 June 10, 1988

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

JUDGE IVAN W. SMITH, CHAIRMAN
JUDGE JERRY HARBOUR
JUDGE GUSTAVE A. LINENBERGER, JR.

In the Matter of	
Public Service Co. of New Hampshire, et al.	Docket No. 50-443-OL 50-444-OL
(Seabrook Station, Units 1 & 2)	Offsite Emergency Planning Issues

AMENDED TESTIMONY OF WILLIAM R. CUMMING AND JOSEPH H. KELLER ON BEHALF OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY ON SHELTERING/BEACH POPULATION ISSUES

INTRODUCTION OF WITNESSES

I, William R. Cumming, am an attorney in the Program Law Division of the Office of General Counsel, Federal Emergency Management Agency (FEMA).

I, Joseph H. Keller, am employed by Westinghouse Idaho Nuclear Company as a Fellow Scientist at the Idaho National Engineering Laboratory, a Department of Energy Laboratory.

Our Statements of Professional Qualifications are included in this testimony as Attachments A and B, respectively.

BACKGROUND

Our testimony addresses several issues. The first is whether the requirement for a range of protective actions specified in Planning Standard J of NUREG 0654/FEMA REP 1, Rev. 1, applies uniformly to each special population within the EPZ. A closely related issue is whether the requirement for a range of protective actions has been met with respect to the summer beach population in the New Hampshire portion of the EPZ. We also consider the issue of whether the decision by the State of New Hampshire not to shelter the summer beach population except in very limited circumstances is supported by a technically appropriate basis.

The NRC Staff has advised FEMA that it does not interpret its regulations to require sheltering for each segment of the EPZ population. In the Supplemental Testimony which was prefiled on January 25, 1988, FEMA staced:

> (a) that it is appropriate to consider further the adequacy of the emergency response plan for the transient population of the beaches within the Seabrook Emergency Planning Zone (EPZ) during the summer, that is, from May 15 to September 15, as indicated in the New Hampshire Radiological Emergency Response Plan (NHRERP); (b) that the requirement of NUREG 0654/FEMA REP 1, Rev. 1, for a "range of protective actions" may or may not be satisfied by evacuation alone; (c) that FEMA cannot conclude that the NHRERP is adequate with respect to that beach population until it is clear that the State of New Hampshire has considered the use of sheltering for the transient beach population and explains what use, if any, it intends to make of sheltering. This latter point should not be interpreted to mean that FEMA has imposed a requirement that sheltering be available. If the State of New Hampshire intends not to employ sheltering for the transient beach population (which is not presently clear from the NHRERP), then FEMA expects the State to develop the rationale for such a choice and provide it to FEMA for review.

The materials submitted by the State of New Hampshire make it clear that it

has considered the use of sheltering for the transient beach population and explains what use, if any, it intends to make of sheltering. It also provides a rationale for the State's choice which is technically supportable. As a consequence, FEMA now finds that the provisions in the NHRERP regarding planning elements J.9. and J.10.m. of NUREG 0654/FEMA REP 1, Rev. 1, are adequate with respect to the summer beach population.

The focus of this testimony is primarily two-fold: our position is based on both legal and technical considerations.

Legal considerations were a very important influence. In the discussion which follows, the purpose is not to present a legal argument, but to present as accurately as possible the history of how FEMA developed its position. For this reason, the narrative below follows a chronological sequence.

In a memo to the Regional Assistance Committee dated December 31, 1985, Edward A. Thomas, Chief of the Natural and Technological Hazards Division, Region 1, FEMA, identified the summer beach population within the EPZ as a special planning issue.

The June 18, 1986, letter from the Chief Hearing Counsel of the NRC Staff to the General Counsel of FEMA, which has been served on the parties to this litigation, dealt in part with the question of minimum dose reduction. It expressed the position that no pre-set minimum dose reduction was required for offsite emergency plans to be acceptable and that such plans were intended to cope with a range of accidents, not a single accident.

The Commission ruled, on July 24, 1986, in the Long Island Lighting Company (Shoreham) case (24 NRC 22, 29 (CLI-86-13 1986)) that emergency planning requirements do not require that an adequate plan achieve a pre-set

minimum radiation dose savings or a minimum evacuation time for the plume exposure pathway emergency planning zone in the event of a serious accident; rather they attempt to achieve reasonable and feasible dose savings under the circumstances.

On February 18, 1987, Dr. Robert Bores, Technical Assistant, Division of Radiation Safety and Safeguards, NRC Region I, King of Prussia, Pennsylvania, sent a letter to Edward A. Thomas expressing the view that the NHRERP does achieve significant dose savings for the transient beach population and that there are a number of special circumstances which work together to lessen the risk. At the next meeting of the Regional Assistance Committee (RAC), in April, 1987, a consensus was reached that the issue had been adequately treated in the NHRERP. FEMA was prepared to endorse that position in testimony before this ASLB.

The proposed rule change dealing with the evaluation of utility-sponsored emergency response plans, published by the NRC at 52 Fed. Reg. 6980 (March 6, 1987), included a comment that offsite emergency response plans in general were not to be judged by any specific quantitative standard. This view was reiterated with the publication of the final rule change at 52 Fed. Reg. 42,078 (November 3, 1987).

Dr. Bores's letter of June 4, 1987, to Edward Thomas essentially repeated the views stated in the earlier letter, but the most notable difference was the omission of any reference to the containment structure at Seabrook Station. The foreknowledge that this second letter would be sent prompted FEMA to review the beach population issue. This letter was delivered to Mr. Thomas only hours before FEMA's Statement of Position was filed and served on the parties.

On June 4, 1987, FEMA filed a Statement of Position which took the position that, until the beach population issues were resolved, it could not make a finding of reasonable assurance.

The testimony which FEMA prefiled on September 11, 1987, reiterated the position taken on June 4.

At the start of the current hearings in this case on October 4, 1987, Sherwin Turk, Counsel for the NRC Staff, filed a proposed rebuttal plan with this Board, outlining the testimony which the NRC was considering offering. It included a statement that NRC's regulations were not contravened by the absence of shelter for the beach population.

On October 15, 1987, Dr. Bores sent to Sherwin Turk an account of the RAC meeting of July 30, 1987 in which he expressed the view that the lack of a reference to the Seabrook containment in his letter of June 4, 1987 made no difference in the technical rational or conclusions.

On November 6, 1987, the ASLB heard arguments on the admissibility of testimony of Stephen C. Sholley, et al. At that time, counsel for the NRC cited the material published with the final rule at 52 Fed. Reg. 42,078 (November 3, 1987) and the Commission's ruling in the Shoreham case (24 NRC 22, 29 (CLI-86-13 1986)).

On November 16, 1987, this Board ruled from the bench that the proffered testimony of Stephen C. Sholley, et al., was not admissible, citing as controlling the Commission's ruling in the Shoreham case (24 NRC 22, 29 (CLI-86-13 1986)).

On November 30, 1987, Sherwin Turk wrote to Stephen Oleskey, Deputy Attorney General of the Commonwealth of Massachusetts, and indicated his

perception that FEMA's prefiled testimony was based on an erroneous legal standard.

On January 7 and 8, 1988, the RAC met and the majority of the RAC endorsed the views stated in Dr. Bores's letter of June 4, 1987.

FEMA filed its Supplemental Testimony on the Sheltering/Beach Population Issues on January 25, 1988.

On February 11, 1988, the State of New Hampshire submitted to FEMA a Response to FEMA's Supplemental Testimony. This was followed by additional material on February 19, 1988.

On February 18, 1988, Sherwin Turk sent a letter to H. Joseph Flynn, FEMA counsel, affirming FEMA's understanding that NRC Staff's interpretation of its regulations did not require sheltering for all accidents at all times and at all locations within the plume exposure EPZ.

The RAC met and discussed the state of the plans for the summer beach population on February 29, 1988. The majority reaffirmed its position that the NHRERP was adequate in its treatment of the summer beach population.

Over the period encompassed by the foregoing discussion, it became increasingly clear to FEMA that to require sheltering for the transient beach population as a condition of a finding of reasonable assurance is inconsistent with the precept that emergency planning requirements do not require that an adequate plan achieve a pre-set minimum radiation dose savings or a minimum evacuation time. This testimony reflects that realization as well as deference to the NRC Staff and Commission on their interpretation of the requirement for a range of protective actions. FEMA agrees with that interpretation.

Furthermore, events since the filing of FEMA's Prefiled Testimony on March 14, 1988, and a continuing review of the record of this litigation have tended to reinforce FEMA's position on the beach population/sheltering issues. In addition to the items listed above, FEMA also relies on:

The Appeal Board ruling in Public Service of New Hampshire (Seabrook) ALAB-838, 23 NRC 585 (1986), affirming the decision of the ASLB (ASLBP 82-471-03, April 29, 1986) rejecting the contention of the Commonwealth of Massachusetts on the beach population;

Partial Initial Decision in Long Island Lighting Co. (Shoreham) LPB-88-13 (May 9, 1988), holding, in part, that monitoring and decontamination are considered protective actions within the meaning of the phrase, "range of protective actions";

All events occurring on the record during the course of these proceedings to date; and

The bench ruling of this ASLB on May 10, 1988, on the admissibility of the Sholley/Beyea testimony.

TECHNICAL APPROPRIATENESS ANALYSIS

On page 2 of the prefiled Supplemental Testimony of January 25, 1988, FEMA stated that it expected the State to consider the use of sheltering for the transient beach population and explain what use, if any, it intends to make of sheltering.

On February 11, 1988, Richard H. Strome, Director of the Office of Emergency Management of the State of New Hampshire wrote to Mr. Henry G. Vickers, Regional Director of FEMA Region I, enclosing a document entitled

"New Hampshire Response to FEMA Supplemental Testimony" which presented the State's justification for choosing to use shelter in the beach areas only in limited circumstances. In essence, the justification is that sheltering for the transient beach population is a protective action of limited usefulness in realizing dose savings, regardless of the season (page 1) and that the public is much more likely to be afforded meaningful dose reductions by moving out of the EPZ than by moving to a shelter within the EPZ (page 2).

The February 11th submission considers an evacuation of the general beach population in the vicinity of the plant as a protective action strategy at the Alert level. In the case of transit dependent transients, temporary sheltering as it is outlined in the proposed plan changes is sensible because it does not delay their evacuation.

The response by New Hampshire to the FEMA Supplemental Testimony is adequate in concept. The transient beach population is treated as a special population and the special considerations afforded this special population include precautionary actions such as early beach closure at Emergency Classification Levels (ECLs) prior to the necessity for considerations of protective actions for the general public.

ECLs range from Notification of Unusual Event (the least severe) through Alert, Site Area Emergency, and General Emergency (the most severe). The current NHRERP calls for beach closure to be considered at the Alert ECL and implemented no later than the Site Area Emergency ECL. For these ECLs there will be no significant doses associated with beach closure as a precautionary action.

It is FEMA's understanding of NRC's current guidance and internal response procedures, as stated in NUREG 1210, that initial protective action decisions for areas near the site should be based on plant status without inclusion of calculations of projected doses unless a release of radioactive material is already underway. The basis for the immediate evacuation of the close-in areas without dose calculations is based on the fact that, unless a release of radioactive material is underway, there is little or no likelihood of having reliable predictive information needed to perform dose projection calculations. The information necessary to make an accurate calculation would include the projected duration of a release, the time at which such a release would begin, and the magnitude of a projected release.

In addition, in severe accident sequences the total dose potential is comprised of several components. These are the direct exposure from immersion in the plume, cloud-shine from a plume overhead, exposure from inhalation of the plume, and ground-shine from deposited radionuclides. The exact relationship among the various components will vary with time and distance from the point of release; however, in severe accident sequences the ground-shine component is most likely to be the major contributor to total dose if no protective actions are taken.

In those cases, if the dose reduction strategy is sheltering first followed by an evacuation after plume passage, the total dose reduction would not be as great as that for the immediate evacuation strategy. The sheltering part of the strategy reduces dose primarily from the plume immersion and inhalation component. In the New Hampshire submission, the dose reduction factor ascribed to the available shelters is 0.9. That means that an

individual inside such a shelter would receive 90% of the plume immersion dose he or she would receive without shelter. Another way of expressing this measurement is to say that a building with a dose reduction factor of 0.9 provides a dose reduction of 10%.

The dose reduction for the inhalation dose is greater than 10%, but approaches zero depending on the rate at which outside air, the plume, infiltrates the shelter. It is generally accepted that after two hours, the effectiveness of a shelter to reduce the inhalation exposure begins to degrade. For the "unwinterized" structures in the New Hampshire beach areas, this degradation would likely begin much sooner. During the evacuation after plume passage, the individual previously in shelters would still receive the ground-shine dose, potentially the major component. Therefore, sheltering followed by evacuation is likely to be a less effective means of achieving dose reduction than evacuation alone, particularly for severe accident sequences.

In the immediate evacuation case, as stated above, the dose reduction involves the ground-shine component. The exact dose reduction which would result in most cases is difficult to predict due to the many potential combinations of the geometries of the plume and the evacuation routes. In the extremely rare case where the evacuation routes coincide with the plume path, an estimate of the dose reduction can be made. Because of the dispersion and dilution of the plume as it moves downwind from the point of release, the dose rate decreases with distance. The rate at which the dose rate decreases as a function of distance (r) from the source can be approximated by an inverse power series (r^{-a}, where a varies between 1.5 and 3 depending on the

atmospheric stability class). Generally speaking, the closer an area is to the point of release, the greater the potential dose savings to be achieved by early evacuation.

By implementation of the immediate evacuation strategy, dose reduction greater than those to be derived from a "shelter first-evacuate later" concept can be obtained by movement of the population relatively short distances even in the extremely unlikely case where the plume track and the evacuation routes coincide.

CONCLUSION

The requirement for a range of protective measures has been satisfied even though the State of New Hampshire has chosen not to shelter the summer beach population except in very limited circumstances. With respect to the summer beach population, the planning elements J.9. and J.10.m. of NUREG 0654/FEMA REP 1, Rev. 1, have been met. There exists a technically appropriate basis for the choice made by the State of New Hampshire not to shelter the summer beach population except in very limited circumstances. At the same time, whenever this choice is incorporated into the NHRERP, implementing detail will be necessary.

ATTACHMENT A

WILLIAM R. CUMMING
4243 Vacation Lane
Arlington, Virginia 22207
(703) 527-3919

PROFESSIONAL QUALIFICATIONS

Offer over fifteen years experience in a series of increasingly significant public policy positions where legal/administrative knowledge was used to achieve priority management objectives. Areas of expertise include:

Legal Administration — History of success in coordinating difficult policy and legal issues . . . expert in developing systems and procedures for detecting and controlling fraud and abuse of governmental programs . . . experienced in developing legal frameworks for new programs and decentralizing activities.

Management/Administration — Successful in undertaking many new, understaffed, mission-oriented assignments and achieving management objectives in both civilian and military settings . . . broad background in program development . . . knowledge of contracting and procurement law . . . skilled in handling debarment and suspension of contractors and program participants.

Personnel Supervision — Supervised groups ranging from 5 to 130 . . . experienced in designing training and program materials . . . skilled in handling employee and union relations . . . successful in developing program alternatives to conserve personnel resources . . . effective at motivating staff members to deliver maximum performance levels.

PROFESSIONAL EXPERIENCE

OFFICE OF THE GENERAL COUNSEL
FEDERAL EMERGENCY MANAGEMENT AGENCY — 1979 to Present

Assistant General Counsel (Projects) (1986 to Present)

Responsible for development of legal positions related to planning, preparedness response and mitigation for both peacetime and wartime civil emergencies and integration into existing National Security institutions.

- Coordinate Technical Assistance to the Associate General Counsel for Litigation, General Law, Insurance and Mitigation; the Assistant General Counsel and the Regional Counsel.
- Conceive and implement legal policies and procedures related to warning systems, communications, population relocation, protection and damage assessment to be utilized during disasters and National Security Emergencies.
- Coordinate legal plans to assure continuity of the Federal Civil Government in a wide range of National Security Emergencies.
- Develop legal plans for the protection of industry, post-attack recovery and economic stabilization during National Security Emergencies and disasters.
- Develop legal authorities for emergency evacuation and sheltering decisions.
- Senior attorney responsible for legal aspects of agency telecommunications policies, including AT&T consent order impact on National Security Emergencies.
- Provide legal advice and technical support to State and Local governments, on emergency preparedness.
- Develop legislative programs to prevent fraud, waste and abuse in programs.

Associate General Counsel (Litigation) (1980 to 1985)

Supervised all attorneys performing litigation services for the Director and General Counsel of the Federal Emergency Management Agency.

- Supervised an average open caseload of 300 defensive and affirmative cases in various state and federal trial and appellate courts; savings to government exceeded $85 million.
- Established and coordinated Regional Counsels.
- Determined trial and appellate recommendations and strategy for FEMA; coordinated with Department of Justice on cases having government wide impact.

PROFESSIONAL EXPERIENCE . . . *Continued*

Assistant General Counsel (Insurance) (1979 to 1980)

Provided legal advice to the Federal Insurance Administration (FEMA) including responsibility for preparation and sign-off of legal opinions, regulations and conduct of litigation; defended over 700 claims with many individual cases exceeding $5 million in potential liability.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT 1974 to 1979

Attorney-Advisor, Supervisory Trial Attorney
Office of the Associate General Counsel for Regulatory Programs

Supervised six attorneys; prepared all appropriate pleadings, motions and appellate briefs in cases related to HUD programs in federal trial and appellate courts. Reviewed, drafted and commented on legislation.

INTERNAL REVENUE SERVICE 1970 to 1974

Senior Tax Law Specialist (Projects Section)
Estate and Gift Tax Branch (1973 to 1974)

Prepared numerous private and published revenue rulings which determined IRS position concerning income, estate, gift and fiduciary returns.

Special Advisor to the Assistant Commissioner (Stabilization) 1972

Developed regulations of the Pay Board, Price Commission and Rent Advisory Board; served as the Assistant Commissioner's liaison with these organizations on enforcement issues.

Tax Law Specialist, Various Branches under Assistant Commissioner (Technical) (1970 to 1971)

EDUCATION

Juris Doctor, 1967
University of Virginia

Bachelor of Arts, History, *Magna Cum Laude*, 1964
Lehigh University

MILITARY

United States Army, 1967 to 1970; Commissioned 1968
1LT Field Artillery Highest Rank
Nuclear Weapons Unit Commander 1968 to 1969
Staff Officer, Intelligence and Operations 1969 to 1970
Overseas Service, Federal Republic of West Germany
Decorations: Army Commendation Medal

LEGAL

Admitted to Virginia State Bar; admitted to practice before the Virginia Supreme Court and United States Tax Court.

References Available Upon Request

ATTACHMENT B

JOSEPH H. KELLER
PROFESSIONAL QUALIFICATIONS

Education:

Bachelor of Science in Chemistry, Washington College, Chestertown, MD, 1956.

Master of Science in Inorganic Chemistry, Pennsylvania State University, University Park, PA, 1958.

Graduate Assistant in Chemistry, Pennsylvania State University, University Park, PA, 1958-61.

Professional Positions: 1961-1966

Assistant Professor of Chemistry at Idaho State University, Pocatello, ID. Responsibilities included teaching courses in freshman chemistry, quantitative analysis, instrumental analysis, advanced inorganic chemistry and laboratory radiochemistry.

8/66 - 10/73

Employed at the Idaho National Engineering Laboratory in Idaho Falls, ID (then called the National Reactor Testing Station). The site is government owned and administered by the Department of Energy Research and Development Agency. I was employed by one of the operating contractors, initially Idaho Nuclear Corp. followed by Allied Chemical Corp. My position was a technical one in the research and development area of fission product behavior and properties.

10/73 - 6/74

Employed as research scientist by Nuclear Environmental Services division of SAI, Inc., Idaho Falls, ID. responsibilities included contract support on performance of gaseous rad waste processing equipment in a BWR and analysis of sources of inplant radiation exposure to workers.

6/74 - 12/78

Employed as scientific and engineering supervisor by Allied Chemical Corporation at the Idaho National Engineering Laboratory. Responsibilities included supervision of a research laboratory involved with analysis of fission product levels in irradiated nuclear fuel specimens and analysis of the fission product content of samples of the worlds 1st known natural fission reactor and the supervision of an analysis laboratory for environmental samples. Conducted contract research in support of NRC.

12/78 - present

Employed as scientist by Allied Chemical Corp., Exxon Nuclear Idaho Co., Inc., (after 7/3/79), and Westinghouse Idaho Nuclear Company, Inc. (after 3/1/84), at the Idaho National Engineering Laboratory. Responsibilities include research and development contract support to NRC and FEMA.

Attended FEMA orientation training course on Radiological Emergency Preparedness Planning for DOE Contract Personnel.

Experience:

Prove existence of previously unrecognized airborne radioiodine species to be hypoiodous acid.

Developed sampling device to differentiate various chemical forms of airborne radioiodine.

Developed inorganic adsorbent to retain airborne radioiodine.

Measured gaseous fission products in effluents and process streams in 5 BWR's stations.

Performed effluent and environmental measurements to assess iodine-grass-cow-milk dose pathway at BWR's.

Made effluent and environmental measurements of radioiodine at a pharmaceutical plant to assess environmental impact.

Analyzed fuel specimens to determine accurately the fission yields in the fast flux region of the neutron spectrum.

Analyzed fuel specimens to establish breeding or conversion ratio in Th-U fuels from the light water breeder program.

Developed a sampling device for airborne ^{14}C and ^{3}H in nuclear plant effluents and process streams.

Participated in environmental program to measure movement of radionuclides through process equipment in PWR's so that the predictive models could be evaluated.

Responsible for technical evaluation of commercial BWR off-gas systems.

Evaluated applicability of off-site, real-time instrumentation to determine the magnitude of unmonitored releases in accident situations.

Evaluated soil to vegetation transfer of stable cesium and strontium.

Reviewed current state of knowledge on scavenging in the environment airborne radioiodine by rain or snow.

Testified as FEMA witness at Indian Point and Shoreham ASLB hearings.

Adjunct faculty member at FEMA Emergency Management Institute.

Invited instructor at Atomic Energy Council of the Republic of China/Taiwan Power Company sponsored "Training Course on Planning, Preparedness, and Response to Nuclear Accidents"

Publications:

J. H. Keller, F. A. Duce, and F. O. Cartan, "Retention of Iodine on Selected Particulate Filters and a Porous Silver Membrane Being Considered for the LOFT Maypack", IN-1078, May 1967

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J. H. Keller, L. W. McClure, M. Hoza, A. L. Ayers Jr., R. Lo, and L. W. Barrett, "Boiling Water Reactor Off-gas Systems Evaluation", NUREG/CR-0727, June 1979

R. W. Benedict, A. B. Christensen, J. A. Del Debbio, J. H. Keller, and D. A. Knecht, "Technical and Economic Feasibility of Zeolite Encapsulation for Krypton-85 Storage", ENICO-1011, September 1979

J. H. Keller, B. G. Motes, D. W. Akers, T. E. Cox, S. W. Duce, and J. W. Tkachyk, "Measurement of Xe-131, C-14 and Tritium in Air and I-131 Vegetation and Milk Around the Quad Cities Nuclear Power Station", NUREG/CR-1195, ENICO-1023, March 1980

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J. H. Keller, "Update on Radioiodine Monitoring", at the 14th Annual National Conference on Radiation Control, Portland, MA, May 1982

J. H. Keller, "Iodine Sampling Under Emergency Conditions", invited paper at IEEE Nuclear Science Symposium, Orlando, FL, November 1984

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In the Matter of	
Public Service Co. of New Hampshire, et al.	Docket No. 50-443-OL 50-444-OL
(Seabrook Station, Units 1 & 2)	Offsite Emergency Planning Issues

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing Amended Testimony of William R. Cumming and Joseph H. Keller on Behalf of the Federal Emergency Management Agency on Sheltering/Beach Population Issues have been served on the following by Express Mail service on this 10th day of June, 1988.

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