UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE, et al.	Docket Nos. 50-443-OL 50-444-OL
(Seabrook Station, Units 1 and 2	Off-site Emergency Planning Issues

AFFIDAVIT OF STEVEN C. SHOLLY

Steven C. Sholly, being on oath deposes and says as follows:

1. I am an Associate Consultant with MHB Technical Associates, 1723 Hamilton Avenue, Suite K, San Jose, California, 95125. A statement of my professional qualifications is attached hereto and marked Attachment A.

2. MHB Technical Associates has been requested by the Department of the Attorney General, The Commonwealth of Massachusetts, to perform a technical review of a recent filing by Counsel for Public Service Company of New Hampshire which petitions the Commission for an exception or waiver of NRC regulations related to the size of the plume exposure pathway

emergency planning zone ("plume EPZ"). Specifically, the petition seeks a reduction of the plume EPZ from about 10 miles in radius to 1 mile in radius.

3. The PSNH filing consists of: (a) a letter dated 18 December 1986, from Thomas G. Dignan, Jr., to the Secretary of the Commission; (b) PSNH's petition for waiver or exception, dated 18 December 1986; (c) PSNH's memorandum in support of the petition, undated; (d) affidavits by Peter S. Littlefield, Shengdar Lee, John G. Robinson, and Messrs. Fleming, Torri, Woodard, Lutz, Henry, Budnitz, Aldrich, Hendrie, Rasmussen, Ritzman, Stratton, and Wilson; (e) three letters from Robert J. Budnitz to J. DeVincentis, dated 9 November 1985, 17 January 1986, and 29 April 1986; (f) a report by Shengdar Lee and Peter S. Littlefield, "Licensing Aspects of the Seabrook Emergency Planning Zone Study," YAEC-1502, dated December 1985; (g) a Pickard, Lowe & Garrick report, "Seabrook Station Risk Mangement and Emergency Planning Study," PLG-0432, dated December 1985; and (h) a second Pickard, Lowe & Garrick report, "Seabrook Station Emergency Planning Sensitivity Study," PLG-0465, dated April 1986.

4. In addition, based on our review to date of these documents, it is apparent that substantial, additional documentation will need to be reviewed in order to prepare an adequate response to PSNH's filing. This documentation includes: (a) the original Seabrook PRA study, "Seabrook Station Probabilistic Safety Assessment", Pickard, Lowe & Garrick, PLG-0300, dated December 1983; (b) the draft PRA review by Lawrence

Livermore National Laboratory, "A Review of the Seabrook Station Probabilistic Safety Assessment", dated 12 December 1984; (c) the review of the containment failure modes and source term analyses by Brookhaven National Laboratory, "Review of Seabrook Station Probabilistic Safety Assessment: Containment Failure Modes and Radiological Source Terms", NUREG/CR-4540, dated February 1986; (d) an NTS Engineering report, "Seismic Fragilities of Structures and Components at the Seabrook Generating Station, Units 1 and 2," Rev. 1, NTS 1589.01, June 1986; (e) a draft Brookhaven National Laboratory review of PLG-0465, "Technical Evaluation of the EPZ Sensitivity Study for Seabrook," BNL Technical Report A-3852, December 5, 1986; and (f) various submittals, formal and informal, concerning aspects of the PSNH-sponsored studies, prepared by consultants to PSNH, consultants to the NRC Staff, and by members of the NRC Staff.

5. Performing a technical review of this documentation is equivalent to conducting a detailed review of a full-scope probabilistic risk assessment (PRA) study. It is well recognized that the review of such a study is a difficult and time-consuming process even when relatively well-established methods are used, and when there is ready access to the plant, the practitioners who performed the original study, and computer code input decks used in the original study. In the case of the review of the PSNH-sponsored studies, evolving analytical methods (which are still under review in the technical community) were utilized, and there seems to be little basis for assuming that PSNH will cooperate with our review.

6. For example, a Brookhaven National Laboratory "PRA Review Manual" (prepared for the NRC) stated that about 24 to 40 man-months of effort would be required for a review the behavior of the plant up through core damage, but not including accident phenomenology, containment failure analysis, source term assessment, and accident consequence analysis. This level of effort was characterized as a "necessary minimum" for this level of review. 1/2/ It should be noted that attempting to perform such a review on a minimum schedule by adding additional analysts causes inefficiencies in the review process that require the expenditure of greater resources than cited here.

7. Due to the manner in which the document which provides the detailed technical basis for the 10-mile plume exposure pathway EPZ 3/ is organized and the nature of the technical

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1/ A. El-Bassioni, et al., PRA Review Manual, Brookhaven National Laboratory, NUREG/CR-3485, BNL-NUREG-51710, prepared for the Division of Safety Technology, Office of Nuclear Reactor Regulation, NRC, September 1985, Section 1.3.

2/ This range of effort for a PRA review is consistent with prior practice by the NRC Staff. For example, the NRC-sponsored review of the Indian Point Probabilistic Safety Study by Sandia National Laboratories required about 20 man-months of effort over a three and one-half month time frame. This review was limited to the accident sequence and plant damage state frequency portion of the PRA. See, G.J. Kolb, et al., Review and Evaluation of the Indian Point Probabilistic Safety Study, NUREG/CR-2934, SAND82-2929, December 1982, Section 1. NRC Staff review efforts on this and the remainder of the Indian Point PRA required the expenditure of considerable additional resources.

3/ U.S. Nuclear Regulatory Commission and U.S. Environmental Protection Agency, Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants, NUREG-0396, EPA 520/1-78-016, December 1978.

arguments presented in the PSNH filing, a large number of different technical issues must be addressed. These technical issues include the estimated frequency of accident sequences and associated plant damage states, the progression of core damage and associated severe accident phenomena for these plant damage states, the analysis of containment strength and failure modes (including bypass pathways), the development (based on an analysis of relevant chemical and physical phenomena) of source terms 4/ for these plant damage states, and the assessment of dose versus distance relationships based on these source terms. None of these elements can be omitted. Thus, the effort required for review could be significantly greater than the 24 to 40 man-month effort cited above for only the core damage frequency analysis.

8. Simply reviewing the available documentation related to the PSNH waiver/exemption request will require several weeks of work for a number of reviewers. Performing the necessary detailed reviews, computer calculations, sensitivity analyses, and related technical studies in order to provide a meaningful assessment of the PSNH documentation will require a minimum of six months. This is particularly true considering that it is unlikely that PSNH would cooperate in the conduct of this assessment by providing physical access to the Seabrook Unit 1 plant, assess to appropriate records, and access to the technical

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4/ Source terms are expressions of the release magnitudes and chemical and physical characteristics of releases of radioactive materials from nuclear power plants as a result of a severe accident.

personnel who performed the original studies in order to seek clarification and/or additional information for our review. This asserted lack of cooperation will, if it proves to be true, necessarily slow the progress of the assessment that must be conducted in order to provide a meaningful response to the PSNH petition. The six-month time period considers the fact that the review can build upon the work already performed by NRC consultants (and others) in examining the PSNH-sponsored studies.

9. Based on the foregoing, it is my opinion that a minimum of six months will be required in order to perform the analyses necessary to providing a meaningful response to the PSNH waiver/exemption request. Thus, the earliest possible time a response could be provided to the PSNH petition would be July 1987.

10. The statements expressed in this affidavit are true and correct to the best of my knowledge and belief.

Steven C. Sholly

Steven C. Sholly

State of California }
County of Santa Clara } ss.

On this the 23rd day of December 19 86, before me, the undersigned Notary Public, personally appeared

Steven C. Sholly

known to me to be the person(s) whose name(s) is subscribed to the within instrument and acknowledged that he executed the same for the purposes therein contained.
IN WITNESS WHEREOF, I hereunto set my hand and official seal.

OFFICIAL SEAL
MYRNA L BARRY
NOTARY PUBLIC - CALIFORNIA
SANTA CLARA COUNTY
My comm. expires JUN 24, 1987

Myrna L. Barry

GENERAL ACKNOWLEDGEMENT FORM

Attachment A

PROFESSIONAL QUALIFICATIONS OF STEVEN C. SHOLLY

STEVEN C. SHOLLY
MHB Technical Associates
1723 Hamilton Avenue
Suite K
San Jose, California 95125
(408) 266-2716

EXPERIENCE:

September 1985 - PRESENT

Associate - MHB Technical Associates, San Jose, California

Associate in energy consulting firm that specializes in technical and economic assessments of energy production facilities, especially nuclear, for local, state, and federal governments and private organizations. MHB is extensively involved in regulatory proceedings and the preparation of studies and reports. Conduct research, write reports, participate in discovery process in regulatory proceedings, develop testimony and other documents for regulatory proceedings, and respond to client inquiries. Clients have included: State of California, State of New York, State of Illinois.

February 1981 - September 1985

Technical Research Associate and Risk Analyst - Union of Concerned Scientists, Washington, D.C.

Research associate and risk analyst for public interest group based in Cambridge, Massachusetts, that specializes in examining the impact of advanced technologies on society, principally in the areas of arms control and energy. Technical work focused on nuclear power plant safety, with emphasis on probabilistic risk assessment, radiological emergency planning and preparedness, and generic safety issues. Conducted research, prepared reports and studies, participated in administrative proceedings before the U.S. Nuclear Regulatory Commission, developed testimony, anlayzed NRC rule-making proposals and draft reports and prepared comments thereon, and reponded to inquirires from sponsores, the general public, and the media. Participated as a member of the Panel on ACRS Effectiveness (1985), the Panel on Regulatory Uses of Probabilistic Risk Assessment (Peer Review of NUREG-1050; 1984), Invited Observer to NRC Peer Review meetings on the source term reassessment (BMI-2104; 1983-1984), and the Independent Advisory Committee on Nuclear Risk for the Nuclear Risk Task Force of the National Association of Insurance Commissioners (1984).

January 1980 - January 1981

Project Director and Research Coordinator - Three Mile Island Public Interest Resource Center, Harrisburg, Pennsylvania

Provided administrative direction and coordinated research projects for a public interest group based in Harrisburg, Pennsylvania, centered around issues related to the Three Mile Island Nuclear Power Plant. Prepared fundraising proposals, tracked progress of U.S. Nuclear Regulatory Commission, U.S. Department of Energy, and General Public Utilities activities concerning cleanup of Three Mile Island Unit 2 and preparation for restart of Three Mile Island Unit 1, and monitored developments related to emergency planning, the financial health of General Public Utilities, and NRC rulemaking actions related to Three Mile Island.

July 1978 - January 1980

Chief Biological Process Operator - Wastewater Treatment Plant, Derry Township Municipal Authority, Hershey, Pennsylvania

Chief Biological Process Operator at a 2.5 million gallon per day tertiary, activated sludge, wastewater treatment plant. Responsible for biological process monitoring and control, including analysis of physical, chemical, and biological test results, procees fluid and mass flow management, micro-biological analysis of activiated sludge, and maintenance of detailed process logs for input into state and federal reports on treatment process and effluent quality. Received certification from the Commonwealth of Pennsylvania as a wastewater treatment plant operator. Member of Water Pollution Control Association of Pennsylvania, Central Section, 1980.

July 1977 - July 1978

Wastewater Treatment Plant Operator - Borough of Lemoyne, Lemoyne, Pennsylvania

Wastewater treatment plant operator at 2.0 million gallon per day secondary, activated sludge, wastewater treatment plant. Performed tasks as assigned by supervisors, including simple physical and chemical tests on wastewater streams, maintenance and operation of plant equipment, and maintenance of the collection system.

September 1976 - June 1977

Science Teacher - West Shore School District, Camp Hill, Pennsylvania

Taught Earth and Space Science at ninth grade level. Developed and implemented new course materials on plate tectonics, environmental geology, and space science. Served as Assistant Coach of the district gymnastics team.

September 1975 - September 1976

Science Teacher - Carlisle Area School District, Carlisle, Pennsylvania

Taught Earth and Space Science and Environmental Science at ninth grade level. Developed and implemented new course materials on plate tectonics, environmental geology, noise pollution, water pollution, and energy. Served as Advisor to the Science Projects Club.

EDUCATION:

B.S., Education, majors in Earth and Space Science and General Science, minor in Environmental Education, Shippensburg State College, Shippensburg, Pennsylvania, 1975.

Graduate coursework in Land Use Planning, Shippensburg State College, Shippensburg, Pennsylvania, 1977-1978.

PUBLICATIONS:

1. "Determining Mercalli Intensities from Newspaper Reports," Journal of Geological Education, Vol. 25, 1977.

2. A Critique of: An Independent Assessment of Evacuation Times for Three Mile Island Nuclear Power Plant, Three Mile Island Public Interest Resource Center, Harrisburg, Pennsylvania, January 1981.

3. A Brief Review and Critique of the Rockland County Radiological Emergency Preparedness Plan, Union of Concerned Scientists, prepared for Rockland County Emergency Planning Personnel and the Chairman of the County Legislature, Washington, D.C., August 17, 1981.

4. The Necessity for a Prompt Public Alerting Capability in the Plume Exposure Pathway EPZ at Nuclear Power Plant Sites, Union of Concerned Scientists, Critical Mass Energy Project, Nuclear Information and Resource Service, Environmental Action, and New York Public Interest Research Group, Washington, D.C., August 27, 1981. *

5. "Union of Concerned Scientists, Inc., Comments on Notice of Proposed Rulemaking, Amendment to 10 CFR 50, Appendix E, Section IV.D.3," Union of Concerned Scientists, Washington, D.C., October 21, 1981. *

6. "The Evolution of Emergency Planning Rules," in The Indian Point Book: A Briefing on the Safety Investigation of the Indian Point Nuclear Power Plants, Anne Witte, editor, Union of Concerned Scientists (Washington, D.C.) and New York Public Interest Research Group (New York, NY), 1982.

7. "Union of Concerned Scientists Comments, Proposed Rule, 10 CFR Part 50, Emergency Planning and Preparedness: Exercises, Clarification of Regulations, 46 F.R. 61134," Union of Concerned Scientists, Washington, D.C., January 15, 1982. *

8. Testimony of Robert D. Pollard and Steven C. Sholly before the Subcommittee on Energy and the Environment, Committee on Interior and Insular Affairs, U.S. House of Representatives, Middletown, Pennsylvania, March 29, 1982, available from the Union of Concerned Scientists.

9. "Union of Concerned Scientists Detailed Comments on Petition for Rulemaking by Citizen's Task Force, Emergency Planning, 10 CFR Parts 50 and 70, Docket No. PRM-50-31, 47 F.R. 12639," Union of Concerned Scientists, Washington, D.C., May 24, 1982.

10. Supplements to the Testimony of Ellyn R. Weiss, Esq., General Counsel, Union of Concerned Scientists before the Subcommittee on Energy Conservation and Power, Committee on Energy and Commerce, U.S. House of Representatives, Union of Concerned Scientists, Washington, D.C., August 16, 1982.

11. Testimony of Steven C. Sholly, Union of Concerned Scientists, Washington, D.C., on behalf of the New York Public Interest Research Group, Inc., before the Special Committee on Nuclear Power Safety of the Assembly of the State of New York, hearings on Legislative Oversight of the Emergency Radiologic Preparedness Act, Chapter 708, Laws of 1981, September 2, 1982.

12. "Comments on 'Draft Supplement to Final Environmental Statement Related to Construction and Operation of Clinch River Breeder Reactor Plant'," Docket No. 50-537, Union of Concerned Scientists, Washington, D.C., September 13, 1982. *

13. "Union of Concerned Scientists Comments on 'Report to the County Commissioners', by the Advisory Committee on Radiological Emergency Plan for Columbia County, Pennsylvania," Union of Concerned Scientists, Washington, D.C., September 15, 1982.

14. "Radiological Emergency Planning for Nuclear Reactor Accidents," presented to Kernenergie Ontmanteld Congress, Rotterdam, The Netherlands, Union of Concerned Scientists, Washington, D.C., October 8, 1982.

15. "Nuclear Reactor Accident Consequences: Implications for Radiological Emergency Planning," presented to the Citizen's Advisory Committee to Review Rockland County's Own Nuclear Evacuation and Preparedness Plan and General Disaster Preparedness Plan, Union of Concerned Scientists, Washington, D.C., November 19, 1982.

16. Testimony of Steven C. Sholly before the Subcommittee on Oversight and Investigations, Committee on Interior and Insular Affairs, U.S. House of Representatives, Washington, D.C., Union of Concerned Scientists, December 13, 1982.

17. Testimony of Gordon R. Thompson and Steven C. Sholly on Commission Question Two, Contentions 2.1(a) and 2.1(d), Union of Concerned Scientists and New York Public Interest Research Group, before the U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board, in the Matter of Consolidated Edison Company of New York (Indian Point Unit 2) and the Power Authority of the State of New York (Indian Point Unit 3), Docket Nos. 50-247-SP and 50-286-SP, December 28, 1982. *

18. Testimony of Steven C. Sholly on the Consequences of Accidents at Indian Point (Commission Question One and Board Question 1.1, Union of Concerned Scientists and New York Public Interest Research Group, before the U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board, in the Matter of Consolidated Edison Company of New York (Indian Point Unit 2) and the Power Authority of the State of New York (Indian Point Unit 3), Docket Nos. 50-247-SP and 50-286-SP, February 7, 1983, as corrected February 16, 1983. *

19. Testimony of Steven C. Sholly on Commission Question Five, Union of Concerned Scientists and New York Public Interest Research Group, before the U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board, in the Matter of Consolidated Edison Company of New York (Indian Point Unit 2) and the Power Authority of the State of New York (Indian Point Unit 3), Docket Nos. 50-247-SP and 50-286-SP, March 22, 1983. *

20. "Nuclear Reactor Accidents and Accident Consequences: Planning for the Worst," Union of Concerned Scientists, Washington, D.C., presented at Critical Mass '83, March 26, 1983.

21. Testimony of Steven C. Sholly on Emergency Planning and Preparedness at Commercial Nuclear Power Plants, Union of Concerned Scientists, Washington, D.C., before the Subcommittee on Nuclear Regulation, Committee on Environment and Public Works, U.S. Senate, April 15, 1983, (with "Union of Concerned Scientists' Response to Questions for the Record from Senator Alan K. Simpson," Steven C. Sholly and Michael E. Faden).

22. "PRA: What Can it Really Tell Us About Public Risk from Nuclear Accidents?," Union of Concerned Scientists, Washington, D.C., presentation to the 14th Annual Meeting, Seacoast Anti-Pollution League, May 4, 1983.

23. "Probabilistic Risk Assessment: The Impact of Uncertainties on Radiological Emergency Planning and Preparedness Considerations," Union of Concerned Scientists, Washington, D.C., June 28, 1983.

24. "Response to GAO Questions on NRC's Use of PRA," Union of Concerned Scientists, Washington, D.C., October 6, 1983, attachment to letter dated October 6, 1983, from Steven C. Sholly to John E. Bagnulo (GAO, Washington, D.C.).

25. The Impact of "External Events" on Radiological Emergency Response Planning Considerations, Union of Concerned Scientists, Washington, D.C., December 22, 1983, attachment to letter dated December 22, 1983, from Steven C. Sholly to NRC Commissioner James K. Asselstine.

26. Sizewell 'B' Public Inquiry, Proof of Evidence on: Safety and Waste Management Implications of the Sizewell PWR, Gordon Thompson, with supporting evidence by Steven Sholly, on behalf of the Town and Country Planning Assocation, February 1984, including Annex G, "A review of Probabilistic Risk Analysis and its Application to the Sizewell PWR," Steven Sholly and Gordon Thompson, (August 11, 1983), and Annex O, "Emergency Planning in the UK and the US: A Comparison," Steven Sholly and Gordon Thompson (October 24, 1983).

27. Testimony of Steven C. Sholly on Emergency Planning Contention Number Eleven, Union of Concerned Scientists, Washington, D.C., on behalf of the Palmetto Alliance and the Carolina Environmental Study Group, before the U.S. Nuclear Regulatory Commission Atomic Safety and Licensing Board, in the Matter of Duke Power Company, et. al. (Catawba Nuclear Station, Units 1 and 2), Docket Nos. 50-413 and 50-414, April 16, 1984. *

28. "Risk Indicators Relevant to Assessing Nuclear Accident Liability Premiums," in Preliminary Report to the Independent Advisory Committee to the NAIC Nuclear Risk Task Force, December 11, 1984, Steven C. Sholly, Union of Concerned Scientists, Washington, D.C.

29. "Union of Concerned Scientists' and Nuclear Information and Resource Service's Joint Comments on NRC's Proposal to Bar from Licensing Proceedings the Consideration of Earthquake Effects on Emergency Planning," Union of Concerned Scientists and Nuclear Information and Resource Service, Washington, D.C., Diane Curran and Ellyn R. Weiss (with input from Steven C. Sholly), February 28, 1985. *

30. "Severe Accident Source Terms: A Presentation to the Commissioners on the Status of a Review of the NRC's Source Term Reassessment Study by the Union of Concerned Scientists," Union of Concerned Scientists, Washington, D.C., April 3, 1985. *

31. "Severe Accident Source Terms for Light Water Nuclear Power Plants: A Presentation to the Illinois Department of Nuclear Safety on the Status of a Review of the NRC's Source Term Reassessment Study (STRS) by the Union of Concerned Scientists," Union of Concerned Scientists, Washington, D.C., May 13, 1985.

32. The Source Term Debate: A Review of the Current Basis for Predicting Severe Accident Source Terms with Special Emphasis on the NRC Source Term Reassessment Program (NUREG-0956), Union of Concerned Scientists, Cambridge, Massachusetts, Steven C. Sholly and Gordon Thompson, January 1986.

33. Direct Testimony of Dale G. Bridenbaugh, Gregory C. Minor, Lynn K. Price, and Steven C. Sholly on behalf of State of Connecticut Department of Public Utility Control Prosecutorial Division and Division of Consumer Counsel regarding the prudence of expenditures on Millstone Unit III, February 18, 1986.

34. Implications of the Chernobyl-4 Accident for Nuclear Emergency Planning for the State of New York prepared for the State of New York Consumer Protection Board, by MHB Technical Associates, June 1986.

35. Review of Vermont Yankee Containment Safety Study and Analysis of Containment Venting Issues for the Vermont Yankee Nuclear Power Plant, prepared for New England Coalition on Nuclear Pollution, Inc., December 16, 1986.

* Available from the U.S. Nuclear Regulatory Commission, Public Document Room, Lobby, 1717 H Street, N.W., Washington, D.C.

Affidavit of Gordon R Thompson PhD

I, Gordon Thompson, hereby depose and say:

My qualifications are set forth in an attached resume. This indicates that I have experience in assessing the potential for accidental releases of radioactive material from nuclear power facilities, and in assessing the potential role of emergency planning in mitigating the public health effects arising from such releases.

This affidavit addresses a request by New Hampshire Yankee Division, Public Service Company of New Hampshire, that the emergency planning zone (EPZ) at the Seabrook nuclear power plant be reduced. Specifically, this affidavit addresses a schedule set by the relevant NRC Atomic Safety and Licensing Board, whereby intervenors must outline their arguments against the request by 27 January 1987.

Such a schedule is unreasonable and would not permit a thorough examination of the relevant issues. Those issues are highly technical and involve the behavior of engineering systems in ways which are very difficult to predict.

Since the emergency planning measures which occur within the EPZ are a form of public protection which is quite separate from the engineered features and operating practices at the plant, it is imperative that the request to reduce the EPZ receives close scrutiny. Such scrutiny can only be given if the technical arguments in favor of the request are the subject of open review and debate by members of the technical community.

Among the issues which demand open debate are : (i) the behavior of reinforced concrete structures under extreme loadings; (ii) the nature of containment loading under core melt conditions; (iii) opportunities for containment bypass; (iv) behavior of steam generator tubes under core melt conditions; (v) the integrity of major components of the reactor cooling system; (vi) the potential for, and implications of, sabotage; (vii) the nature of the radioactive releases arising from particular accident sequences; and (viii) the public health implications of postulated radioactive releases.

Each of these issues is the subject of ongoing research, and involves modes of behavior of complex systems which can currently be predicted only within broad ranges of uncertainty. These uncertainty ranges are to varying degrees susceptible to reduction through continued research. An open and thorough technical debate could identify and characterize the various uncertainties.

Intervenors should have the opportunity to present a variety of expert technical witnesses, to ensure that the issues receive adequate debate. In view of the complexity of the issues, and their multidisciplinary nature, a substantial period would be required for these experts to prepare their arguments. This period should be, at a minimum, 6 months.

.....continued

In support of this contention, it should be noted that the NRC recognizes that there will be continuing debate about the behavior of nuclear plants during severe accidents. Early in 1987, the NRC will publish for comment a draft version of its report NUREG-1150, which will summarize the findings of extensive studies pertaining to the risk associated with nuclear plants. The NRC plans to issue the final version of NUREG-1150 about 1 year later, allowing time both for public comment and for the completion of ongoing studies. Since many of the issues to be addressed in NUREG-1150 are relevant in the context of the Seabrook EPZ, there are no grounds for an arbitrary acceleration of debate in that context.

Signed under the pains and penalties of perjury, this
30th day of December, 1986 :

Gordon R. Thompson

Gordon R Thompson PhD
Institute for Resource and Security Studies
27 Ellsworth Avenue
Cambridge, MA 02139

Commonwealth of Massachusetts
County of [illegible]
Subscribed and sworn to before
me this 30TH day of Dec. 1986
Deborah W Maher
Notary Public
Notary Public
My [illegible] Expires [illegible], 1990

Resume
for
Gordon Thompson

September 1986

Professional Expertise

Consulting scientist on energy, environment, and international security issues.

Education

* PhD in Applied Mathematics, Oxford University, 1973.
* BE in Mechanical Engineering, University of New South Wales, Sydney, Australia, 1967.
* BS in Mathematics and Physics, University of New South Wales, 1966.

Current Appointments

* Executive Director, Institute for Resource & Security Studies (IRSS), Cambridge, MA.
* Coordinator, Proliferation Reform Project (an IRSS project).
* Treasurer, Center for Atomic Radiation Studies, Acton, MA.
* Member, Board of Directors, Political Ecology Research Group, Oxford, UK.
* Member, Advisory Board, Gruppe Okologie, Hannover, FRG.

Consulting Experience (selected)

* Lakes Environmental Association, Bridgton, ME, 1986 : analysis of federal regulations for disposal of radioactive waste.
* Greenpeace, Hamburg, FRG, 1986 : participation in an international study on the hazards of nuclear power plants.
* Three Mile Island Public Health Fund, Philadelphia, PA, 1983-present : studies related to the Three Mile Island nuclear plant.
* Attorney General, Commonwealth of Massachusetts, Boston, MA, 1984-present : analyses of the safety of the Seabrook nuclear plant.
* Union of Concerned Scientists, Cambridge, MA, 1980-1985 : studies on energy demand and supply, nuclear arms control, and the safety of nuclear installations.
* Conservation Law Foundation of New England, Boston, MA, 1985 : preparation of testimony on cogeneration potential at the Maine facilities of

Great Northern Paper Company.

* Town & Country Planning Association, London, UK, 1982-1984 : coordination and conduct of a study on safety and radioactive waste implications of the proposed Sizewell nuclear plant.
* US Environmental Protection Agency, Washington, DC, 1980-1981 : assessment of the cleanup of Three Mile Island Unit 2 nuclear plant.
* Center for Energy & Environmental Studies, Princeton University, Princeton, NJ, 1979-1980 : studies on the potentials of various renewable energy sources.
* Government of Lower Saxony, Hannover, FRG, 1978-1979 : coordination and conduct of studies on safety aspects of the proposed Gorleben nuclear fuel center.

Other Experience (selected)

* Co-leadership (with Paul Walker) of a study group on nuclear weapons proliferation, Institute of Politics, Harvard University, 1981.
* Foundation (with others) of an ecological political movement in Oxford, UK, which contested the 1979 Parliamentary election.
* Conduct of cross-examination and presentation of evidence, on behalf of the Political Ecology Research Group, at the 1977 Public Inquiry into proposed expansion of the reprocessing plant at Windscale, UK.
* Conduct of research on plasma theory (while a PhD candidate), as an associate staff member, Culham Laboratory, UK Atomic Energy Authority, 1969-1973.
* Service as a design engineer on coal plants, New South Wales Electricity Commission, Sydney, Australia, 1968.

Publications (selected)

* Nuclear-Weapon-Free Zones : A Survey of Treaties and Proposals (edited with David Pitt), Croom Helm Ltd, Beckenham, UK, forthcoming.
* International Nuclear Reactor Hazard Study (written with fifteen other authors), September 1986, Greenpeace, Hamburg, FRG (2 volumes).
* "What happened at Reactor Four" (the Chernobyl reactor accident), Bulletin of the Atomic Scientists, August/September 1986, pp 26-31.
* The Source Term Debate : A Report by the Union of Concerned Scientists (written with Steven Sholly), January 1986, Union of Concerned Scientists, Cambridge, MA.
* "Checks on the spread" (a review of three books on nuclear proliferation), Nature, 14 November 1985, pp 127-128.

* Editing of Perspectives on Proliferation, Volume I, August 1985, published by the Proliferation Reform Project, Institute for Resource and Security Studies, Cambridge, MA.
* "A Turning Point for the NPT ?", ADIU Report, Nov/Dec 1984, pp 1-4, University of Sussex, Brighton, UK.
* "Energy Economics", in J Dennis (ed), The Nuclear Almanac, Addison-Wesley, Reading, MA, 1984.
* "The Genesis of Nuclear Power", in J Tirman (ed), The Militarization of High Technology, Ballinger, Cambridge, MA, 1984.
* A Second Chance : New Hampshire's Electricity Future as a Model for the Nation (written with Linzee Weld), Union of Concerned Scientists, Cambridge, MA, 1983.
* Safety and Waste Management Implications of the Sizewell PWR (prepared with the help of 6 consultants), a report to the Town & Country Planning Association, London, UK, 1983.
* Utility-Scale Electrical Storage in the USA : The Prospects of Pumped Hydro, Compressed Air, and Batteries, Princeton University report PU/CEES #120, 1981.
* The Prospects for Wind and Wave Power in North America, Princeton University report PU/CEES # 117, 1981.
* Hydroelectric Power in the USA : Evolving to Meet New Needs, Princeton University report PU/CEES # 115, 1981.
* Editing and part authorship of "Potential Accidents & Their Effects", Chapter III of Report of the Gorleben International Review, published in German by the Government of Lower Saxony, FRG, 1979 -- Chapter III available in English from the Political Ecology Research Group, Oxford, UK.
* A Study of the Consequences to the Public of a Severe Accident at a Commercial FBR located at Kalkar, West Germany, Political Ecology Research Group report RR-1, 1978.

Expert Testimony (selected)

* International Physicians for the Prevention of Nuclear War, 6th Annual Congress, Koln, FRG, 1986 : Relationships between nuclear power and the threat of nuclear war.
* Maine Land Use Regulation Commission, 1985 : Cogeneration potential at facilities of Great Northern Paper Company.
* Interfaith Hearings on Nuclear Issues, Toronto, Ontario, 1984 : Options for Canada's nuclear trade and Canada's involvement in nuclear arms control.
* Sizewell Public Inquiry, UK, 1984 : Safety and radioactive waste implications of the proposed Sizewell nuclear plant.

* New Hampshire Public Utilities Commission, 1983 : Electricity demand and supply options for New Hampshire.
* Atomic Safety & Licensing Board, Dockets 50-247-SP & 50-286-SP, US Nuclear Regulatory Commission, 1983 : Use of filtered venting at the Indian Point nuclear plants.
* US National Advisory Committee on Oceans and Atmosphere, 1982 : Implications of ocean disposal of radioactive waste.
* Environmental & Energy Study Conference, US Congress, 1982 : Implications of radioactive waste management.

Miscellaneous

* Australian citizen.
* Married, one child.
* Resident of USA, 1979 to present; of UK, 1969-1979.
* Extensive experience of public speaking before professional and lay audiences.
* Author of numerous newspaper, newsletter, and magazine articles and book reviews.
* Has received many interviews from print and electronic media.

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