UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DUKE POWER COMPANY, ET AL.	)	Docket Nos. 50-413
	)	50-414
(Catawba Nuclear Station,	)	
Units 1 and 2)	)	

AFFIDAVIT OF GERALD E. SIMONDS AND
EDWARD F. BRANAGAN, JR. IN SUPPORT OF SUMMARY
DISPOSITION OF PALMETTO ALLIANCE CONTENTION 27

1. I, Gerald E. Simonds being duly sworn do depose and state: I am employed by the U.S. Nuclear Regulatory Commission in the Office of Inspection and Enforcement, Division of Emergency Preparedness and Engineering Response, Emergency Preparedness Branch (EPB). My professional qualifications are attached. I am a technical reviewer for the Catawba Nuclear Station, Units 1 and 2, and am responsible for the assessment of the state of preparedness for radiological emergency preparedness planning onsite, and the review of FEMA findings in conjunction with offsite planning. I certify that I have personal knowledge of the matters set forth herein with respect to the above areas for which I am responsible, and that the statements made are true and correct to the best of my knowledge.

2. I, Edward F. Branagan, Jr., being duly sworn, do depose and state: I am a Health Physicist in the Radiological Assessment Branch, Division of Systems Integration within the Office of Nuclear Reactor Regulation.

A copy of my professional qualifications is attached. I certify that I have personal knowledge of the matters set forth herein with respect to the radiological environmental monitoring program and studies regarding the usefulness of real-time monitors under accident conditions. The statements made are true and correct to the best of my knowledge.

3. As admitted by the Licensing Board in its Memorandum and Order, dated March 5, 1982, Palmetto Alliance Contention #27 states:

> The Applicants should be required to place real time monitors capable of reading gamma radiation levels around the site in order to provide emergency operations personnel with information required to make decisions necessary to reasonably assure the health and safety of the public under conditions of radiological release to the environment. Thermoluminescent dosimeters are only accurate within about plus or minus thirty percent and only provide a post hoc assessment of conditions.

This contention asserts that Applicants' plan is inadequate because it does not call for reliance by emergency response personnel upon real-time monitors placed around the plant site for information upon which to base emergency protective response in the event of a radiological accident. This affidavit discusses the Staff's findings that Applicants' plans for accident assessment and protective action decisionmaking are adequate and contains the Staff's conclusions as to the usefulness of fixed real-time monitors for this purpose.

4. Under 10 CFR 50 Appendix E, Part IVB, an applicant is required to develop emergency action levels, based on in-plant conditions and instrumentation in addition to onsite and offsite monitoring, to be used for determining when and what type of protective measures should be considered within and outside the site boundary to protect public health and

safety, and for determining the need for notification and participation of local and State agencies.

5. Under 10 CFR 50.47(b)(9) & (10), an applicant is required to have developed and in place:

a. adequate methods, systems, and equipment for assessing and monitoring actual or potential offsite consequences of a radiological emergency condition,

b. a range of protective actions for the plume exposure pathway Emergency Planning Zone (EPZ) for emergency workers and the public,

c. guidelines for the choice of protective actions during an emergency, and

d. protective actions for the ingestion exposure pathway EPZ appropriate to the locale.

The criteria stated in NUREG-0654, FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Rev. 1 (Nov. 1980), pertinent to the contention state that each applicant shall establish the relationship between effluent monitor readings and onsite and offsite exposure and contamination for various meteorological conditions; and each emergency response organization shall provide methods, equipment, and expertise to make rapid assessments of the actual or potential magnitude and location of any radiological hazard

through liquid or gaseous release pathways, as well as to make arrangements to locate and track the airborne radioactive plume, using either or both Federal and State resources. (NUREG-0654, Para. II.I.8, 11.)

6. The staff has reviewed Revision 2 of the Radiological Emergency Response Plan for Catawba against the detailed criteria of NUREG-0654, and concludes that the plan is adequate as reported in Supplement 1 to NUREG-0954, Catawba SER, April 1983. Implementing procedures need to be developed or refined for use at the Catawba site. These procedures and the training provided to the personnel to implement them will be evaluated at the pre-operational exercise. The plant operator responsible for recommending protective actions will base his recommendations upon several factors: mainly, core conditions, containment conditions, coolant and secondary system conditions, effluent and perimeter monitor readings, and meteorological conditions. All of the in-plant monitors, in concert, indicate the status of plant conditions, including (but not limited to) radiation levels, flow, temperatures, pressures, and liquid levels. A significant variation in any parameter in the system will be accompanied by significant variations in other system parameters such that there is little chance of an unplanned release escaping the notice of the plant operators. Using the monitor readings and control room alarms, the plant operator (supervisor) will make judgments, based on predetermined Emergency Action Levels, as to the overall plant condition, the existence and seriousness of an emergency condition, and the protective actions to recommend to offsite authority. (Catawba Emergency Response Plan, Rev. 2, January 1983; Chapter D, Figures D-1 through D-4).

7. Plant monitoring systems are designed to continuously indicate the condition of the plant to the operators and to the Operator Aid Computer. This means that the operator has current (instantaneous) information on plant (reactor) conditions and trend analysis of the prime indicators upon which to base his judgments. Thus, before any release of radioactivity can occur, these conditions are analyzed, the situation classified, the Emergency Response Teams alerted, and appropriate protective action recommendations selected.

8. Mobile monitoring teams with appropriate equipment, such as, real-time monitors, sampling equipment, and radios, are dispatched offsite under routine conditions to record the level of background radiation in the EPZ, and during a radiological emergency situation to survey and measure the degree and extent of any radioactive plume released from the plant. The mobile teams report their location and readings while traversing the plume to the dispatcher who then updates the plot of the plume. During an emergency, the primary value of offsite monitoring with real time monitors is to update and refine the plume projections made previously by the plant operator. (Catawba Emergency Response Plan, Chapter I, Section I-4). Were the plant operator to wait until the plume indications appeared on the offsite monitors before making his recommendations for protective actions to offsite authorities, undue delay would result adversely affecting the ability of such authorities to take and direct timely responsive actions.

9. The procedure by which the teams make surveys and take samples is given in the Emergency Plan Implementing Procedures, such as HP/0/B/1009/03, Environmental Surveillance, Following a Primary to

Secondary Leak, and HP/0/B/1009/04, Environmental Surveillance Following a Large Unplanned Release of Gaseous Radioactivity. Supplies and equipment issued to each team are listed in the Catawba Emergency Plan, Section H.

10. Since Contention 27 asserts that real-time monitors should be placed in the environs around Catawba, the Staff will briefly review the requirements for a radiological environmental monitoring program, and the results of previous studies regarding the usefulness of real-time monitors under accident conditions. The requirements for radiological environmental monitoring, as a backup to effluent monitoring, are described in the Branch Technical Position (BTP) of the NRC's Radiological Assessment Branch (Branch Technical Position, An Acceptable Radiological Environmental Program, Rev.1, November 1979) which requires continuous monitoring of samples for three types of effluents: airborne noble gases, airborne radioiodines and particulates, and radioactive liquids. In addition, the NRC requires the placement of about 40 stations with two or more dosimeters such as thermoluminescent detectors (TLDs) or one instrument for measuring and recording dose rate continuously to monitor direct radiation. The detectors are to be placed in two concentric rings of stations at distances from the site of about 1 to 2 miles, and about 4 to 5 miles. Thus, while real-time monitors may be used, they are not required. The Applicants' preoperational environmental monitoring program is described in Section 6.1 of the ER and in Section 5.9.3.4 of the FES. The results of this program are intended to supplement the results of the radiological

effluent monitoring program. As stated in the FES (p. 5-24), the staff has reviewed Applicants' pre-operational monitoring program and found that it is generally acceptable.

11. In regard to real-time monitors, the NRC requested one of its contractors to provide an independent assessment of the usefulness of real-time monitors at nuclear power stations under accident conditions, and an assessment of the validity of the information obtained from these monitors. The results of that study have been published in a report entitled "An Assessment of Offsite, Real-Time Dose Measurement Systems for Emergency Situations" by W. J. Maeck, et al (NUREG/CR-2644), 1982.

12. The main conclusions of this NRC-funded study are:

1. "While a ring of detectors around a nuclear power station can provide the means for monitoring releases, the number of stations required for two detectors to provide information within a factor of 5 of each other can be as large as 50 or more for one installation."

2. "The use of short-time (15 min) data from a fixed offsite monitoring system to project downwind dose rates is a complex and highly uncertain process. Based on our study the uncertainty associated with a projected value is at least a factor of 10 or more."

3. "The use of a fixed offsite monitoring system to determine the magnitude of an unmonitored release in the presence of a monitored release is highly questionable. Depending on the ratio of the unmonitored release to the monitored release, uncertainties of factors of 25 and 50 are common."

4. "In general, it is highly questionable that a fixed station emergency monitoring system (16-32 units) can provide sufficiently reliable technical information to be of use in a decisionmaking process in the event of an emergency situation."

13. In addition to the NRC-funded study, a Task Force of The Atomic Industrial Forum evaluated the usefulness of real-time monitors. The

results of that study were published in a report entitled "Evaluation of an Environs Exposure Rate Monitoring System for Post-Accident Assessment" by C. D. Thomas, Jr. et al (AIF/NESP-023), 1981. One of the main conclusions of this study was that:

> "Using data from an environs monitoring system to project dose rates at other locations is a two-step process. The first step is to deduce a source term from the environs data. The second is to make projections using this source term. Making accurate projections would be extremely difficult and in some cases impossible because it would require accurately knowing:
>
> a. either plume centerline dose rate or location of the plume centerline relative to the detectors;
>
> b. effective heights of all releases (monitored and unmonitored);
>
> c. energy compositions of releases;
>
> d. shine contributions to detector dose rates due to contained sources (e.g., airborne activity on BWR refueling floor);
>
> e. meteorological stability class;
>
> f. local meteorological phenomena (e.g., looping, fumigation)."

14. The Staff agrees with the technical evaluation of its contractors (see NUREG/CR-2644), namely, "that the use of a fixed offsite monitoring system to determine the magnitude of an unmonitored release in the presence of a monitored release" would not generally serve a useful function, since "depending on the ratio of the unmonitored release to the monitored release, uncertainties of factors of 25 and 50 would be common." It is unlikely "that a fixed station (16-32 unit) emergency monitoring system would provide sufficiently reliable technical information to be of use in a decision-making process in the event of an emergency situation."

15. The Staff therefore concludes that real-time offsite monitors will not materially assist the Emergency Response Team in fulfilling its obligation under the regulations for timely alerting of the offsite authorities and recommending protective actions. The Applicants' system (as discussed in paragraphs 6 through 10 above) however, is designed to identify potential problems (which may lead to offsite releases) in the early stages of development in compliance with the Code of Federal Regulations, Title 10, Section 50.47. The Applicants have developed a series of Emergency Action Levels, based on observable and measurable indications in the control room upon which the control room operator can alert the emergency response team, declare an emergency, alert the offsite authorities, and make recommendations for protective actions.

16. Offsite monitors, whether real-time or accumulative, are designed to measure conditions in the field at the monitor location and were designed to produce data for the Environmental Impact Statement. They can only measure radiation after it has arrived at the monitor location and do not provide any advance warning of the radioactive plume. Applicants' plan for using mobile teams with real-time monitors will assist in updating and refining plume projections previously made by the plant operator (paragraph 8), but will not materially assist in the initial protective action decisionmaking. The in-plant monitor system, with the EAL's, assist the control room operator in forecasting an unplanned release, determining its isotopic content, projecting the magnitude of the

release, and, coupled with the available meteorology data, deciding on protective action recommendations in advance of the release itself passing the site boundary.

Edward F. Branagan, Jr.
Edward F. Branagan, Jr.

Subscribed and sworn to before me
this 27th day of June, 1983

Malinda L. McDonald
Notary Public

My commission expires: 7/1/86

Gerald E. Simonds
Gerald E. Simonds

Subscribed and sworn to before me
this 5 day of July, 1983

Maxine N. Laiefsky
Notary Public

My commission expires: 7/1/86

MAXINE N. LAIEFSKY
NOTARY PUBLIC
MONTGOMERY COUNTY, MD.

STATEMENT OF PROFESSIONAL QUALIFICATIONS
OF GERALD E. SIMONDS

I received a B.S. in Physics from the University of Detroit in 1952, and a M.S. in Mechanical Engineering from the Florida Institute of Technology in 1972. I completed the Naval Nuclear Ship Superintendents School at Puget Sound Naval Shipyard in 1975. I am currently employed by the Nuclear Regulatory Commission as a Physical Scientist in the Emergency Preparedness Branch. I joined the NRC in October 1981 as a Physical Scientist, Emergency Preparedness Specialist, in the Emergency Preparedness Branch, Division of Emergency Preparedness and Engineering response. My responsibilities include review of the emergency preparedness plans for several nuclear power plants, including Catawba. This includes review of both onsite and offsite planning. In addition, I have participated in onsite emergency preparedness appraisals and emergency exercises as a team member at several sites. In this context, I have conducted onsite checks of emergency equipment and facilities, notificaton systems, personnel training and performance, procedures and interfaces with offsite agencies and the training of their personnel. Since coming with the NRC I have successfully completed the Pressurized Water Reactor Technology Course and the Boiling Water Reactor Technology Course at Chattanooga, Tennessee. I am the NRC Staff reviewer for Emergency Preparedness for the Catawba facility.

EDWARD F. BRANAGAN, JR.
OFFICE OF NUCLEAR REACTOR REGULATION

PROFESSIONAL QUALIFICATIONS

From April 1979 to the present, I have been employed in the Radiological Assessment Branch in the Office of Nuclear Reactor Regulation of the U. S. Nuclear Regulatory Commission (NRC). As a Health Physicist with the Radiological Assessment Branch, I am responsible for evaluating the environmental radiological impacts resulting from the operation of nuclear power reactors. In particular, I am responsible for evaluating radio-ecological models and health effect models for use in reactor licensing.

In addition to my duties involving the evaluation of radiological impacts from nuclear reactors, my duties in the Radiological Assessment Branch have included the following: (1) I managed and was the principal author of a report entitled "Staff Review of 'Radioecological Assessment of the Wyhl Nuclear Power Plant'" (NUREG-0668); (2) I serve as a technical contact on an NRC contract with Argonne National Laboratory involving development of a computer program to calculate health effects from radiation; (3) I serve as the project manager on an NRC contract with Idaho National Engineering Laboratory involving estimated and measured concentrations of radionuclides in the environment; (4) I serve as the project manager on an NRC contract with Lawrence Livermore Laboratory concerning a literature review of values for parameters in terrestrial radionuclide transport models; and (5) I serve as the project manager on an NRC contract with Oak Ridge National Laboratory concerning a statistical analysis of dose estimates via food pathways.

From 1976 to April 1979, I was employed by the NRC's Office of Nuclear Materials Safety and Safeguards, where I was involved in project management and technical work. I served as the project manager for the NRC in connection with the NRC's estimation of radiation doses from radon-222 and radium-226 releases from uranium mills, in coordination with Oak Ridge National

Laboratory which served as the NRC contractor. As part of my work on NRC's Generic Environmental Impact Statement on Uranium Milling (GEIS), I estimated health effects from uranium mill tailings. Upon publication of the GEIS, I presented a paper entitled "Health Effects of Uranium Mining and Milling for Commercial Nuclear Power" at a Conference on Health Implications of New Energy Technologies.

I received a B.A. in Physics from Catholic University in 1969, a M.A. in Science Teaching from Catholic University in 1970, and a Ph.D. in Radiation Biophysics from Kansas University in 1976. While completing my course work for my Ph.D., I was an instructor of Radiation Technology at Haskell Junior College in Lawrence, Kansas. My doctoral research work was in the area of DNA base damage, and was supported by a U.S. Public Health Service traineeship; my doctoral dissertation was entitled "Nuclear Magnetic Resonance Spectroscopy of Gamma-Irradiated DNA Bases."

I am a member of the Health Physics Society.

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CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF MOTION FOR SUMMARY DISPOSITION OF PALMETTO ALLIANCE CONTENTION 27," "NRC STAFF MOTION FOR SUMMARY DISPOSITION OF CESG CONTENTION 18 (PALMETTO 44)," "NRC STAFF MOTION FOR SUMMARY DISPOSITION OF DES CONTENTION 17," "NRC STAFF MOTION FOR SUMMARY DISPOSITION OF DES CONTENTION 19," and "NRC STAFF MOTION FOR SUMMARY DISPOSITION OF PALMETTO CONTENTION 16" in the above-captioned proceeding have been served on the following by deposit in the United States mail, first class, or, as indicated by an asterisk, by deposit in the Nuclear Regulatory Commission's internal mail system, this 8th day of July, 1983:

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