a LOOP/LOCA event. In addition, no means had been provided to keep track of the loads that were being manipulated.

(A11) The specific concerns are addressed in a Request for Additional Information from A. L. Schwencer to J. D. Leonard, dated February 5, 1985, which is hereby incorporated into this testimony.

~~We are requiring that the specific concerns identified during our review by acceptably addressed by the licensee before we complete our evaluation. These specific concerns are addressed in a Request for Additional Information transmitted from A. L. Schwencer to J. D. Leonard dated February 5, 1985.~~

Q.12. ~~Is there reasonable assurance that the EDGs will be operated within their load capacity?~~ Based on these concerns, is there reasonable assurance that the procedures and training adequately address the questions posed in Question 9?

A.12. (A11) Based on the information we have reviewed to date, we have not found reasonable assurance that the EDGs will be operated within their load capacity. Based on the information we have reviewed to date and the concerns identified, we have not found reasonable assurance that (1) the procedures and training would not lead the operators to load the EDGs to over 3300KW, (2) the procedures and training provide the necessary guidance to have the EDG load reduced to less than 3300KW within one hour, and (3) the training program adequately addressed the technical concerns associated with the 3300KW load limit associated

with the EDGs. We believe that if the specific concerns identified in our February 5, 1985 Request for Additional Information are adequately addressed by the licensee, reasonable assurance could be found that these three questions would be satisfied.

PROFESSIONAL QUALIFICATIONS

JAMES WILLIAM CLIFFORD

My name is James William Clifford. I am employed as an Operational Safety Engineer in the Procedures and Systems Review Branch, Division of Human Factors Safety, Office of Nuclear Reactor Regulation, U. S. Nuclear Regulatory Commission, Washington, D. C. I have held this position since October 1980. I have also been assigned as Acting Section Leader, Section A (Procedures) of the Procedures and Systems Review Branch for the period of March 28, 1983 to September 11, 1983. The Procedures and Systems Review Branch reviews and evaluates licensee programs for the technical, human factors, and operational aspects of nuclear power plant operating and maintenance procedures. I was involved in the pre-licensing audit of emergency operating procedures at five (5) applicants' sites, and have reviewed the emergency operating procedure development programs for eight (8) applicants and operating reactors. These reviews included the evaluation of technical guidelines, operational concerns, and the human factors guidelines to be used in the development and implementation of the emergency operating procedures. I was involved as one of the principal staff reviewers for the human factors aspects of emergency operating procedure generic technical guidelines for B&W and Combustion Engineering Owners Group guidelines, and, through the reviews of procedures for three (3) BWR applicants, assisted in the evaluation of the adequacy of the BWR Owners Group guidelines. I was the principal reviewer for the operational and human factors concerns for the Pressurized Thermal Shock generic issue, including audits of emergency operating procedures for six plants.

From July 1978 to October 1980, I was a naval officer qualified to the equivalent of a shift supervisor at the naval nuclear power prototype at Windsor, CT, where my responsibilities included supervision of plant operations, training of new personnel, and ensuring the continued expertise of experienced personnel. From March 1976 to July 1978 I was a naval officer assigned to a nuclear powered ship, where my responsibilities included safe operation of the ship's nuclear power plant.

I earned a BS degree in Systems Engineering from the U. S. Naval Academy in 1974. During my naval service and my employment with the NRC, I have attended several courses, varying from one week to six months in duration, on plant engineering, human factors, and plant operations. I am previously qualified as Chief Engineer Officer for Naval Nuclear Propulsion Plants.

JOSEPH J. BUZY

Professional qualifications

Current Position: Systems Engineer (Training & Assessment)
Personnel Qualifications Branch
Division of Human Factors Safety
U.S. Nuclear Regulatory Commission

Education: B.S. Marine Engineering - 1954
U.S. Merchant Marine Academy
Kings Point, N.Y.

Experience:

o Military Service - 1954 - 1956 Served as Damage Control Officer and later Engineering Officer on U.S.S. Hollis APD-86.

o Nuclear - 1956 - 1960: Employed by Bettis Laboratories under contract to the Naval Reactors Program as an operating engineer for the Large Ship Prototype, AIW. I was trained and qualified as Chief Operator on the submarine prototype SIW and assisted in training Navy personnel for SIW and later AIW. I later qualified as Chief Operator on AIW and was assigned as test coordinator during the AIW power escalation program. I was later transferred to Newport News Shipyard as a Bettis Laboratory representative during the construction and start-up testing of the U.S.S. Enterprise. I assisted in initial start-up of two reactor plants on the Enterprise.

1960 - 1963: Employed by the Martin-Marietta Corporation as an operations test engineer for the PM-1 plant. The plant was built for the AEC and Airforce in Baltimore, Maryland, and transported to Sundance, Wyoming. At the site I qualified as Shift Supervisor and was in charge of a combined military crew during the start-up and demonstration phases of the PM-1 plant. I trained and qualified a majority of the military crew who later operated the PM-1 plant.

1963 - 1978: Employed by the AEC as Nuclear Engineer in the Operator Licensing Branch. I was trained and qualified as an operator licensing examiner and responsible for developing and administering written and operating examinations under 10 CFR Part 55 for all types of reactor licensed under 10 CFR 55 and 115. I occasionally directed AEC consultants in development and administration of examinations. In 1970, I was appointed as Section Leader for Power and Research Reactors (P&RR). I trained and supervised several OLB examiners in addition to a group of six to eight consultant examiners. The P&RR section administered examinations at all research and test reactors, Babcock and Wilcox, Combustion Engineering, General Atomics (HTGRs at Peach Bottom and Fort St. Vrain) and the sodium cooled reactors, Fermi I and SEFOR.

Examinations also included use of simulators. The P&RR section occasionally provided personnel to conduct examinations at the Westinghouse and General Electric plants. The P&RR section also reviewed Section 13.2, Training, in the FSAR and developed safety evaluation reports in this area.

1978 - 1979: I was assigned to Region II, Atlanta, Georgia and participated in a Pilot Test Program for regionalization of OLB functions. I was responsible for all licensed operator and senior operator renewals as well as changes to requalification programs in Region II. I developed and conducted examinations on all types of reactors, including the use of simulators, in the Region. Shortly after the Three Mile Island, Unit 2, accident, I was detailed as part of the NRC team at TMI for several weeks. Due to large demands on the OLB staff at Headquarters, the Pilot Test Program was suspended in the fall of 1979 and I returned to Headquarters as the PWR (Westinghouse) Section Leader. I was employed in this capacity until February of 1982.

1982 - Present: I am currently assigned as a Systems Engineer (Training and Assessment). This position requires: review of licensee's applications in Chapter 13.2 of the FSAR and preparation of Safety Evaluation Reports, review of changes to the licensee's requalification programs, response to Regional reports to provide resolution on the interpretation of training requirements. I have been recently assigned as a reviewer of Shift Advisor training programs. I have also participated in review of the ATWS event at Salem and the review of PTS training at H.B. Robinson and Calvert Cliffs. In addition, I have participated in the review of training programs at TMI.

Publications: I have contributed to several NUREGs published by the NRC.

RICHARD J. ECKENRODE
PROFESSIONAL QUALIFICATIONS
HUMAN FACTORS ENGINEERING BRANCH
DIVISION OF HUMAN FACTORS SAFETY

Since December 1980 when I was hired by the U.S. NRC, I have been assigned to the Human Factors Engineering Branch, Division of Human Factors Safety, Office of Nuclear Reactor Regulation. My initial responsibilities included: (1) participation in the development of NUREG-0700, "Guidelines for Control Room Design Reviews," and (2) participation in the onsite control room design reviews required for operating licenses. Subsequently, I have participated in over 20 control room design reviews, 12 of which I directed. I was a member of the NRC Task Forces which reviewed the steam generator tube rupture event at R. E. Ginna Nuclear Power Plant and the ATWS event at Salem Generating Station.

I have been active in the application of the human factors discipline to manned systems since 1960 and have directed or participated in more than 30 major human factors projects. I am a member of the Human Factors Society.

I hold a Bachelor of Science degree in Aeronautical Engineering from St. Louis University and have completed five NRC sponsored courses in Nuclear Reactor Concepts, Radiation/Contamination Protection, Pressurized Water Reactor Fundamentals, BWR Technology, and PWR Simulation.

From 1963 until joining the U.S. NRC in 1980, I was a Principal Associate with Dunlap and Associates, Inc., of Norwalk, Connecticut. Dunlap and Associates, Inc. is a research and consulting firm in the areas of systems and operations analyses and the behavioral sciences including human factors.

Some of my major projects included:

- Development of human factors guidelines for designing CRT color display formats for a large electrical power distribution control room. Subsequently designed a major portion of the displays.
- Development of a task analysis methodology for determining training requirements and training device requirements and characteristics, as applied to Infantry and Cavalry Fighting Vehicles.
- Conducted human factors and systems analyses resulting in man/machine interface design recommendations, procedures development and training requirements recommendations for the following systems and programs:
 - o Optical lens manufacturing facility
 - o Hematology laboratory
 - o Navy AEGIS combat system program
 - o Trident submarine missile system
 - o Remotely piloted aircraft
 - o UTTAS and research helicopters
 - o Antisubmarine Warfare attack team trainer
 - o Landing helicopter assault ship

- Chemical/biological warfare protective clothing
- Manned orbital laboratory
- Apollo/Saturn prelaunch checkout system

From 1960 to 1963 I was with the Life Sciences Department of McDonnell Aircraft Corporation. During that time I participated in the human factors analysis and design work on projects Mercury and Gemini and on mechanical ground support equipment for the F4 Tactical Fighter aircraft. I also participated in the Mercury astronaut acceleration training program and gathered human performance data to assist in verifying mission reliability estimates.