

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

DOCKETED

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

SECOND SUPPLEMENTAL FILING
TO INTERVENOR'S MOTION TO REOPEN THE RECORD
FOR RECONSIDERATION OF THE MOTION FOR A STAY

In the Board's Memorandum and Order of September 24, I was permitted an opportunity to submit expert testimony as to the safety significance of the Quality Control and construction deficiencies under consideration in previous filings

Under separate cover, Dr. Charles Anderson has submitted an affidavit that addresses this issue. Dr Anderson's affidavit stresses the need for further evidentiary hearings to resolve the contested matters.

MOTION TO RECONSIDER STAY OF OPERATION

The "four factor test" for the favorable consideration of a stay has been met as follows:

(1) The strength of Dr. Anderson's initial affidavit and further research on the issue is likely to result in a reopened record with a different outcome.

(2) I clearly stand to be irreparably injured should the plant operate without the resolution of these significant safety concerns. Dr. Anderson's affidavit supports the assertion that the integrity of the containment at V.C. Summer has been compromised and would not withstand design basis seismic activity. The seismic design basis of the plant has already been exceeded by actual events. The company's assertions that "overbuilding" and "conservatism" will make up for the underestimation of the seismic design basis

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loses all credibility in the face of the Quality Control and construction deficiencies within the containment structure. Without the granting of a stay of criticality pending resolution of this matter, irreparable harm may befall me.

(3) The Applicant would suffer no economic loss by an indefinite stay of operation. Rate increase for V.C. Summer construction cost is presently in effect, under bond, and will not be heard by the Public Service Commission before January, 1983. A stay of criticality would not alter these economic realities.

(4) The public served by the Applicant would suffer no loss of service. The peak load for SCE3G in 1982 was 2,463 MW in August. This is a decrease from the previous year's peak of 2,557. (SC PSC Exhibit #23, SCE3G Data Request #1, Docket #82-240-E) SCE3G's generating capability without the V.C. Summer plant is 3,359 MW. This constituted a 34% reserve capacity during 1982's peak load. The company's records project a peak load for 1983 of 2,700 MW, which is most probably high. This would constitute a reserve capacity of 20% for 1983, if demand rises to the company projection (demand fell in 1982). As the Federal Energy Regulatory Commission recommends no more than 13% reserve over peak as being cost effective for ratepayers to maintain, the company's own statistical forecasts indicate there will be no impact on the public through loss of power should the operation of the V.C. Summer plant's operation be indefinitely stayed.

I believe this information satisfies the four factors of 10 CFR 2.793(e) for a stay of the Board's earlier order which allowed low power testing. Accordingly, I move that my motion for a stay be granted pending evidentiary hearings to resolve this matter.

Respectfully submitted,


Brett Bursey
10-7-82

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

INTERVENOR'S SUPPLEMENTAL FILING
ON MOTION TO REOPEN THE RECORD
AND CONDUCT FURTHER HEARINGS

ENGINEER'S REPORT
(IN PART)

The attached Engineering Report dated October 7,
1982 by Dr. C. M. Anderson, P. E., Esquire, is submitted
by Intervenor for consideration on matters of engineering
expertise.

FOR BRETT BURSEY

October 8, 1982

Brett Bursey, Intervenor

ENGINEERING REPORT

REACTOR CONTAINMENT BUILDING

CADWELDS

VIRGIL C. SUMMER NUCLEAR STATION
UNIT 1
COUNTY OF BERKS
COMMONWEALTH OF PENNSYLVANIA

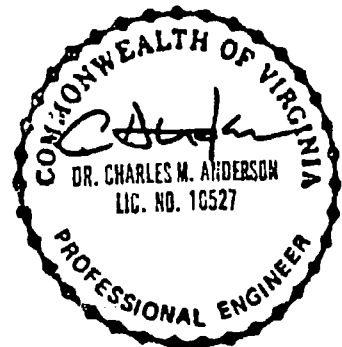
For

MR. BRETT BURSEY, INTERVENOR
GRASS ROOTS ORGANIZING WORKSHOP
18 BLUFF ROAD
COLUMBIA, SOUTH CAROLINA 29201

By

AA ENGINEERING
9213 BOIS AVENUE
VIENNA, VIRGINIA 22180

OCTOBER 7, 1982



BY

DR. C. M. ANDERSON, Ph.D., ESQUIRE

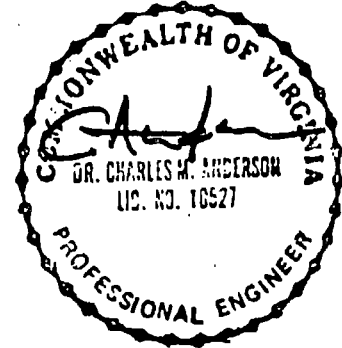
Registered Professional Engineer

Dr. C. M. Anderson, Esquire

Professional Engineer

October 7, 1982

To: Mr. Brett Burse, Intervenor
Grass Roots Organizing Workshop
18 Bluff Road
Columbia, South Carolina 29201
Ph: (803) 254-9398
(803) 254-4565



Re: Review of Partial File
Reactor Containment Building
South Carolina Electric & Gas Co.
Virgil C. Summer Nuclear Station, Unit 1

STRUCTURAL ENGINEERING REPORT

In response to your request, I have reviewed the following documents:

- (1) GAI Report No. 2278, "Reactor Containment Building Structural Acceptance Test," by J. F. Fulton 3/18/81
- (2) Intervenor's Motion to Reopen the Record and Conduct Further Proceedings and Request for a Stay 8/10/82
- (3) Intervenor's Supplemental Filing on Motion to Reopen the Record and Conduct Further Hearings 8/26/82
- (4) NRC Staff Response to Intervenor's Motion to Reopen the Record and Request for a Stay by Steven C. Goldberg 9/10/82
- (5) Licensee's Response in Opposition to Intervenor's Requests to Reopen the Record and Conduct Further Proceedings and for a Stay by DEBEVOISE & LIBERMAN of no date

AA Engineering 9213 Bois Avenue, Vienna, Virginia 22180 (703) 938-4430

- (6) Memorandum and Order, Administrative Judge Grossman 9/24/82

The above included various affidavits and attachments, e.g.,

- (1) D. A. Nauman 9/9/82
- (2) James F. Fulton of illegible date, 1982, 3 pp
- (3) Harold L. Jennings of no date, 2 pp
- (4) Joseph Lenahan 9/9/82
- (5) Sang Bo Kim and John G. Spraul 9/10/82
- (6) John M. Torbet of illegible date, September, 1982, 2 pp
- (7) Brett Bursey 8/26/82
- (8) Harold Laverne Jennings 8/12/82

I also discussed various aspects of the containment building history of weldments with you and Mr. Robert Guild, Esquire, on October 3, 1982 telephonically.

The purpose of these cursory and partial reviews was to determine if there exists prima facie an engineering basis for a reasonable determination that there are significant safety related questions to resolve.

FINDINGS

- (1) The vertical tendons cannot properly be designed or rationalized to accept tangential shear stresses in addition

to those post-tensioning stresses from their exclusive post-tensioning function.

- (2) The tangential shear stresses can properly be accepted only by vertical mild steel re-bars.
- (3) Ample doubt has been raised as to the "as-built" condition of vertical mild steel re-bars, viz., the "cadwelds", i.e., the mechanical butt splicing, to be able to properly accept these tangential shear stresses.
- (4) If the "cadwelds," of the vertical mild steel re-bars are as complained of, then the mild steel re-bars are without ability to perform their design function, i.e., to properly accept the tangential shear stresses, the building is without structural integrity, and, additionally, the concrete walls of the containment building are "structurally honeycombed."
- (5) This "structural honeycomb" condition creates additional stress concentrations and makes the structural integrity of these walls less than if these mild steel re-bars had not been installed in the first place. The result of this diminution in structural integrity will result in structural cracking of the walls generally and eventual loosening of the vertical post-tensioning cable anchorages.
- (6) The seismic analysis is deficient in that a reported Richter of 2.8 as a design seismic loading is deficient.
- (7) Some of the load factors used in design are deficient.
- (8) The "cadweld" problem is aggravated by the fact that loading combinations required by code are deficient and a rea-

sonable shear loading conditon would require two directional shears concurrent with tension in vertical reinforcement.

- (9) Any problem of foundation settlement because of soil conditions would seriously aggravate the above conditions.
- (10) GAI Report 2278 test results do not mitigate these comments.

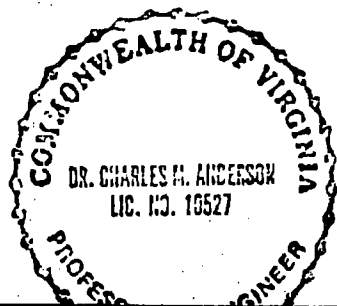
CONCLUSIONS

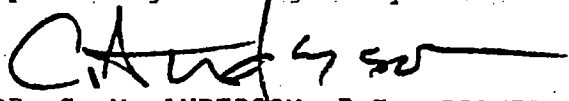
I believe that the containment building is most probably structurally unsafe to carry a reasonable seismic loading without incurring some structural failure affecting its functional safety.

There is an obvious and overwhelming engineering basis for a reasonable determination that there are significant public safety related questions not yet resolved.

These conclusions are in direct dispute with Mr. Fulton. Others' commercial design experience are questioned.

This writer is prepared to make further "...meaningful and substantial contribution to development of a record..." upon the granting of an adequate opportunity to visit the site, interview affiants, and review a complete file and time for a more complete engineering analysis.




DR. C. M. ANDERSON, P.E., ESQUIRE
Pennsylvania P.E. No. PE-030855-E

BURSEY

-5-

10/7/82

AFFIDAVIT

COMMONWEALTH OF VIRGINIA

COUNTY OF FAIRFAX, to-wit:

DR. C. M. ANDERSON, a person known to me, came before me, swore to the truth of the above report as he verily believes, and signed in my presence on the bottom of page 4. on 10/7/82.

Margaret A. Heit

NOTARY PUBLIC

My commission expires

July 21, 1984

Mr. C. M. Anderson

Summary of Formal University Training

University of California, Berkeley

Post-Doctoral Studies in Geotechnical Engineering:
Soil Mechanics and Foundations

Georgetown University Law Center, Washington, DC

Juris Doctor, J.D.
Major: The Law

University of Minnesota, Minneapolis

Bachelor of Civil Engineering, B.C.E.
Major: Civil Engineering

Master of Science in Civil Engineering, M.S.C.E.
Major: Foundation Engineering

Doctor of Philosophy, Ph.D.

Major: Structural Engineering

University of New Mexico, Albuquerque

Bachelor of Science, B.S.

Major: Geology

Master of Science in Civil Engineering, M.S.C.E.
Major: Soil Engineering

Dr. C. M. Anderson
Civil Engineer

Dr. Anderson as a Civil Engineer is Registered in Virginia, the District of Columbia, Maryland, West Virginia, California, Minnesota, Oklahoma, New Mexico, and Arizona as a Professional Engineer and holds the Degree Bachelor of Civil Engineering, B.C.E.

He Has Practiced as a Design Civil Engineer and Engineer Inspector of Civil Construction since 1963 in over half of these United States and three major regions of the Far East.

He Has Been in Responsible Charge of numerous large Civil Engineering Projects throughout this Country and Overseas in these General Civil Engineering Design Areas: Drainage, Site Plans, Highways, Roads, Land Development, Planning, Dams, Levees, Dykes, Jetties, Piers, Breakwaters, Percolation, Sanitary, Water Supply, Urban Runoff, Waterproofing, Construction, Erosion, Hydraulics and Hydrology.

Dr. C. M. Anderson
Structural Engineer

Dr. Anderson as a Structural Engineer is Registered in nine States as a Professional Engineer and holds the Doctorate Degree, Ph. D., in Structural Engineering. His Doctoral Dissertation, under the auspices of the American Iron and Steel Institute addressed Theoretical, Computer, and Experimental Analyses of Large Framed Building Structures.

He Has Practiced as a Design Structural Engineer and Engineer Inspector of Structural Construction since 1963 in over half of these United States and three major regions of the Far East.

He Has Been in Responsible Charge of numerous large Structural Engineering Projects throughout this Country and Overseas in these General Structural Engineering Design Areas: Buildings, Bridges, Piers, Piles, Caissons, High-Rise Structures, Underground Structures, Towers, Dams, Catenaries, Frames, Trusses, Pre-Stress Structures, Research, and Structures Subjected to Dynamic Loads, viz., Earthquake, Wind, Waves, and Mechanical Vibrations.

He Has Also evaluated existing buildings for Structural Adequacy and has conducted Load Test Programs for Buildings and Piles.

Dr. C. M. Anderson
Soil Engineer

Dr. Anderson as a Soil Engineer is Registered in nine States as a Professional Engineer and holds the Graduate Degree, Master of Science in Civil Engineering, M.S.C.E., Majoring in Soil Engineering. His Masters' Thesis, under the auspices of the United States Air Force, at the Wang Civil Engineering Research Facility, addressed Theoretical Computer and Experimental Analyses of Stress/Strain Relationships in Granular Soils in Triaxial Shear with Dynamic Soil Moduli.

He Has Practiced as a Design Soil Engineer and Engineer Inspector of Soil Construction since 1963 in over half of these United States and three major regions of the Far East.

He Has Been in Responsible Charge of numerous large Civil/Earth Projects throughout this Country and Overseas in these General Soil Engineering Design Areas: Foundation Soils and Materials for Highways, Expansion of Bentonite, Research, Settlement, Compaction, Densification, Consolidation, Dynamics, Liquefaction, Exploratory Sub-Surface Investigation, Laboratory Testing, Soil Percolation Tests, Permeability Testing, Soils Profiles, Land Development, Site Plans, and Field Inspection.

Dr. C. M. Anderson
Foundation Engineer

Dr. Anderson as a Foundation Engineer is Registered in nine States as a Professional Engineer and holds the Graduate Degree, Master of Science in Civil Engineering, M. S. C. E., Majoring in Foundation Engineering. His Masters Thesis, under the auspices of the National Science Foundation, Washington, D. C., addressed Theoretical, Computer, and Experimental Analyses of Structures/Soils Interaction in Foundations for Large Civil Projects.

He Has Practiced as a Design Foundation Engineer and Engineer Inspector of Foundation Construction since 1963 in over half of these United States and three major regions of the Far East.

Dr. Anderson has been in Responsible Charge of numerous large Foundation Projects throughout this Country and Overseas in these General Foundation Engineering Design Areas: Foundations of all Types for Large Buildings, Piers and Abutments for Bridges, Retaining Walls, Underground Structures, Foundations on Expansive Clay, Caissons, Piles, Foundations for High-Rise & Towers, Dams, Research, and Soil/Structure Interaction for Dynamic Loadings: Earthquakes, Wind, Mechanical Vibrations, and Waves.

Dr. C. M. Anderson
Geotechnical Engineer

Dr. Anderson as a Geotechnical Engineer is Registered in nine States as a Professional Engineer and did his Post-Doctoral Studies in Geotechnical Engineering at the University of California at Berkeley in 1973 after Ten Years of Design Experience.

He Has practiced as a Geotechnical Engineer and Engineer Inspector of Geotechnical Construction since 1963 in over half of these United States and three major regions of the Far East.

He Has Been in Responsible Charge of numerous large Geotechnical Projects throughout this Country and Overseas in these General Geotechnical Engineering Design Areas: Foundations, Soil Mechanics, Liquefaction, Earthquakes, Densification by Blasting, Compaction by Loading Surcharge, Consolidation by Dewatering, Highway Route Location, Highway Materials Studies, Bridge Site Selection, Tunneling, Rock Mechanics, Marine Structures, and Water Wells.

This Professional Field includes the Fields of Soil Mechanics, Foundations, Rock Mechanics, Geology, Seismicity, and Construction.

Dr. C. M. Anderson
Geologist

Dr. Anderson as a Geologist is Registered and holds the Degree, Bachelor of Science in Geology, B. S. His training in Geology bridges the gap between the Earth Sciences and the Engineering Disciplines.

He Has Practiced as a Design Geologist and Geological Engineer and Geologist Inspector of Construction since 1971 in over half of these United States and three major regions of the Far East.

He Has Been in Responsible Charge of numerous large Geologic Projects throughout this Country and Overseas in these General Geologic Design Areas: Geologic Surveys for Sites for Bridges, Highway Route Selections, Sites for High-Rise Structures, Sites for Sanitary Landfills, Dams, Soil Origin, Faults, Fissures for Seepage, Reservoirs, Seismicity, Structural Geology, and Mapping.

Dr. C. M. Anderson
Highway and Bridge Engineer

Dr. Anderson as a Highway & Bridge Engineer has designed over two hundred miles of Highways and Roads and more than one hundred Bridges throughout the United States and the Far East starting in 1964.

In 1968/1969 Dr. Anderson headed a group of ten Structural Designers to design Interstate Exchanges and large Bridge Structures as Consultant to the New Mexico State Highway Department.

In 1969/70 as Consultant for the Royal Thai Highway Department, he headed a Group of forty Engineers, Draftsmen, and Field and Lab Technicians in the design of Feeder Roads and Slab-Span Bridges to tie the Countryside and Jungles of Thailand to their Capital, Bangkok.

Again in 1972/73, Dr. Anderson, as Consultant, headed a Group of thirty Professionals to design Federal Highway Administration Highways and Prestressed Bridges for the Bureau of Indian Affairs on the Navajo Reservation in Arizona and New Mexico.

He Has Been Doing Highway and Bridge design and Inspection of Construction in Nebraska, California, and the East Coast more recently.

Dr. C. M. Anderson
Author and Lecturer

Dr. Anderson as an Author has written extensively in the areas of Residential Construction, Federal Legislation, and the Law, some of which are published by the Federal Government Printing Office, are regulations under certain Federal Programs for Construction, and are listed in part below:

- *Manual for the Construction of Residential Basements in Non-Coastal Flood Environs*
- *Hydraulic/Hydrologic Manual*
- *Manual for Procedure and Evaluation of Exceptions*
- *Manual for the Repair and Rehabilitation of Properties Damaged by Floods*
- *Manual for the Determination of the Life Term of Coastal Structures*
- *Manual and Study of a Request for Exception for Fairbanks, Alaska*
- *Legislative, Judicial, and Engineering Aspects of the National Flood Insurance Program*
- *Administration of the National Flood Insurance Program - Potential Death by Litigation*
- *Bases for Community and Citizen Litigation Against the National Flood Insurance Act of 1973*
- *White Paper for the White House Staff on Floods*
- *White Paper for Senator Thomas Eagleton on Floods*
- *Workshop Paper for the United States Congress (OTA)*
- *Investigation of Expansive Soils Damage Claims, HOW*
- *The Law of Mechanics' Liens*

Dr. Anderson has lectured at the Universities of California at Berkeley, Georgetown, Minnesota, Maryland, New Mexico, and Howard University, and has given workshops for the Maryland County Building Officials and Inspectors Association, the National Association of Home Builders Annual Conventions, the Fairfax County Department of Consumer Protection, the Federal Trade Commission Task Force on Housing Construction, the White House Staff, and the Washington Suburban Sanitary Commission.

Dr. C. M. Anderson
Residential Construction Expert

Dr. Anderson as an Internationally recognized Expert on Residential Construction has had his work cited in publication by the U.S. Army Corps of Engineers, the Department of Housing and Urban Development (HUD), the Federal Housing Administration (FHA), the National Association of Home Builders (NAHB) magazine Builder, the Federal Insurance Administration (FIA), the Canadian Research Council (CRC), the Portland Cement Association (PCA), the National Masonry Concrete Association, the Washington Suburban Sanitary Commission, the Insurance Company of North America, all of whom he has advised.

He Has Served for four years as Director of Engineering for the National Association of Home Builders (NAHB), Washington, D.C., during which period he Authored six books on Construction under Contract to the Federal Government.

Dr. Anderson has advised the White House Staff, the Federal Congress's Office of Technology Assessment (OTA), and several Senators on continuing occasions. He has investigated the Home Owners Warranty Program (HOW) and has consulted for the Federal Trade Commission's (FTC) Legal Task Force on the Housing Industry. Dr. Anderson's personal commercial client file on wet basements, settling foundation, framing, roofs, etc. is one of the most complete in the country.

The Areas of Civil Engineering

Civil Engineering

Highways, Reservoirs, Tunnels, Traffic, Water Supply and Treatment, Sanitary and Storm Sewers, Hydraulics, Hydrology, Airfields, Marine Engineering.

Structural Engineering

Buildings, Bridges, Antennae, Towers, Retaining Walls, Docks, Piers, Wharfs, and Dams and Other Hydraulic Structures and Drainage Structures.

Soil Engineering

Soil Mechanics, Permeability, Settlement, Bearing Capacity, Compression, Consolidation, Swelling, Stability, Stress/Strain, Index Properties, Materials Studies, Earth Dams, Berms.

Foundation Engineering

Footings & Mats, Piles, Caissons, Piers, Underground Structures, Abutments.

Geotechnical Engineering

Rock Mechanics, Soil Mechanics, Underground Flows, Tunnel Foundation Structures, Seismicity, Earthquakes, Liquefaction.

Construction Engineering

Program Evaluation and Review Technique (PERT), Critical Path Method (CPM), Value Engineering and Quality Control, Cost Estimating, Bidding, Contracting.

Geology

Highway Route Selection, Building and Bridge Site Selection, Fault and Fracture Mapping, Structural Geology, Underground Water Source Studies, and Site Selection for Sanitary Landfills, Dams and Reservoirs.

Land Development

Land Search, Preliminary Site Studies, Zoning, Surveys, Topographic Maps, Land Planning, Economic Analyses, Sub-Division, Site Plans, Design, and Construction Contracting and Management.

Legal Theories of Recovery in Construction Cases

There Are essentially three Theories of Recovery in Engineering/ Construction Law: Negligence, Fraud, and Breach of Warranty.

Negligence requires no special elaboration. Did any of the Parties do something with regard to the Engineering or Construction of the project that they should not have done or did they fail to do something that perhaps they should have done. Obviously, the negligence theory can be used against a Contractor who ignores all or part of his Engineer or Architect's recommendations. Negligence may also be used as a Theory against a Broker who may have told the Owner that the Builder took certain precautions in order to preclude soil problems when, in fact, the Broker did not know what had been done in that regard.

The Second Theory of Liability is that of Fraudulent Concealment. If a Vendor, whether Contractor or Broker, is aware of an adverse soil condition, which is not evident to the Owner or Purchaser and fails to tell him about it, the owner may make a Claim for Fraud.

Perhaps the Most Important Theory of Recovery, because its the easiest to prove, is that of Breach of Warranty. A Warranty is simply a promise by a Seller, Contractor, or other Party that relates to the condition of the project. If that promise is given verbally or put in writing, then it is an Express Warranty. Such a Warranty may be given by a Constructor, Broker, a Lender, Architect, or most anyone.

Dr. C.M. Anderson

Advocate

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Vienna, Virginia 22180
(703) 938 4430*