UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
SOUTH CAROLINA ELECTRIC & GAS COMPANY	)	Docket No. 50-395
	)	
(Virgil C. Summer Nuclear Station, Unit 1)	)	

AFFIDAVIT OF JAMES H. BARKER
ON PROJECTED POPULATION DOSES

My name is James H. Barker, Staff Health Physicist for South Carolina Electric & Gas Company, and my qualifications can be found in Attachment A. The purposes of this statement are to summarize the methodology and results of population dose projections made in support of the license application for the Summer Nuclear Station, and to address the question whether such doses have been conservatively estimated (i.e. more likely over- than under estimated).

Dose projections can be found in four separate documents. The four documents are the Final Safety Analysis Report (FSAR), the Operating License Environmental Report (ER), in both of which, dose estimates were prepared by subcontractors for SCE&G, the Safety Evaluation Report (SER), and the Draft Environmental Statement (DES), both prepared by or for the NRC Staff.

I have reviewed all four documents with regard to dose projections. I find that they use standard analytical

techniques and conform to current regulatory procedures in arriving at their projected doses. The FSAR and ER both include detailed descriptions of the methods used and assumptions made. Briefly, they use the PWR-GALE computer code (NUREG-0017) to predict effluent source terms. These predictions are consistent with historical results obtained from operating plants. These source releases are then propagated into the environment using the methods of NRC Reg. Guide 1.113 for water transport and Reg. Guide 1.111 for gaseous transport. Dose calculations are made following the procedures outlined in Reg. Guide 1.109. A similar methodology is used by the NRC Staff in the SER, but less information on their assumptions is presented. Finally, the DES implies similar methodology but is not as specific as to its exact choice of models or assumptions; from the results reached, however, the DES obviously uses more conservative models and assumptions for dose estimates.

A comparison of the predictions of the four reports leads to the following conclusions. The FSAR, ER, and SER, while containing minor differences, are in basic agreement on dose projections. The DES appears to be a more conservative calculation since it projects doses in the range two to six times larger than the other analyses. In my judgement, the results of the FSAR, ER, and SER already contain conservatism, but because the overall doses are small, independent of report chosen, it seems reasonable for the purposes of this discussion (i.e. whether doses might have been underestimated for NEPA purposes) to err on the

side of further conservatism and choose the results obtained for NEPA purposes in the DES analysis.

The summary results of the DES projections can be found in Tables 4.9, 4.10, and 4.11. These tables show that, even for this conservative analysis, the projected doses to the maximum exposed individual are at least an order of magnitude less than the design objectives found in Appendix I, 10 CFR Part 50 and the position statement of the NRC Staff RM-50-2 also published as Annex to Appendix I 10 CFR Part 50.

Table 4.11 shows a projected one year dose to the population of the United States in the year 2000 to be 537 man-rems. This population dose is combined with results of the 1972 BEIR report to estimate health effects. The results show no significant or measurable health impact on man from the routine operation of the Summer Nuclear Plant.

It is appropriate to note that the largest single contributor to population dose is the 500 man-rem assumed to be received as occupational exposure. That estimate is conservative in that current industry experience with Westinghouse PWR's similar to Summer indicates that 375 man-rem would be a more realistic estimate. (Summary Proceedings, Westinghouse 1980 REM Seminar, Pittsburgh, Pa., October, 1980.)

I hereby certify that the foregoing information is true and correct to the best of my knowledge and belief.

James H. Barker
JAMES H. BARKER

Subscribed and sworn to before me
this 6th day of May, 1981.

Darlene G. Stover (L.S.)
Notary Public

My Commission expires: 12-22-88.

JAMES HOWARD BARKER

PROFESSIONAL QUALIFICATIONS

I am a Staff Health Physicist for South Carolina Electric & Gas Company, Columbia, South Carolina. My principal responsibilities with South Carolina Electric & Gas Company are in making offsite dose calculations, developing radiological technical specifications, formulation of corporate ALARA policy, providing technical expertise in the area of computers to the V. C. Summer Station onsite health physics group, and in providing health physics input to the Radiological Emergency Plan for the V. C. Summer Nuclear Station.

I graduated from Loyola University in Chicago, Illinois in 1966, receiving a B.S. in Physics. I received my Ph.D. in Physics from Texas A&M University, College Station, Texas, in 1971 and engaged in further postgraduate studies in health physics at Oak Ridge National Laboratory in 1975.

From 1966 to 1971 I was a Teaching and Research Associate in the Physics Department at Texas A&M University. As a full time graduate student I was involved in research in the area of charged-particle spectroscopy utilizing solid state detectors and magnetic spectrographs.

From 1971 to 1973 I was a Postdoctoral Research Associate and Instructor with the Department of Chemistry at Washington University in St. Louis, Missouri during which time I had teaching duties in introductory qualitative and quantitative analysis laboratories and was engaged in research to in-beam

gamma-ray spectroscopy involving particle-γ and γ-γ coincidence measurements, Doppler-shift lifetime measurements, and neutron time-of-flight energy determinations.

From 1973 to 1976 I was an Assistant Associate Professor of Physics at St. Louis University where I taught lower division courses in physics program as well as upper division and graduate courses in atomic and nuclear physics. I redesigned the undergraduate laboratories in atomic physics and optics. During this time I was engaged in research in the area of gamma-ray spectroscopy involving $(\alpha,p\gamma)$ reactions on nuclei in the Ni region. In 1973 I obtained a grant from the Research Corporation to support work in the area of Doppler-shift lifetime measurements and in 1975 I received a travel grant from Oak Ridge Associate Universities to support research at the Oak Ridge Isochronous Cyclotron. This grant has been continuously renewed.

From 1976 to 1980 I was an Associate Professor of Physics with tenure at St. Louis University. During this period I taught both lower and upper division courses in the physics program and in 1977 I received an NSF grant to initiate an undergraduate program in health physics. I designed and taught all courses and implemented three extensive laboratories in this area. My research during this time was in the area of experimental heavy-ion nuclear physics. The most recent work has involved the use of gamma-ray multiplicity measurements to obtain nuclear properties of the continuum. I was a principal designer of

the $450 k "spin spectrometer" now being installed at the Holifield Heavy Ion Research Facility at Oak Ridge National Laboratory.

From 1980 to 1981 I was Faculty Research Participant, Physics Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

In 1981 I accepted employment with South Carolina Electric & Gas Company as Staff Health Physicist.

NRC Reports

Draft Environmental Statement related to the operation of Virgil C. Summer Nuclear Station, Unit No. 1. NUREG-0534, June 1979, and Supplement November 1980.

Safety Evaluation Report related to the operation of Virgil C. Summer Nuclear Station, Unit No. 1. NUREG-0717, February 1981 and Supplement.

Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Pressurized Water Reactors. NUREG-0017, April, 1976.

Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I. Regulatory Guide 1.109, Rev. 1, October 1977.

Methods for Estimating Atmospheric Transport and Dispension of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors. Regulatory Guide 1.111, Rev. 1, July 1977.

Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I. Regulatory Guide 1.113, Rev. 1, April 1977.

EPA Reports

Summary of Radioactivity Released in Effluents from Nuclear Power Plants from 1972 thru 1975. EPA 520/3-77-006, June 1977.

Other Reports

Virgil C. Summer Nuclear Station Operating License Environmental Report, SCE&G.

Virgil C. Summer Nuclear Station Final Safety Analysis Report, SCE&G.

The Effects on Populations of Exposure to Low Levels of Ionizing Radiation: 1972 BEIR I, NAS/NRC.

The Effects on Populations of Exposure to Low Levels of Ionizing Radiation: 1980 BEIR III, NAS/NRC.

Summary Proceedings, Westinghouse 1980 REM Seminar, Pittsburgh, Pa., October, 1980.

Date: May 7, 1981

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SOUTH CAROLINA ELECTRIC & GAS COMPANY and	)	
SOUTH CAROLINA PUBLIC SERVICE AUTHORITY	)	Docket No. 50-395 OL
(Virgil C. Summer Nuclear Station)	)	

NOTICE OF APPEARANCE

Notice is hereby given that the undersigned attorney herewith enters an appearance in the captioned matter. In accordance with §2.713, 10 C.F.R. Part 2, the following information is provided:

Name	-	James Michael McGarry, III
Address	-	DEBEVOISE & LIBERMAN 1200 Seventeenth Street, N.W. Washington, D.C. 20036
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Admission	-	United States Court of Appeals District of Columbia Circuit United States District Court District of Columbia
Name of Party	-	South Carolina Electric & Gas Company, et al P. O. Box 764 Columbia, South Carolina 29202

J. Michael McGarry III
James Michael McGarry, III

Dated at Washington, District of Columbia
this 7th day of May, 1981.

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(Virgil C. Summer Nuclear Station)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "Applicants' Motion For Summary Decision of Intervenor Brett A. Brusey's Contention A10 Regarding Health Effects", "Applicants' Memorandum Of Points And Authorities In Support Of Its Motion For Summary Disposition Respecting Intervenor, Brett A. Bursey's Contention 10A Regarding Health Effects", "Applicants' Statement Of Material Facts As To Which There Is No Genuine Issue To Be Heard Respecting Intervenor, Brett A. Bursey's Contention A10", "Affidavit Of Leonard D. Hamilton Concerning The Health Effects Of Low Level Radiation", "Affidavit Of James H. Barker On Projected Population Doses", "Notice of Appearance of J. Michael McGarry, III", in the above captioned matter, were served upon the following persons by deposit in the United States mail, first class postage prepaid, or by overnight messenger service with next day delivery guaranteed, as indicated by an asterisk, this 7th day of May, 1981.

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