UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
Philadelphia Electric Company	)	Docket Nos. 50-352
	)	50-353
(Limerick Generating Station, Units 1 and 2)	)	

STATEMENT OF SAMPATH RANGANATH, LLOYD S. BURNS, JR., FRANKLIN E. COOKE, AND STEPHEN E. CARTER IN SUPPORT OF MOTION FOR SUMMARY DISPOSITION OF CONTENTION I-62

Q.1. State your names, addresses and briefly describe your professional qualifications relating to the subject of pressurized thermal shock.

A.1a. My name is Sampath Ranganath. I am Manager of the Mechanics Analysis group of the Nuclear Engineering Division, General Electric Company. In that position I am responsible for stress analysis work on all BWRs, including Limerick Generating Station. Additional responsibilities include fracture mechanics, fatigue evaluations, finite element analysis, stress corrosion cracking, residual stress analysis, and dynamic margin of components. I received a BSME from Bangalore University in 1965, an MS in Mechanical Engineering from Indian Institute of Science in 1967 and a Ph. D. in Engineering from Brown University in 1971. I have been employed by GE for nine years in the area of solid mechanics. The statement of my professional qualifications is attached hereto and incorporated by reference herein.

A.1b. My name is Lloyd S. Burns, Jr. I am a Senior Engineer and a Technical Leader of the Containment and Radiological Engineering group of

the Nuclear Engineering Division, General Electric Company. In that position I am responsible for the calculation of neutron flux and fluence on General Electric BWRs including Limerick Generating Station. I obtained a BA degree in physics from Kalamazoo College. I have been employed by General Electric for 27 years working in the areas of nuclear radiation analysis. The statement of my professional qualifications is attached hereto and incorporated by reference herein.

A.1c. My name is Franklin E. Cooke. I am a Principal Design Engineer in the Reactor Pressure Vessel and Internals Design group of the Nuclear Engineering Division, General Electric Company. In that position I am responsible for defining the reactor operating limits to assure adequate fracture toughness of the reactor pressure vessel, including that for the Limerick Generating Station.

I obtained a Bachelor of Science degree in Mechanical Engineering from Southern Methodist University in 1950. I have been employed by the General Electric Company for 28 years in the area of nuclear steam supply system design, testing and operation. I have been working in the area of fracture toughness requirements since 1974. The statement of my professional qualifications is attached hereto and incorporated by reference herein.

A.1d. My name is Stephen E. Carter. I am an engineer in the Plant Materials Application group of the Nuclear Engineering Division, General Electric Company. In that position I provide support for design, procurement and quality control in the areas of reactor pressure vessel and

piping and I am responsible for assuring compliance with the requirements of 10 CFR Part 50, Appendices G & H. I received a B.S. degree in Metallurgy from the Pennsylvania State University in 1980. I have been employed by GE for the past 3 years in the area of nuclear materials technology. The statement of my professional qualification is attached hereto and incorporated by reference herein.

Q.2. Are you familiar with contention I-62 in the Limerick proceeding which alleges that the Limerick Generating Station can suffer a major breach of containment due to Pressurized Thermal Shock?

A.2. Yes.

Q.3. What sections of the Final Safety Analysis Report for the Limerick Generating Station contain information that is related to the responses to Contention I-62?

A.3. Related reactor pressure vessel information is found, primarily, in FSAR Section 5.3. Fracture toughness and material surveillance aspects, for example, are detailed in Sections 5.3.1.5 through 5.3.1.9.

FSAR Section 4.3.2.8 describes reactor pressure vessel neutron flux and fluence calculations.

Q.4. Please define the term Pressurized Thermal Shock.

A.4. Pressurized Thermal Shock (PTS) is a condition that may affect some PWR's but no BWR's. PTS results from the introduction of cold water into a hot pressure vessel while the pressure is high. Thermal stresses are produced in the vessel walls when cold water is introduced into the vessel. These stresses, in conjunction with stresses which occur as a result of high vessel pressure, have the potential to cause crack propagation in vessel materials. The materials of which the reactor pressure vessel is made can become embrittled as a result of substantial neutron bombardment. This embrittlement could, under certain conditions, adversely affect the ability of the materials to withstand these combined stresses.

PTS has been recognized as a problem in some pressurized water reactors because (i) pressure for some events can remain high in a PWR during cold water injections, and (ii) the neutron flux is high enough to cause significant vessel material embrittlement.

Q.5. Describe why the phenomenon of pressurized thermal shock is not significant for a boiling water reactor (BWR) such as the Limerick Generating Station.

A.5. PTS is not a problem for boiling water reactors since the necessary ingredients--high reactor vessel pressure during cold water injection and significant neutron irradiation embrittlement -- do not occur in a BWR. Furthermore, the decrease in vessel material fracture toughness as a result of irradiation is substantially less in a BWR than that in a PWR. Specific reasons for these conclusions are as follows:

- The pressure in a BWR follows the water-steam saturation curve. During cold water injection, such as from the High Pressure Coolant Injection (HPCI) system, the pressure in the BWR drops because the water and steam remain in equilibrium.

- The neutron fluence at the vessel wall in a BWR is very low compared with a PWR because of the presence of a large water-filled annulus between the vessel and the shroud surrounding the reactor core, and because of a substantially lower reactor core power density. Thus, radiation embrittlement effects are minimal in a BWR.

The design, construction, testing, operation and surveillance, together with the physical behavior of the BWR, as stated above, assure that PTS is not a problem for the Limerick Generating Station.

Q.6. Please describe the codes and standards to which the Limerick reactor vessels are designed and fabricated.

A.6. The Limerick reactor pressure vessels are designed, fabricated, tested, inspected, and stamped in accordance with the requirements of ASME Code Section III, Nuclear Power Plant Components, Class 1, including the Summer 1969 Addenda and ASME Code Section IX, Welding Specifications, including Summer 1969 Addenda.

Q.7. Describe the manner in which the Limerick pressure vessels were designed and constructed in accordance with ASME Sections III and IX.

A.7. The reactor pressure vessels are vertical, cylindrical pressure vessel of welded construction fabricated in accordance with ASME Code, Section III, Class 1 requirements. All RPV fabrication was performed in accordance with GE approved drawings, fabrication procedures, and test procedures. The shell and vessel head were made from formed low-alloy steel plates, and the flanges and nozzles from low-alloy steel forgings. Welding performed to join these vessel components was in accordance with ASME Sections III and IX requirements. Weld test samples were required for each procedure for major vessel full penetration welds.

All plate, forgings, and bolting were 100% ultrasonically tested and surface examined by magnetic particle methods or liquid penetrant methods in accordance with ASME Code Section III requirements. In addition, the pressure retaining welds were ultrasonically examined in accordance with ASME Code Section XI and Regulatory Guide 1.150 (Rev. 1) guidelines.

Fracture toughness properties were measured and controlled in accordance with ASME Code Section III requirements to limits specified by General Electric Company.

Q.8. Define the meaning of fracture toughness as used in the design of the Limerick reactor pressure vessels and describe how the fracture toughness of the ferritic pressure boundary materials of the Limerick reactor pressure vessels were determined.

A.8. "Fracture Toughness" is a measure of a material's inherent ability to resist unstable extension of flaws in the presence of applied,

dynamic, impact, or other suddenly applied loads. Appendix G of 10 CFR Part 50 specifies minimum fracture toughness requirements for ferritic materials of pressure-retaining components of the reactor coolant pressure boundary of water cooled power reactors to provide adequate margins of safety during any condition of normal operation, including anticipated operational occurrences and system hydrostatic tests, to which the pressure boundary may be subjected over its service lifetime.

Section 5.3.1.5 of the FSAR demonstrates the compliance of the Limerick reactor vessel design with the requirements of 10 CFR Part 50 Appendix G. As described therein, the ferritic pressure boundary materials of the Limerick 1 reactor pressure vessel (RPV) were qualified by toughness testing in accordance with the 1968 edition of the ASME Code including the Summer 1969 Addenda. In addition, these materials were tested to the augmented fracture toughness requirements specified by GE. All RPV components were impact tested by either the drop-weight test or the Charpy V-Notch impact test. Both impact tests were conducted on beltline plate material, closure flange material, top head material, feedwater and LPCI nozzle material forgings. Reference temperature nil ductility transition temperature (RT_{NDT}) values for the RPV components were established using impact test data and procedure that meets the requirements of 10 CFR 50 Appendix G. Similarly, compliance of the Limerick Unit 2 reactor with 10 CFR Part 50 Appendix G will be demonstrated prior to issuance of an operating license for that unit.

Q.9. Describe the effect of neutron irradiation over the life of the facility on fracture toughness properties of the vessel.

A.9. The effect of neutron fluence on pressure vessel materials is to cause a decrease in its fracture toughness. The decrease in toughness is, however, significant only at high fluences--well above those expected in the Limerick vessels based upon conservative calculational techniques as verified by operational experience.

Q.10. Describe how the fluences for the Limerick vessels were determined.

A.10. The neutron fluence calculations were carried out on the basis of analytical models incorporating reactor core data, geometric arrangement, and basic physical data. These items are incorporated into computer programs to solve the transport equations for nuclear radiation. These programs were verified in strict compliance with the quality assurance provisions of 10 CFR 50 Appendix B. The results of these calculations have been compared to field measurements and found to conservatively overpredict the neutron fluence.

The BWR vessel geometry from the view point of neutron vessel fluence calculations can be described in terms of a cross sectional view of concentric cylinders. The inner core region consists of 764 square fuel bundles of identical geometrical size arranged in a pattern simulating a cylinder. This region is surrounded by an annulus of water of an average thickness of approximately 8 inches. The core water is separated from the downcommer water by a stainless steel metal shroud 2 inches thick. The downcommer region containing the jet pumps is a water region 22.1 inches thick. The vessel is approximately 6.2 inches thick in the beltline region. See FSAR Figure 4.3-29.

Q.11. What were the effects of the calculated fluence on reactor vessel operating limits?

A.11. A maximum fluence for the core beltline material of 1.1×10^{18} n/cm^2 at one quarter of the vessel wall thickness from the inside diameter was conservatively calculated. This fluence was applied over the entire length of the core beltline plates and welds in order to determine the shift in fracture toughness which was, in turn, used to determine the reactor operating limits at the end of reactor service life. For critical nozzles such as the LPCI nozzle, the fluence was uniquely calculated for each nozzle. The resulting core beltline operating limitations are less restrictive than those operating limitations established as a result of other reactor vessel parts. Such vessel parts are located well away from the core beltline in a region of insignificant fluence with respect to fracture toughness properties of the vessel material.

The results are depicted on FSAR Figure 5.3-4, a copy of which is attached hereto. This figure will become part of the Technical Specifications for Limerick Unit 1 and will define the minimum temperature versus reactor pressure required to assure adequate fracture toughness. A similar curve will be developed for Unit 2. The dashed lines represent the limits for the core beltline region after exposure to the fluences described above. It may be seen that the solid curves to the right of the respective dashed lines require a higher temperature for a given pressure. This figure, therefore, demonstrates that the core beltline region is not limiting with regard to the setting of temperature and pressure limits for the reactor.

The portion of the curve labeled "Vessel Discontinuity Limits" represents the limits for those portions of the reactor vessel away from the core beltline. They are established by stress analyses which include the effects of cold water injections and other mechanical loads that may be applied in addition to reactor pressure loading. The evaluations are in accordance with ASME Code Section III and 10 CFR 50 Appendix G.

Q.12. What confirmatory fracture mechanics evaluations have been performed?

A.12. A fracture mechanics evaluation of the effects of a potential loss of coolant accident (LOCA) in a BWR/6 reactor vessel of similar design to Limerick has been performed. The purpose of that analysis was to determine if crack propogation could occur as a result of stresses induced in the vessel by the injection of cold water by the Emergency Core Cooling System (ECCS). The analysis included determination of thermal stresses in the vessel and calculation of resulting applied stress intensity factors which would exist at the tip of a potential crack in the vessel wall. The stress intensity factors were compared to the available materials fracture toughness which was calculated considering vessel temperature and neutron fluence effects on vessel material properties. It was found that the available vessel material fracture toughness always exceeded the applied stress intensity factors for all postulated crack depths. It was therefore concluded that crack propogation would not occur, even for large initial flaws with depths approaching the vessel wall thickness.

Limerick specific fluence, material properties, and NDT shift data confirm that the results of the generic analysis are applicable to the Limerick Reactor Pressure Vessels.

Q.13. What surveillance program is planned for the Limerick vessels?

A.13. Surveillance specimens were fabricated from heats of materials (i.e., both weld and plate) that are actually used in the beltline core region. The coupon orientations are equivalent to the orientations of the specimens used to establish unirradiated impact properties. Three surveillance specimen capsules which contain both Charpy V-Notch and tensile specimens are placed in the vessel. Each capsule also includes an Fe, Ni, and Cu flux wire. A separate neutron dosimeter is attached alongside one of the capsules and contains 3 Cu and 3 Fe wires. These dosimeters can be used to periodically check the actual flux field to which the capsules are exposed. The specimens will be removed at intervals over the life of the vessel in order to confirm the adequacy of the predicted irradiation effects.

Q.14. What are your overall conclusions concerning the effect of PTS on the Limerick Generating Station pressure vessels?

A.14. The conditions necessary for the occurrence of PTS in PWRs cannot occur in BWRs such as Limerick because of differences in design and operation. The integrity of the Limerick vessels are assured by conservative design, selection of materials, construction, testing, operation, and surveillance in accordance with regulatory requirements.

Sampath Ranganath

Sampath Ranganath

Lloyd S. Burns, Jr.

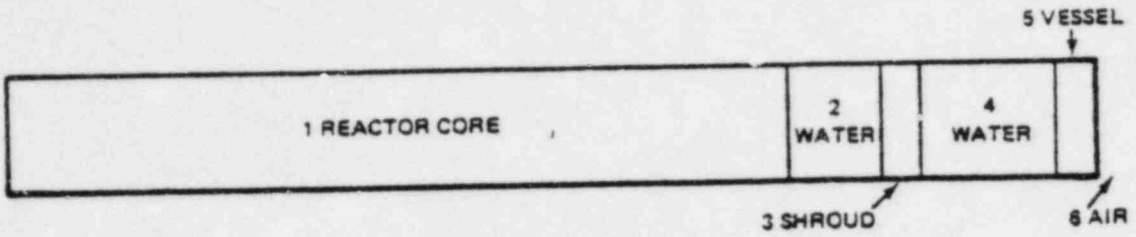
Lloyd S. Burns, Jr.

Franklin E. Cooke

Franklin E. Cooke

Stephen E. Carter

Stephen E. Carter

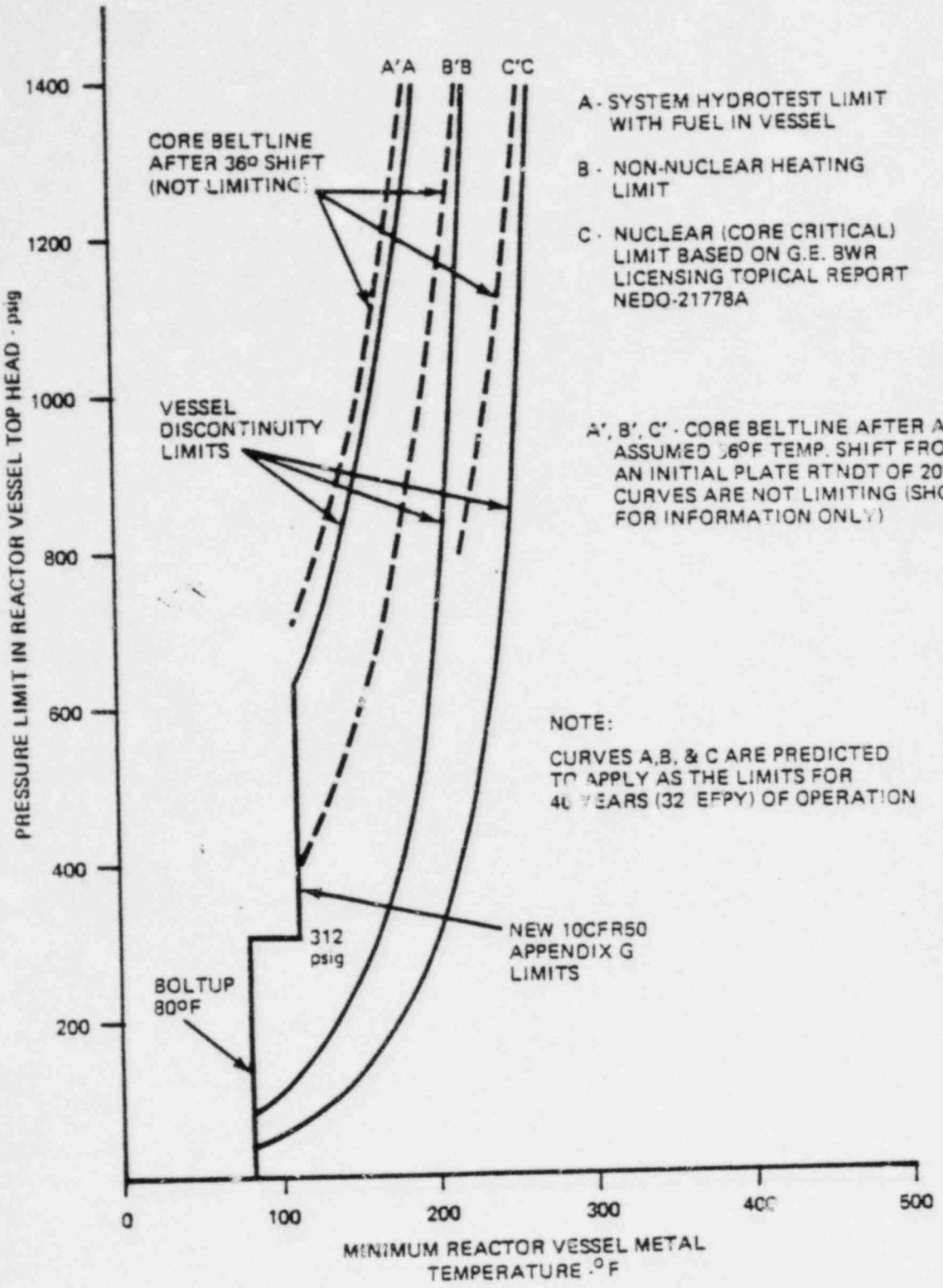


MATERIAL		RADIUS INCHES	MATERIAL	MATERIAL DENSITY
NO.	NAME			
			WATER	0.274g/cm^3
1	REACTOR CORE	93.56	UO_2	2.642 g/cm^3
			ZIRCONIUM	0.896 g/cm^3
2	WATER	101.4	WATER	0.74 g/cm^3
3	SHROUD	103.4	304L STAINLESS STEEL	FROM ASME SA 240
4	WATER	125.5	WATER	0.74 g/cm^3
5	VESSEL	131.68	CARBON STEEL	FROM ASME 533
6	AIR		AIR	1.3 X 10^{-3} g/cm^3

LIMERICK GENERATING STATION
UNITS 1 AND 2
FINAL SAFETY ANALYSIS REPORT

MODEL FOR ONE-DIMENSIONAL TRANSPORT ANALYSIS OF VESSEL FLUENCE

FIGURE 4.3-29



LIMERICK GENERATING STATION
UNITS 1 AND 2
FINAL SAFETY ANALYSIS REPORT

UNIT 1 MINIMUM TEMPERATURE
REQUIRED VS REACTOR PRESSURE

FIGURE 5.3-4

REV. 22, 07/83

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
Philadelphia Electric Company	)	Docket Nos. 50-352
	)	50-353
	)	
(Limerick Generating Station, Units 1 and 2)	)	

AFFIDAVIT OF SAMPATH RANGANATH, MANAGER, MECHANICS ANALYSIS GROUP, NUCLEAR ENGINEERING DIVISION GENERAL ELECTRIC COMPANY, REGARDING CONTENTION I-62

STATE OF CALIFORNIA)
COUNTY OF SANTA CLARA) ss:

Sampath Ranganath, being duly sworn according to law, deposes and says:

1. My name is Sampath Ranganath. I am Manager, Mechanics Analysis group, Nuclear Engineering Division, General Electric Company.

2. I participated in the answer to Question 1a, which includes a Statement of my Professional Qualifications, and the answers to Questions 4, 5, 12 and 14. The statements therein are true and correct to the best of my knowledge, information and belief.

10/11/83
Date

Sampath Ranganath
Sampath Ranganath

Subscribed and sworn before me on 11 OCTOBER 1983.

OFFICIAL SEAL
KAREN S. VOGELHUBER
NOTARY PUBLIC - CALIFORNIA
SANTA CLARA COUNTY
My Commission Expires Dec. 21, 1984

Karen S. Vogelhuber
Notary Public

I10102-1

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
Philadelphia Electric Company	)	Docket Nos. 50-352
	)	50-353
	)	
(Limerick Generating Station, Units 1 and 2)	)	

AFFIDAVIT OF LLOYD S. BURNS, JR. SENIOR ENGINEER, CONTAINMENT AND RADIOLOGICAL ENGINEERING, NUCLEAR ENGINEERING DIVISION, GENERAL ELECTRIC COMPANY, REGARDING CONTENTION I-62

STATE OF CALIFORNIA)
COUNTY OF SANTA CLARA) ss:

Lloyd S. Burns, being duly sworn according to law, deposes and says:

1. My name is Lloyd S. Burns, Jr. I am a Senior Engineer in the Containment and Radiological Engineering group, Nuclear Engineering Division, General Electric Company.

2. I participated in the answer to Question 1b, which includes a Statement of my Professional Qualifications, and the answers to Questions 2, 3, 10, 11, and 14. The statements therein are true and correct to the best of my knowledge, information and belief.

3. I am familiar with the contents of FSAR Section 4.3.2.8 as they pertain to the above answers. The statements, tables, and figures in that section of the FSAR, as amended through Rev. 22, 7/83, are true and correct to the best of my knowledge, information and belief.

Oct 10, 1983
Date

Lloyd S Burns Jr.
Lloyd S. Burns, Jr.

Subscribed and sworn before me on October 10, 1983.

OFFICIAL SEAL
RUTHE M KINNAMON
NOTARY PUBLIC - CALIFORNIA
SANTA CLARA COUNTY
My comm. expires APR 20, 1985

Ruthe M. Kinnamon
Notary Public

175 Curtner Avenue, San Jose, CA 95125

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
Philadelphia Electric Company	)	Docket Nos. 50-352
	)	50-353
(Limerick Generating Station, Units 1 and 2)	)	

AFFIDAVIT OF FRANKLIN E. COOKE, PRINCIPAL DESIGN ENGINEER, REACTOR VESSEL AND INTERNALS DESIGN, NUCLEAR ENGINEERING DIVISION, GENERAL ELECTRIC COMPANY, REGARDING CONTENTION I-62

STATE OF CALIFORNIA)
COUNTY OF SANTA CLARA) SS:

Franklin E. Cooke, being duly sworn according to the law, deposes and says:

1. My name is Franklin E. Cooke. I am a Principal Design Engineer in the Reactor Pressure Vessel and Internals Design group, Nuclear Engineering Division, General Electric Company.

2. I participated in the answer to Question 1c, which includes a Statement of my Professional Qualifications, and the answers to Questions 2, 3, 6, 7, 11 and 14. The statements therein are true and correct to the best of my knowledge, information and belief.

3. I am familiar with the contents of FSAR Section 5.3 as they pertain to the above answers. The relevant statements, tables, and figures in that section of the FSAR, as amended through Rev. 22, 7/83, are true and correct to the best of my knowledge, information and belief.

October 7, 1983
Date

Franklin E. Cooke
Franklin E. Cooke

Subscribed and Sworn to Before Me on 7 October 1983.

Karen S. Vogelhuber
Notary Public

OFFICIAL SEAL
KAREN S. VOGELHUBER
NOTARY PUBLIC - CALIFORNIA
SANTA CLARA COUNTY
My Commission Expires Dec. 21, 1984

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
Philadelphia Electric Company	)	Docket Nos. 50-352
	)	50-353
	)	
(Limerick Generating Station, Units 1 and 2)	)	

AFFIDAVIT OF STEPHEN E. CARTER, ENGINEER, PLANT MATERIALS APPLICATION, NUCLEAR ENGINEERING DIVISION, GENERAL ELECTRIC COMPANY, REGARDING CONTENTION I-62

STATE OF CALIFORNIA)
COUNTY OF SANTA CLARA) ss:

Stephen E. Carter, being duly sworn according to law, deposes and says:

1. My name is Stephen E. Carter. I am an engineerin the Plant Materials Application group, Nuclear Engineering Division, General Electric Company.

2. I participated in the answer to Question 1d, which includes a Statement of my Professional Qualifications, and the answers to Questions 2, 3, 8, 9 and 13. The statements therein are true and correct to the best of my knowledge, information and belief.

3. I am familiar with the contents of FSAR Sections 5.3.1 and 5.3.3 as they pertain to the above answers. The relevant statements, tables, and figures in those sections of the FSAR, as amended through Rev. 22, 7/83, are true and correct to the best of my knowledge, information and belief.

10/11/83
Date

Stephen E. Carter
Stephen E. Carter

Subscribed and sworn before me on 11 OCTOBER 1983

Karen S. Vogelhuber
Notary Public

OFFICIAL SEAL
KAREN S. VOGELHUBER
NOTARY PUBLIC - CALIFORNIA
SANTA CLARA COUNTY
My Commission Expires Dec. 21, 1984

PROFESSIONAL QUALIFICATIONS

SAMPATH RANGANATH
MANAGER, MECHANICS ANALYSIS
NUCLEAR ENGINEERING DIVISION
GENERAL ELECTRIC COMPANY

My name is Sampath Ranganath. My business address is 175 Curtner Ave., San Jose, CA., 95125. I am the Manager of the Mechanics Analysis group of the Nuclear Engineering Division of the General Electric Company. I have been in this position for five years. I am responsible for all analytical work on the Limerick Generating Station in the areas of stress analysis, fracture mechanics, fatigue evaluations, finite element methods development, stress corrosion cracking, residual stress analysis, and dynamic margin of components.

I received a BSME from Bangalore University in 1965, an MS from Indian Institute of Science in 1967, and a Ph. D. in Engineering from Brown University in 1971.

I have been employed by General Electric Company for 9 years in the area of solid mechanics. I have been a key contributor to several EPRI programs including those related to improved fatigue design rules for carbon steel and fracture mechanics evaluation of the pressure vessel

under LOCA conditicns. I am a member of the Subgroup on Standards and Evaluation, Section XI, ASME Code, contributing in the development of rules for evaluating flaws in nuclear pressure vessel components.

I am a member of the ASME and a registered Professional Engineer in the state of California. I am an adjunct lecturer at the University of Santa Clara and have taught courses in fracture mechanics and pressure vessel design at the University of Santa Clara. I am the author of several papers in the fields of dynamic behavior, stress analysis plasticity, fracture mechanics and fatigue.

PROFESSIONAL QUALIFICATIONS

LLOYD S. BURNS, JR.
TECHNICAL LEADER, CONTAINMENT AND RADIOLOGICAL ENGINEERING
NUCLEAR ENGINEERING DIVISION
GENERAL ELECTRIC COMPANY

My name is Lloyd S. Burns and my business address is 175 Curtner Ave., San Jose, CA., 95125. I am a Senior Engineer and Technical Leader in the Containment and Radiological Engineering group of the Nuclear Engineering Division of the General Electric Co. I have the responsibility for calculation of the neutron flux and fluence calculations for General Electric BWR's.

I received my B. A. in Physics from Kalamazoo College, Kalamazoo, Michigan in 1950.

I have been employed by the General Electric Company since 1956. All of my work experience with General Electric has been in the area of radiation analysis. I have worked with commercial reactor power plants since 1968. Prior to that time I worked on mobile reactor designs primarily for government applications. I have participated in the development of the currently used neutron transport methodology.

I am currently a Technical Leader in the Containment and Radiological Engineering group. I have overall technical responsibility for radiation analysis work within General Electric's scope of responsibility for BWR plants. One portion of the radiation analysis work is the calculation of neutron flux and fluence on BWR reactor pressure vessel. I have performed neutron flux and fluence calculations for BWR vessels and I have prepared the neutron fluence data for the Limerick Generating Station. I have actively followed the measurement and data available on vessel fluence of operating BWR reactors.

I am a registered Professional Engineer in California.

PROFESSIONAL QUALIFICATIONS

FRANKLIN E. COOKE
PRINCIPAL DESIGN ENGINEER
REACTOR PRESSURE VESSEL & INTERNALS DESIGN
NUCLEAR ENGINEERING DIVISION
GENERAL ELECTRIC COMPANY

My name is Franklin E. Cooke. My business address is 175 Curtner Ave., San Jose, CA., 95125. I am a Principal Engineer in Reactor Pressure Vessel & Internals Design group of the Nuclear Engineering Division of General Electric Company. In this position I am responsible for defining the reactor operating limits to assure adequate fracture toughness of the reactor pressure vessel.

I received my Bachelor of Science degree in Mechanical Engineering in 1950 from Southern Methodist University.

I have been employed by General Electric in its nuclear energy business for twenty eight years. My duties have included the design, testing and operation of the nuclear steam supply system for General Electric boiling water reactor designs. I have been working in the area of fracture toughness requirements since 1974. My current responsibilities include definition of fracture toughness operating limits for the reactor vessel,

definition of standard plant reactor specifications, review of product safety standards and regulatory guides, thermal cycle evaluations, and definition of reactor water level operating limits.

PROFESSIONAL QUALIFICATIONS

STEPHEN E. CARTER
ENGINEER, PLANT MATERIALS APPLICATION
NUCLEAR ENGINEERING DIVISION
GENERAL ELECTRIC COMPANY

My name is Stephen E. Carter. My business address is 175 Curtner Avenue, San Jose, CA., 95125. I am an engineer in Plant Materials Application, Nuclear Engineering Division, General Electric Company. In that position I provide support for design, procurement, and quality control in the areas of the reactor pressure vessel, piping and pipe whip restraints. I am also responsible for assuring compliance with the requirements of 10 CFR Part 50, Appendices G & H. In addition, I am Program Manager for "Process and Product Specifications".

I received a Bachelor of Science degree in Metallurgy from the Pennsylvania State University in 1980. I have been a member of the General Electric nuclear materials staff for over 3 years. My past responsibilities at GE have included applied corrosion research of low alloy steels, austenitic stainless steels, and Inconel alloy 600.

LAW OFFICES

CONNER & WETTERHAHN, P.C.

1747 PENNSYLVANIA AVENUE, N.W.

WASHINGTON, D.C. 20006

TROY B. CONNER, JR.
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OF COUNSEL
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CABLE ADDRESS: ATOMLAW

October 12, 1983

Mr. Robert L. Anthony
Friends of the Earth of
the Delaware Valley
P. O. Box 186
103 Vernon Lane
Moylan, Pennsylvania 19065

In the Matter of
Philadelphia Electric Company
(Limerick Generating Station, Units 1 and 2)
Docket Nos. 50-352 and 50-353

Dear Mr. Anthony:

The Professional Qualifications of John D. Walsh, Science Specialist, Bechtel Group, Inc., was inadvertently omitted as an attachment to "Affidavit of John D. Walsh in Support of Motion for Summary Disposition of Contentions V-3a and V-3b" dated October 6, 1983. A copy of Mr. Walsh's qualifications is enclosed.

Sincerely,

Mark J. Wetterhahn
Counsel for Philadelphia
Electric Company

cc: Service List

PROFESSIONAL QUALIFICATIONS
JOHN D. WALSH
SCIENCE SPECIALIST
BECHTEL GROUP INC.

My name is John D. Walsh. My business address is 50 Beale St. San Francisco, California 94109. I am a professional meteorologist. I am a science specialist in that position. I provide staff support in meteorology and air quality matters. I am responsible for the hazards analyses associated with nearby military, industrial and transportation facilities for a number of nuclear power plants, including the Limerick Generating Station.

I received training as an aerographer with the U.S. Navy during the Korean war. Following that, I attended New York University from 1956 through 1959, and received an A.B. in meteorology. I later joined the U.S. Naval Reserve and was designated as meteorological officer, a designation I still hold with the rank of Commander.

Following receipt of my undergraduate degree, I pursued part-time graduate studies in meteorology, physics, mathematics, and psychology at a number of institutions, including Hofstra College, State University of New York, University of Maryland and University of California-Berkeley. I recently completed requirements for an M.S. degree in Environmental Management at the University of San Francisco.

Following my graduation from undergraduate school, I was employed by Brookhaven National Laboratory as a Research Meteorologist.

The work was primarily in the field of atmospheric dispersion research.

From 1961 through 1966, I was employed by the New York State Department of Health as a Senior Meteorologist in the Bureau of Air Pollution Control. During this time, I assisted in the establishment of a state-wide air pollution control program, and organized methods for evaluating the impacts of industrial and utility facilities on air quality.

From 1966 through 1968, I was employed by NUS Corporation as a Senior Scientist, where I was primarily assigned in preparation of PSAR/FSAR meteorological and climatological chapters, including accident analyses.

From 1968 through 1974, I was employed by several consulting companies as Chief, Air Quality Section, and as Manager of Enviromental Services. My assignments were in atmospheric dispersion studies, in resource development, and in chemical/biological warfare defense systems.

I have been employed by Bechtel Group Inc. since September, 1974. My present title is Science Specialist, and I work as a staff consultant to a number of Bechtel projects. Among my assignments, I have performed numerous accident analyses for over one dozen nuclear power plants. These analyses have included the effects on the operation of these stations of nearby industrial, military and transportation facilities.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
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Philadelphia Electric Company	)	Docket Nos. 50-352
	)	50-353
(Limerick Generating Station, Units 1 and 2)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of:

1. Applicant's Motion for Summary Disposition of Contention I-62 dated October 12, 1983;

2. Applicant's Memorandum in Support of its Motion for Summary Disposition of Contention I-62 dated October 12, 1983;

3. Applicant's Statement of Material Facts as to which There is No Genuine Issue to be Heard as to Contention I-62 dated October 12, 1983;

4. Statement of Sampath Ranganath, Lloyd S. Burns, Jr., Franklin E. Cooke, and Stephen E. Carter in Support of Motion for Summary Disposition of Contention I-62;

5. Affidavit of Sampath Ranganath, Manager, Mechanics Analysis Group, Nuclear Engineering Division, General Electric Company, Regarding Contention I-62 dated October 11, 1983;

6. Affidavit of Lloyd S. Burns, Jr. Senior Engineer, Containment and Radiological Engineering, Nuclear Engineering Division, General Electric Company, Regarding Contention I-62 dated October 10, 1983;

7. Affidavit of Franklin E. Cooke, Principal Design Engineer, Reactor Vessel and Internals Design, Nuclear Engineering Division, General Electric Company, Regarding Contention I-62 dated October 7, 1983;

8. Affidavit of Stephen E. Carter, Engineer, Plant Materials Application, Nuclear Engineering Division, General Electric Company, Regarding Contention I-62 dated October 11, 1983;

9. Letter to Robert L. Anthony dated October 12, 1983 enclosing Professional Qualifications of John D. Walsh, Science Specialist, Bechtel Group, Inc.,

in the captioned matter have been served upon the following by deposit in the United States mail this 12th day of October, 1983:

* Judge Lawrence Brenner (2)
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

* Judge Richard F. Cole
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U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

* Judge Peter A. Morris
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