UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

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

JOINT AFFIDAVIT OF AMRITPAL S. GILL AND HAROLD WALKER

Harold Walker and Amritpal S. Gill, being first duly sworn, affirm that the answers to the following questions are true and correct to the best of their knowledge and belief:

Q1: Gentlemen, please state your name, employer, and occupation.

A1: (Walker) My name is Harold Walker. I am employed by the United States Nuclear Regulatory Commission as a Reactor Engineer in Section B of the Plant Systems Branch, Division of Engineering and Systems Technology, Office of Nuclear Reactor Regulations.

(Gill) My name is Amritpal S. Gill. I am employed by the United States Nuclear Regulatory Commission as a senior electrical engineer in the Electrical Systems Branch, Division of Engineering and Systems Technology, Office of Nuclear Reactor Regulations.

Q2: Gentlemen, please describe your duties.

A2: (Walker) As a Reactor Engineer I am responsible for reviews in the area of nuclear power plant protections against various hazards, including the environmental qualification of electrical equipment important to safety for nuclear power plants as outlined in 10 C.F.R. § 50.49. I have served as the NRC Staff's principal reviewer of Applicants' electrical equipment environmental qualification program for approximately the past six years. As part of my responsibilities, I previously testified in the proceeding concerning NECNP Contention I.B.2, in August 1983 and September 1986. A statement of my professional qualifications is attached to this affidavit.

(Gill) As a senior electrical engineer, I am responsible for reviews and evaluations of the electrical power systems and associated instrumentation and controls needed for safe operation and safe shutdown of nuclear facilities. A more detailed statement of my professional qualifications is attached to this affidavit.

Q3: Gentlemen, what is the purpose of your joint affidavit?

A3: (Walker, Gill) This affidavit addresses the claims made by intervenor New England Coalition On Nuclear Pollution (NECNP) in its "Motion To Reopen The Record And Admit New Contention" which was filed on February 2, 1988. Our affidavit also addresses the claims made in support of that motion in the affidavit of Robert D. Pollard. In brief, this affidavit will explain why: (1) the RG-59

coaxial cable used by Applicants at the Seabrook Station meets the environmental qualification standards set forth in 10 C.F.R. § 50.49 and (2) Mr. Pollard is incorrect in asserting that the "measured insulation resistance of the RG-59 test specimens fell below the required insulation resistance during the environmental qualification tests".

Q4: Gentlemen, the contention which NECNP requests be admitted states:

> Applicants have failed to comply with the Commission's environmental qualification requirements, 10 C.F.R. § 50.49 and Appendix A to 10 C.F.R. Part 50, with respect to RG-59 coaxial cable.

According to NECNP, the basis for this contention is that "RG-59 cable failed to meet its requirement for insulation resistance during equipment qualification testing." Do you agree with NECNP that Applicants have failed to comply with the Commission's environmental qualifications with respect to RG-59 cable?

A4: (Walker) No, I do not agree with NECNP. As I explain in this affidavit, my review of the relevant environmental qualification file (NECNP Ex. 4) leads me to conclude that RG-59 cable will meet its specified performance requirements when subjected to the conditions predicted to be present during a postulated design basis event as required by 10 C.F.R. § 50.49.

Q5: Mr. Walker, please identify and explain the environmental qualification requirements applicable to RG-59 coaxial cable.

A5: (Walker) The Commission's environmental qualification requirements are set forth in 10 C.F.R. § 50.49. In general, section 50.49 requires that three categories of electric equipment "important to safety" be qualified for their application and sets forth specified performance requirements for establishing environmental qualification methods and qualification parameters. The three categories of equipment to which Section 50.49 applies are: (1) safety-related electric equipment; (2) non-safety-related electric equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions by safety-related equipment; and (3) certain post-accident monitoring equipment. 10 C.F.R. § 50.49(b)(1). NUREG-0588 "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment" and Regulatory Guide 1.89 (RG 1.89) set forth the methods by which an applicant can establish that its "important to safety" electrical equipment satisfies the requirements of section 50.49. With respect to electrical cable, such as RG-59 coaxial cable, the qualification standard is IEEE Standard 383-1974, "IEEE Standard for Type Test of Class 1E Electric Cables, Field Splices, and Connections For Nuclear Power Generating Stations". This standard is endorsed by NUREG-0588 and the NRC Staff considers the environmental qualification requirements of 10 C.F.R. 50.49 to have been satisfied if the cable is satisfactorily tested in accordance with IEEE 383-1974.

Q6: Mr. Walker, what is the IEEE-383 standard and what does it require?

A6: (Walker) As previously stated at A5, IEEE 383-1974 is an "IEEE Standard for Type Test of Class 1E Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations". The NRC considers the environmental qualification requirements of 10 C.F.R. 50.49 to have been satisfied for cable if the cable is satisfactorily tested in accordance with IEEE 383-1974. In general, the testing required by this standard includes thermal aging, gamma irradiation, and exposure to a loss-of-coolant accident (LOCA).

Q7: Mr. Walker, was the RG-59 cable tested in accordance with IEEE-383?

A7: (Walker) Yes it was.

Q8: On what do you base your answer?

A8: My answer is based on my review of NECNP Exhibit 4, which was admitted in evidence in the onsite emergency planning and safety issues hearing held in October 1986. Reference 2 of NECNP Ex. 4 is entitled: "Qualification Tests of Electrical Cables In a Simulated Steam-Line-Break and Loss of Coolant Accident Environment: 100 Day Duration, RG-11/u and RG-59/u Coaxial Cables." These qualification tests were performed by the Franklin Institute Research Laboratory, Inc. (FIRL) of Philadelphia, Pennsylvania. At page 2 of Reference 2, the FIRL states:

> The objective of this test program was to demonstrate the ability of coaxial type electrical cables to perform satisfactorily during a test program including thermal aging, gamma irradiation, and exposure to a simulated

> steam line break (SLB) and loss-of-coolant accident (LOCA). The program was based on guidelines provided in IEEE Std 323-1974 and IEEE Std 383-1974.

Q9: What were the results of the tests conducted on the RG-59 coaxial cable?

A9: (Walker) The tests showed that the RG-59 coaxial cable met all environmental test requirements. The tests were conducted by the Franklin Institute Research Laboratory, Inc., a reputable and respected testing laboratory which is well qualified to conduct environmental qualification tests of the type here involved. It conducted these tests in the period March through August 1982, and reported in January 1983 its conclusion that:

> One thermally aged specimen and one unaged specimen of the RG-11/a and RG-59/a types of coaxial cable (4 specimens total), insulated with XLPE and jacketed with Exane, met the acceptance criteria by maintaining their electrical load during a 100-day simulated SLB/LOCA exposure, passing a final bend test around mandrels having a diameter 40 times the cable diameters, and 5-minute ac high-potential-withstand tests at 9.44 and 4.96 kv, respectively, which are equal to 80 v per mil of insulation. The cable jackets were not cracked after the bend test.
>
> NECNP Ex. 4, Ref. 2, p.1
> [Footnotes deleted]

It is noted that the Franklin Institute Research Laboratory is a subsidiary of Franklin Institute of Philadelphia, PA.

Q10 Why do you state that the tests conducted on the RG-59 cable showed it met environmental qualification requirements?

A10. (Walker) In accordance with Regulatory Guide 1.89 (NUREG-0588 is the original edition of RG 1.89), qualification is a verification of a design limited to demonstrating that an item of the electric equipment is capable of performing its safety function under significant environmental stresses resulting from design basis accidents in order to avoid common mode failure. RG 1.89 also states that it is essential that safety-related electric equipment be qualified to demonstrate that it can perform its safety function under the environmental service conditions in which it will be required to function and for the length of time its function is required and that non-safety-related electric equipment covered by paragraph 50.49(b)(2) be able to withstand environmental stresses caused by design basis accidents under which its failure could prevent satisfactory accomplishment of safety functions by safety-related equipment. The specific environment for which an individual item of electric equipment must be qualified depends on the installed location and the conditions under which it is required to perform its safety function, i.e., functional requirements.

The functional requirements for RG-59 as determined by the applicant are noted on p. 6 of 10 of NECNP Ex. 4. There are two requirements.

The first references p. 2 of the attached 1983 Franklin Institute Report "Qualification of Tests of Electrical Cables in Simulated Steam Line Break and Loss of Coolant Accident Environments: 100 Day

Duration RG-11/u and RG-59/u Coaxial Cable" (Reference 2). The acceptance criteria identified in the Franklin Report is that it remain energized "with client specified potential and current" during the environmental qualification test. This was assumed to be satisfied if the total leakage/charging current rate did not exceed approximately 1.0 amp. The test report demonstrates that the acceptance criteria were met throughout the test (Ref. 2, p. 17).

The second functional requirement of NECNP Ex. 4 is that contained in note 7, which indicates that although there are no specific performance requirements identified in the Franklin test report, the cable was subjected to a high potential withstand test and insulation resistance was measured throughout the test; that a minimum insulation resistance (IR) of 160 megohms per 30 feet of cable was indicated (for test on RG-11); and that the applicant has verified that this minimum IR value is acceptable for use to assure environmental qualification of cable at Seabrook. (NECNP Ex. 4, p. 9). It should be noted that for RG-59 cable the minimum IR value remained at or above 300 megohms throughout the test including the period when temperature was 346° F and the cable had been irradiated. Based on my knowledge and experience, I do no know of any applications in nuclear power safety related applications which require cable to have an IR value as high as 300 megohms under LOCA test conditions to assure that it will function as required.

The test acceptance criteria that cable not experience total leakage/charging current in excess of approximately 1.0 amp at any time during the test is a reasonable test criteria to use in environmental qualification tests for cable in order to meet the requirements of IEEE 383-1974. Of course, the applicant must assure that for all plant specific applications covered by 10 C.F.R. § 50.49, conditions are encompassed by the test data. In this case, the applicant has done so. NECNP Ex. 4, Ref. 9.

Q11. Did you also examine the test report of the Franklin Institute Research Laboratory, Inc. (NECNP Ex. 4, Ref. 2), and the Applicants' environmental qualification file on the RG-59 coaxial cable (NECNP Ex. 4), to see if appropriate tests were conducted and reported which could lead to the conclusions regarding the environmental qualification of RG-59 cable?

A11. (Walker) Yes. The tests are set out in the Franklin Institute report. This report, NECNP Ex. 4, Ref. 2, at 9-10, set out the test procedures, the nature of the radiation, steam, chemicals, and humidity to which the cable was exposed. These tests were appropriate for determining the environmental qualification of the cable. Further, the test results were reported in detail which showed the resistance of the cable, that no cracks or other irregularities were observed and that there was no apparent visual

damage to the cables. NECNP Ex. 4, Ref. 2, at 12-13; Table 2; Appendices C and D.

Q12: Mr. Gill, do you agree with Mr. Walker's answers?

A12: (Gill) Yes I do.

Q13: Gentlemen, NECNP contends that the RG-59 cable failed the qualification test because its insulation resistance during the second transient of the steam/chemical spray, high humidity test fell to 300 megohms which, according to NECNP is substantially less than the architect/engineer's specification of 10,000 megohms @ 1000 feet for RG-59 coaxial cable. Is NECNP correct in this assertion?

A13: (Gill, Walker) No. NECNP supports its assertions that the cable failed the qualification tests on the basis of an affidavit of Robert Pollard. Motion at 4. Mr. Pollard premises his assertion on the basis that the RG-59 cable did not meet the insulation resistance purchase requirements for the RG-59 cable of 10,000 megohms at 1000 feet since insulation resistance fell to 300 megohms during the environmental qualification tests. Pollard affidavit, ¶ 2. The conclusion Mr. Pollard draws is incorrect. The insulation resistance values of 10,000 megohms at 1000 feet is not relevant to the insulation values to be measured during an environmental qualification test for the RG-59 cable. The specification cited by Mr. Pollard of insulation resistance of 10,000 megohms at 1,000 feet is not an environmental qualification specification. Rather,

specification of insulation resistance per 1000 foot of cable is a common practice in the electrical cable industry for a wide variety of uses. It simply identifies resistance normal ambient conditions at the manufacturers facility prior to being exposed to conditions of use including safety-related use in nuclear power plants.

Q14: Mr. Gill, Mr. Pollard, states at paragragh 4 of his affidavit that "the measured insulation resistance of the RG-59 [cable] must be corrected for the length of the test specimen in order to compare it to the required insulation resistance." Do you understand what Mr. Pollard means and if so, do you agree with him?

A14: (Gill) I understand Mr. Pollard to be suggesting that the measured insulation resistance value of the RG-59 specimen during the environmental qualification test was obtained on the basis of a cable only fifteen feet in length. He further states that these measured values should be corrected to provide an equivalent insulation resistance value for 1,000 feet in length in order to compare it with the vendor specification insulation resistance value of 10,000 megohms at 1,000 feet. Mr. Pollard's assertion that the insulation resistance value of 10,000 megohms must be met during the environmental qualification test is incorrectly premised. As I explained above, the 10,000 megohms at 1,000 feet value <u>has no relevance to the insulation resistance values measured during the environmental qualification tests</u>. In the case of RG-59 cable, the specimen length used for the qualification test was 30-feet,

although only 15 feet were subjected to the test conditions. The insulation resistance values measured and shown in NECNP exhibit 4, Reference 2, Table 2, page 14 are for 30 feet of RG-59 cable, not 1,000 feet. It should be noted that a cable test specimen of 30 feet length is acceptable under the IEEE-383-1974.

For these reasons, Mr. Pollard similarly is incorrect when he states at paragraph 8 of his affidavit that "RG-11 coaxial cable is not environmentally qualified[.]" Exhibit 4 indicates that RG-11 coaxial cable meets the requirements of section 50.49 as well.

Q15: Gentlemen, does this complete your affidavit?

A15: (Gill, Walker) Yes it does.

Harold Walker

Amritpal Gill

Subscribed to and sworn before me
this 17th day of February 1988

Peggy J. Brown

My Commission expires July 1, 1990

STATEMENT OF
PROFESSIONAL QUALIFICATIONS
OF
AMRITPAL S. GILL

I am a Senior Electrical Engineer in Section B of the Electrical Systems Branch, Division of Engineering and Systems Technology, Office of Nuclear Reactor Regulation, United States Nuclear Regulatory Commission. My duties include serving as a principal reviewer in the area of electrical power systems and the associated instrumentation and controls needed for safe operation and safe shutdown of nuclear reactors. Prior to this assignment, I was an electrical engineer in the Electrical, Instrumentation and Control System Branch where I reviewed safety issues relating to electrical components, equipment and systems needed for safe operation and shutdown of nuclear facilities. Prior to being assigned to the Electrical Instrumentation and Control Systems Branch, I was an electrical engineer in the Power System Branch where my duties included performing technical reviews, analyses and evaluations of the adequacy of electrical equipment, apparatus and components for safe operation and safe shutdown of nuclear power plants. I have been performing these duties since joining NRC in 1982.

I hold a B.E. degree in electrical engineering and M.Sc. degree in electrical engineering. I am a registered professional engineer in the State of Maryland. I am an associate professor and lecturer (part-time) at George Washington University where I teach electrical engineering courses to graduate and practicing engineers. I have written a text book, Electrical Equipment Testing and Maintenance, published by Reston Publishing Co. (Prentice Hall), 1982.

Prior to joining the NRC, I worked for 17 years in the private sector, including an electrical power company where my duties included the selection and development of specifications for electrical systems, equipment and apparatus. I also performed evaluations and testing of electrical equipment and components used for electrical systems.

STATEMENT OF
PROFESSIONAL QUALIFICATION
OF
HAROLD WALKER

I am a Reactor Engineer in Section B of the Plant Systems Branch, Division of Engineering and Systems Technology, Office of Nuclear Reactor Regulation, United States Nuclear Regulatory Commission. My duties include serving as a principal reviewer in the area of nuclear plant protection to assure against various hazards and certain aspects of containment, radioactive waste processing and other support systems assigned to the Branch. Prior to this assignment I was a Mechanical Engineer in the Electrical, Instrumentation and Control Systems Branch where I reviewed the integrity, operability and functional capability of mechanical and electrical equipment, mechanical components, and supports needed for safe operation and safe shutdown of nuclear facilities.

Prior to being assigned to the Electrical Instrumentation and Control Systems Branch, I was a Mechanical Engineer in the Equipment Qualification Branch where my duties included performing technical reviews, analyses and evaluations of the adequacy of the environmental qualification of electrical and mechanical equipment whose failure, due to such environmental conditions as temperature, humidity, pressure and radiation, could adversely affect the performance of safety systems. I was previously a Materials Engineer in the Materials Engineering Branch where my duties and responsibilities involved the review and evaluation of materials performance from the standpoint of operability and functional capability and integrity under normal, abnormal, and accident loading conditions, and analyzing fracture toughness of reactor vessel materials, including specific data to assure that the materials will behave in a non-brittle manner.

Prior to my position in the Materials Engineering Branch, I was a Materials Engineer in the Engineering Branch, Division of Operating Reactors. My duties and responsibilities included the review of operating problems to determine whether safety requirements were being satisfied and to assure that operating problems were corrected, with due regard for safety and environmental protection.

Prior to my position in the Engineering Branch, I was a ACRS Fellow at the Advisory Committee on Reactor Safeguards. My duties included collecting and consolidating information pertaining to non-destructive testing methods.

I hold a B.E. degree in mechanical engineering from the City College of the City University of New York and I have taken graduate courses at the University of Pittsburgh.

Prior to joining the NRC, I was an engineer at Westinghouse Research Corporation in Pittsburgh, Pennsylvania where my duties included the application of the state of the art fracture mechanics as well as the study of structural integrity of materials in various environments and under various loading conditions.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

In the Matter of	)	
	)	Docket Nos. 50-443 OL-01
PUBLIC SERVICE COMPANY OF	)	50-444 OL-01
NEW HAMPSHIRE, et al.	)	On-site Emergency Planning
	)	and Safety Issues
(Seabrook Station, Units 1 and 2)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF RESPONSE TO NECNP MOTION TO REOPEN RECORD AND ADMIT NEW CONTENTION" in the above-captioned proceeding have been served on the following by deposit in the United States mail, first class or, as indicated by an asterisk, by deposit in the Nuclear Regulatory Commission's internal mail system, this 17th day of February 1988.

Sheldon J. Wolfe, Esq., Chairman*
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dr. Jerry Harbour*
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dr. Emmeth A. Luebke
Administrative Judge
5500 Friendship Boulevard
Apartment 1923N
Chevy Chase, Maryland 20815

Atomic Safety and Licensing
Appeal Panel*
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Atomic Safety and Licensing
Board*
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Docketing and Service Section*
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Thomas G. Dignan, Jr., Esq.
Robert K. Gad, III, Esq.
Ropes & Gray
225 Franklin Street
Boston, MA 02110

H. J. Flynn, Esq.
Assistant General Counsel
Federal Emergency Management Agency
500 C Street, SW
Washington, DC 20472

Philip Ahren, Esq.
Assistant Attorney General
Office of the Attorney General
State House Station
Augusta, ME 04333

Carol S. Sneider, Esq.
Assistant Attorney General
Office of the Attorney General
One Ashburton Place, 19th Floor
Boston, MA 02108

George Dana Bisbee, Esq.
Assistant Attorney General
Office of the Attorney General
25 Capitol Street
Concord, NH 03301

Ellyn R. Weiss, Esq.
Diane Curran, Esq.
Harmon & Weiss
2001 S Street, NW
Suite 430
Washington, DC 20009

Robert A. Backus, Esq.
Backus, Meyer & Solomon
116 Lowell Street
Manchester, NH 03106

Paul McEachern, Esq.
Matthew T. Brock, Esq.
Shaines & McEachern
25 Maplewood Avenue
P.O. Box 360
Portsmouth, NH 03801

Charles P. Graham, Esq.
McKay, Murphy & Graham
100 Main Street
Amesbury, MA 01913

Sandra Gavutis, Chairman
Board of Selectmen
RFD #1, Box 1154
Kensington, NH 03827

Calvin A. Canney
City Hall
126 Daniel Street
Portsmouth, NH 03801

Mr. Angie Machiros, Chairman
Board of Selectmen
25 High Road
Newbury, MA 09150

Allen Lampert
Civil Defense Director
Town of Brentwood
20 Franklin
Exeter, NH 03833

William Armstrong
Civil Defense Director
Town of Exeter
10 Front Street
Exeter, NH 03833

Gary W. Holmes, Esq.
Holmes & Ellis
47 Winnacunnet Road
Hampton, NH 03842

J. P. Nadeau
Board of Selectmen
10 Central Street
Rye, NH 03870

Judith H. Mizner, Esq.
Silverglate, Gertner, Baker,
Fine & Good
88 Board Street
Boston, MA 02110

Robert Carrigg, Chairman
Board of Selectmen
Town Office
Atlantic Avenue
North Hampton, NH 03870

William S. Lord
Board of Selectmen
Town Hall - Friend Street
Amesbury, MA 01913

Mrs. Anne E. Goodman, Chairman
Board of Selectmen
13-15 Newmarket Road
Durham, NH 03824

Hon. Gordon J. Humphrey
United States Senate
531 Hart Senate Office Building
Washington, DC 20510

Peter J. Matthews, Mayor
City Hall
Newburyport, MN 09150

Michael Santosuosso, Chairman
Board of Selectmen
South Hampton, NH 03827

Edwin J. Reis
Deputy Assistant General Counsel