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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)

CAROLINA POWER & LIGHT COMPANY)
AND NORTH CAROLINA EASTERN)
MUNICIPAL POWER AGENCY)

Docket No. 50-400 OL

(Shearon Harris Nuclear Power Plant))
)

AFFIDAVIT OF JESSE T. PUGH, III IN SUPPORT OF
APPLICANTS' MOTION FOR SUMMARY DISPOSITION
OF EDDLEMAN CONTENTION 57-C-13

County of Wake)

State of North Carolina)

SS:

JESSE T. PUGH, III, being duly sworn, deposes and says:

1. I am the Director of the Division of Emergency Management of the North Carolina Department of Crime Control and Public Safety. In my position, I am responsible for the State's planning for and response to all emergencies, including accidents at any of the four nuclear plants that affect North Carolina. In that professional capacity, I have been involved in the development of the off-site emergency response capability for the Shearon Harris Nuclear Power Plant as well as the Catawba, McGuire and Brunswick nuclear plants. Through the Division of Emergency Management, I have directed the State's response to more than 650 cases in the last year alone, including the tornadoes in March and Hurricane Diana in September. As a result of both these disasters, several thousand persons had to be sheltered for various lengths of

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time. In addition to these practical experiences, I have completed the Shelter Manager Course and Radiological Defense Officer Course conducted by this Division. A current statement of my professional qualifications and experience is attached hereto as Attachment 1. My business address is 116 West Jones Street, Raleigh, North Carolina 27611. I have personal knowledge of the matters stated herein and believe them to be true and correct. I make this Affidavit in response to Eddleman Contention 57-C-13. I have reviewed this contention and am familiar with the substance of the allegations contained therein.

2. I am aware that the Licensing Board admitted Eddleman Contention 57-C-13 into this proceeding insofar as it calls for the best protection factors in each hospital and nursing home within the plume exposure pathway EPZ of the Harris Plant to be determined in advance of the emergency preparedness exercises for the Harris Plant. In response to the concerns raised by this contention, a survey of each nursing home, hospital and family care facility within the EPZ has been undertaken. As a result of this survey, the areas of each facility which would provide the greatest protection from a radiation release are now known. I believe that the availability of this information satisfies all of the concerns raised by Eddleman Contention 57-C-13, as admitted by the Board. The purpose of this Affidavit is to describe the criteria that were used in determining which areas provided the greatest protection, how the survey was conducted, and what the results are.

3. Atmospheric releases of radioactivity resulting from accidents at nuclear power plants like the Shearon Harris Nuclear Power Plant would form a cloud or plume carrying gaseous fission products and particulates. The effectiveness of a given shelter in providing protection against a passing radioactive plume can be measured by the degree of reduction in the direct exposure and inhalation doses it affords its occupants. This reduction can be characterized by a protection factor (the ratio of the dose outside to

the dose inside) for each exposure pathway. For the direct exposure pathway, the shelter will reduce the dose two ways: first, by being a barrier or shield against the radiation coming from a cloud, and, second, by increasing the distance between the outside radioactive cloud and an occupant inside. Therefore, the greater the number of barriers between the outside of the radioactive plume and the shelter occupant and the denser the barrier material, the better will be the protection factor ("PF") for the direct exposure pathway. In addition, in order to benefit from distance, the further away from outside walls, the lesser the direct dose will be. For the inhalation exposure pathway, the degree of protection will be a function of the air exchange rate with the outside. This phenomenon is governed by the type of apertures and outside covering of a structure. With leakage occurring through outside doors and windows, the rooms with these openings will have the highest radionuclide concentrations since it would take a longer period of time for a volume of air in a centrally located room to be exchanged with outside contaminated air.

4. Given the information outlined in paragraph 3, criteria for determining the best PF areas within hospitals, nursing homes and family care centers within the Harris plume EPZ have been developed. Within a given structure, areas having the best PFs will be centrally located, away from doors and windows, and will have the maximum number of horizontal and vertical partitions (e.g., outside and inside walls, upper floors and roof) between them and the outside environs.

5. A survey was conducted of each nursing home, hospital, and family care facility located within the Harris plume EPZ during the week of October 15, 1984. The names and capacities of the facilities surveyed are identified in Attachment 2 to this Affidavit. The survey was conducted by two engineers, under contract with Carolina Power & Light Company, who are certified by the Federal Emergency Management Agency as fallout shelter analysts.

6. The survey procedure involved interviewing the owners or administrators of each facility and inspecting the interior and exterior structural features of the facility. Special emphasis was placed on those aspects of the facilities which determine their effectiveness in reducing radiological doses received via direct exposure and inhalation pathways. In this regard, the following features were noted in the survey:

- type of structure (e.g., single story, frame)
- presence of basement
- outside covering (shingle, clapboard, brick, etc.)
- type of interior and exterior windows
- type of roof and roof covering
- construction material of exterior walls
- construction material of interior walls
- presence of corridors and hallways
- capability to isolate rooms with windows from hallways or corridors

7. The survey revealed that the structures fall into three general categories: (1) family care centers which were formerly private residential houses, (2) nursing homes which are designed and built especially for care of elderly persons, and (3) hospitals. The only exception is Homes for the Elderly in Fuquay-Varina, which is a community of 72 one- and two-bedroom apartments.

8. A detailed listing of the descriptive features for each facility surveyed is contained in Attachment 3 to this Affidavit. Attachment 3 also identifies those areas within each facility which afford the best protection factor. The following general conclusions can be drawn from the survey: (1) Some of the family care facilities do not have an area which offers substantially better shelter effectiveness than the remainder of the facility, and (2) the nursing homes and hospitals, due to floor plan layouts and construction materials of interior and exterior walls, have locations with significantly

better protection factors than other locations within the same facility.

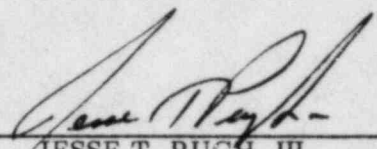
9. As can be seen from the information in Attachment 3, most of the family care facilities were formerly single family homes having one story and no basement. Their general floor plan is such that rooms that can be occupied for relatively long periods of time are usually off hallways or have at least one wall, with windows which have an exterior wall. The symmetry of the facility's floor plan and the use of the same construction materials for different sections of the facility result in a homogenous structure. The occupants of the various parts of such houses will receive roughly comparable protection from the radiation of a plume carrying gaseous radionuclides. Attachment 3 contains guidance on steps to be taken to minimize the dose received by persons in each facility and identifies a "best" PF area where possible.

10. The areas with better PFs in the nursing homes and hospitals were determined to be those sections of their large corridors away from entrances and lobbies. These institutions are generally constructed of concrete blocks, sometimes with brick veneer exteriors. Their interior walls are also of concrete blocks. Consequently, occupants temporarily placed in a corridor would be protected from the source of direct radiation by at least two sets of concrete block walls along either side of the corridor. Further, the areas close to the ends of the corridors, usually near side entrance doors, should be eliminated as potential "better" sheltering locations.

11. On the basis of my review of the methodology used to conduct this survey, I believe that it was conducted professionally and that the results accurately identify the best PF areas of each facility surveyed. Accordingly, the Division of Emergency Management accepts the survey results and will utilize them in its planning for a potential accident at the Harris Plant.

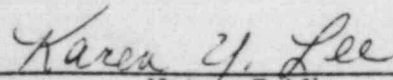
12. When the survey was conducted, the owners or administrators of all facilities were orally apprised of which areas within their facility provide the best protection from

a radiation release. As a followup, a letter will be sent to each owner or administrator telling him or her the survey results and recommending a preferred sheltering location within the facility. In addition, the Division of Emergency Management will retain information from the survey on file for use at the time any accident may occur. The availability of this information affords assurance that maximum protection is provided to all hospital, nursing home or family care facility patients, should sheltering be required in the event of an accident at the Harris Plant.



JESSE T. PUGH, III

Subscribed and sworn to before me,
this 12th day of December 1984.



Notary Public

My commission expires: 12-27-84



Professional Qualifications

EDUCATION

Graduated Asheboro High School, Asheboro, North Carolina, 1965

North Carolina State University, Raleigh, North Carolina, 1969,
B.S., Textile Technology

Computer Application Certificate Program, NCSU, Spring 1982

Enrolled in Master of Public Administration Program, NCSU

Graduate, Government Executives Institute, University of North
Carolina, Chapel Hill, 1980

EMPLOYMENT

Area Coordinator, Division of Civil Preparedness, Asheboro, North
Carolina, July 1978 - May 1979. Responsible for 15-county area,
working with local coordinators and governmental officials in
preparing plans to prevent and/or respond to disasters, both
natural and man-made. Also responsible for arranging specialized
training for local volunteers and governmental employees.

Assistant Director, Division of Emergency Management, May 1979 -
May 1980, promoted to **Deputy Director** May 1980. Responsible for
daily operations of the Division. Supervise 53 employees,
administer budget of approximately \$2 million, managed grant
program to local governments, represent the State in business
transactions and in meetings with local and federal government.

Division Director, Division of Emergency Management, May 1982 to
present. Responsible for the State of North Carolina emergency
response and planning. This includes the coordination of all
emergency response activities of the 17 State agencies. Serve as
State Coordinating Officer and Governor's Authorized
Representative in all disaster related matters. In emergencies
serve as leader of the State Emergency Response Team.

MILITARY

United States Marine Corps, June 1969 - April 1982, highest rank:
First Lieutenant

TRAINING

Radiological Monitoring Instructor Course, August 1978

Basic Seminar for Civil Preparedness Personnel, September 1978

Civil Preparedness Career Development, Phase I, September 1978

Basic Radiological Defense Officer Course, September 1979

United State Coast Guard National Search and Rescue School,
Governor's Island, New York, March 1984.

PROFESSIONAL ORGANIZATIONS

North Carolina Emergency Management Association

National Coordinating Council on Emergency Management

National Association for Search and Rescue

National Emergency Management Association

Association of State Dam Safety Officials

HOSPITALS, NURSING HOMES AND FAMILY CARE FACILITIES LOCATED WITHIN
THE SHNPP PLUME EXPOSURE PATHWAY EMERGENCY PLANNING ZONE

		<u>Number of</u> <u>Beds or Rooms</u>	
A.	Hospitals		
	1. Southern Wake Hospital	28	
	2. Western Wake Hospital	20	
B.	Nursing Homes		
	1. Kinton Nursing Home ¹	80	
	2. Atwater Rest Home		27
	3. James Rest Home	27	
C.	Family Care Facilities		
	1. Adams Family Care ²		18
	2. Morrison Family Care ³		19
	3. Friendship Family Care		8
	4. Anderson Family Care		7
	5. Seagraves Family Care		7
	6. Brown Family Care Center		10
	7. Jack and Clarice Family Care		6
	8. Lyles Family Care		10
	9. Apex Family Care Center		7
D.	Senior Citizen Community		
	1. Homes for the Elderly ⁴	72	

Notes:

- (1) Complex consists of 16 one-bedroom apartments and 1 forty-nine bedroom structure
- (2) Facility consists of 2 houses
- (3) Facility consists of 3 houses
- (4) Complex is made up of 12 two-bedroom and 48 one-bedroom apartments

DESCRIPTIVE FEATURES AND BEST PF AREAS OF HOSPITALS,
NURSING HOMES AND FAMILY CARE CENTERS LOCATED WITHIN
SHNPP PLUME EXPOSURE PATHWAY EPZ

A. Hospitals

1. Facility: Southern Wake Hospital
Location: Fuquay-Varina, NC
Structure: Single story, no basement
Building height: Approximately 10 ft.
Exterior: Concrete blocks with formed stone covering
Roof: Flat built-up, base is concrete over metal decking
Windows: Sliding with aluminum frame
Interior walls: Concrete blocks
Best protection factor area: Portions of corridors away from entrance doors.

2. Facility: Western Wake Hospital
Location: Apex, NC
Structure: Single story, no basement
Building height: Approximately 10 ft.
Exterior: Brick veneer covering concrete blocks
Roof: Flat built-up, base is concrete over metal decking
Windows: Rear of building has large windows with floor to sill height of approximately 3 ft.
Front of building has no windows
Left side has windows at approximately a floor to sill height of 7 ft.
Right side of building has large windows and a double vestibule entrance.
All window frames are aluminum.
Concrete blocks
Building has interior rooms with no direct connection to the outside. However, these rooms (e.g. surgery room, recovery room, X-ray room) are not suitable for prolonged periods of shelter.
Portions of corridors away from entrance doors.

Interior walls: Concrete blocks
General note: Building has interior rooms with no direct connection to the outside. However, these rooms (e.g. surgery room, recovery room, X-ray room) are not suitable for prolonged periods of shelter.
Best protection factor area: Portions of corridors away from entrance doors.

B. Nursing Homes

1. Facility: Kinton Nursing Home
Location: Fuquay-Varina, NC
Building: Main Complex
Structure: Single Story, U-shape, no basement
Exterior: Brick veneer covering concrete blocks
Windows: Horizontal sliding with aluminum frame with floor to floor sill height of approximately 4 ft., 6 ft. on bathrooms
Roof: Sloped, asphalt shingles over tar paper and plywood
Interior walls: Concrete blocks
General floor layout: U-shape, centrally divided by corridor with rooms on both sides. All rooms have at least one wall which is an exterior wall
Building: Apartments
Structure: Single-story, one-bedroom, no basement
Exterior: Brick veneer over wood frame
Roof: Sloped, asphalt shingles over tar paper and plywood
Interior walls: Gypsum board
Best protection factor area: Portions of main complex corridors away from entrance doors.
2. Facility: Atwater Rest
Location: Apex, NC
Structure: Partial two-story, uninhabitable partial basement
Exterior: Concrete blocks
Windows: Aluminum frames inside with outside storm windows
Roof: Front part has flat built-up roofing, rear section is sloped, covered with asphalt shingles over tar paper and plywood
Interior walls: Concrete blocks
General floor layout: T-shape, centrally divided by wide corridors with rooms on both sides. Rear section is two-story structure. Corridors of both first and second floor.
Best protection factor areas:

3. Facility:	James Rest Home
Location:	New Hill, NC
Structure:	Single story, no basement
Exterior:	Front is brick veneer covering concrete blocks, rear is concrete blocks
Roof:	Sloped, asphalt shingles covering tar paper and plywood
Interior walls:	Concrete blocks
General floor layout:	Long, rectangular, centrally divided by wide corridor with rooms on both sides
Best protection factor area:	Portions of corridor away from entrance doors.

C. Family Care Facilities

1. Facility:	Adams Family Care
Location:	Apex, NC
Structure A:	Single story, no basement, 5 years old
Exterior:	Brick veneer covering concrete block walls
Roof:	Sloped, asphalt shingles
Windows:	Sliding with aluminum frames
Interior walls:	Gypsum board
Structure B:	Single story, no basement, 70-80 years old
Exterior:	Clapboard covering wood frame
Roof:	Sloped, asphalt shingles
Windows:	Wood frame sash
Best protection factor area:	Structure A will offer better protection than Structure B. Residents should be moved from Structure B to Structure A. Within Structure A, no single area offers significantly greater protection than remainder of house. However, moving away from windows and entrance doors will increase distance between direct radiation source and in-leaking radioactivity.

2. Facility: Morrison Family Care
Location: New Hill, NC
Structure A: Single story, no basement, 20 years old
Exterior: Brick veneer covering wood frame
Roof: Sloped, asphalt shingles covering tar paper and plywood
Windows: Wood frame sash
Interior walls: Gypsum board
Structures B and C: Single story, no basement. Approximately 20 years old
Exterior: Shingles covering wood frame
Roof: Sloped, asphalt shingles
Best protection factor area: Structure A will offer better protection than structures B and C. Residents should be moved to Structure A. Within Structure A, no single area offers significantly greater protection than remainder of house. However, moving away from windows and entrance doors will increase distance between direct radiation source and in-leaking radioactivity.
3. Facility: Friendship Family Care
Location: Apex, NC
Structure: Single story, no basement, 24 years old
Exterior: Brick veneer covering wood frame
Roof: Sloped, asphalt shingles covering tar paper and plywood
Windows: Wood frame sash
Interior walls: Gypsum board
Best protection factor area: No area offers significantly better protection than other locations of house. However, moving away from windows and entrance doors will increase distance between direct radiation source and in-leaking radioactivity.
4. Facility: Anderson Family Care
Location: Apex, NC
Structure: Single story, no basement, 14 years old

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| Exterior: | Brick veneer over wood frame |
| Roof: | Sloped, asphalt shingles over tar paper and plywood |
| Windows: | Wood frame sash with aluminum storm windows outside |
| Interior walls: | Gypsum board |
| Best protection factor area: | Centrally located kitchen area and dining room enclosed by interior walls only. |
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| 5. Facility: | Seagraves Family Care |
| Location: | Apex, NC |
| Structure: | Single story, no basement |
| Exterior: | Brick veneer over wood frame |
| Roof: | Sloped, asphalt tiles |
| Windows: | Wood frame |
| Interior walls: | Gypsum board |
| Best protection factor area: | No area offers significantly better protection than other locations of the house. However, sheltered residents should stay in the central location of the house which consists of the portions of the living room and family room farthest from the front windows and entrance doors. |
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| 6. Facility: | Brown Family Care |
| Location: | New Hill, NC |
| Structure: | Single story, habitable partial basement, 10 years old |
| Exterior: | Brick veneer covering wood frame |
| Roof: | Sloped, asphalt tiles |
| Windows: | Wood frame sash, outside storm windows |
| Interior walls: | Gypsum board |
| Best protection factor area: | Habitable partial basement which is normally used as a recreation room. |
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| 7. Facility: | Jack and Clarice Family Care |
| Location: | Apex, NC |
| Structure: | Single story, no basement |
| Exterior: | Masonite siding over wood frame |
| Roof: | Sloped, asphalt shingles |
| Windows: | Wood frame sash with exterior aluminum storm windows |
| Interior walls: | Gypsum board |

- General floor layout: Rectangular, center hallway beginning with living room at one end and kitchen/dining room at the other. Bedrooms are on both sides of hallway.
- Best protection factor area: Hallway. (It should be noted that this facility is across the street from Atwater Rest Home which has good protection factor areas. Both facilities are owned by the same person. Consideration should be given to shelter the family care residents in Atwater Rest Home.)
8. Facility: Lyles Family Care
Location: Apex, NC
Structure: Single story, no basement
Exterior: Brick veneer over wood frame
Roof: Sloped, asphalt shingles
Windows: Wood frame sash, aluminum storm windows
Interior walls: Gypsum board
Best protection factor area: Large family room enclosed by interior walls.
9. Facility: Apex Family Care Center
Location: Apex, NC
Structure: Two-story wood frame, no basement, 80-100 years old
Exterior: Clapboard
Roof: Shingles
Windows: Aluminum sash, outside storm windows.
Interior walls: Plaster
Best protection factor area: First floor living room, away from windows

D. Senior Citizen Community

1. Facility:	Homes for the Elderly
Location:	Fuquay-Varina, NC
Structures:	Six clusters of 12 two-bedroom and 48 one-bedroom apartments, single story, no basement, 6 years old
Exterior:	Wood shingles covering wood frame, brick and concrete firewall separating apartment units
Roof:	Sloped, asphalt shingles
Windows:	Sliding with aluminum frame
Interior walls:	Gypsum board
Best protection factor area:	Portion of apartments farthest from windows and entrance door, for example, kitchen area.

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BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

OFFICE OF SECRETARY
DOCKETING & SERVICE
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In the Matter of)

CAROLINA POWER & LIGHT COMPANY)
AND NORTH CAROLINA EASTERN)
MUNICIPAL POWER AGENCY)

Docket No. 50-400 OL

(Shearon Harris Nuclear Power Plant))

CERTIFICATE OF SERVICE

I hereby certify that copies of "Applicants' Motion for Summary Disposition of Eddleman Contention 57-C-13," "Applicants' Statement of Material Facts As To Which There Is No Genuine Issue To Be Heard on Eddleman Contention 57-C-13," and "Affidavit of Jesse T. Pugh, III In Support of Applicants' Motion for Summary Disposition of Eddleman Contention 57-C-13" were served this 12th day of December, 1984 by deposit in the United States mail, first class, postage prepaid, to the parties on the attached Service List.

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Dated: December 12, 1984

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