UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
CINCINNATI GAS & ELECTRIC COMPANY, et al.	)	Docket No. 50-358 OL
	)	
(Zimmer Nuclear Power Station, Unit 1)	)	

AFFIDAVIT OF W. WAYNE MEINKE REGARDING
CONTENTIONS 2(b),(e),(f) AND (g) OF DR. FANKHAUSER

State of Maryland)
)
) SS
County of)
Montgomery)

W. Wayne Meinke, having first been duly sworn, hereby states as follows:

I am employed by the United States Nuclear Regulatory Commission and assigned to its Radiological Assessment Branch, Office of Nuclear Reactor Regulation. My office is located in Bethesda, Maryland. I am responsible for the assessment of the radiological effects of nuclear plant effluents beyond the boundaries of the plant site. This entails the review and evaluation of environmental reports and preparation of environmental statements, the calculation of radiation doses to members of the public resulting from the various exposure pathways of radioactive effluents, and the evaluation of environmental monitoring programs of nuclear power

reactors. As a part of my responsibility I review and analyze the effects of effluents from the proposed Zimmer Nuclear Power Station, Unit No. 1. My educational and professional qualifications are set forth immediately below.

Education

A.B.	Chemistry	Oberlin College	1947
Ph.D.	Nuclear Chemistry	University of California at Berkeley	1950

Experience

From 1950 to 1963 I taught Analytical Chemistry and Radiochemical Techniques at the University of Michigan in Ann Arbor, progressing from Instructor to full Professor. I established the Radiation Safety Program at the University of Michigan and chaired the University's Radiation Policy Committee for 10 years. I helped design radioisotope facilities for the University of Michigan Memorial Phoenix Project and Research Reactor. I used these facilities and the reactor for research in radiochemical trace analysis. Within the U.S. I served as consultant in radioisotope techniques and laboratory design to 15 industrial companies and five (5) government laboratories. Outside the U.S. I was a consultant for the International Atomic Energy Agency and the U.S. A.I.D. program and made study trips on research reactor utilization to 11 foreign countries. I chaired the Subcommittee on Radiochemistry of the National Research Council and edited its series of 66 monographs on the Radiochemistry of the Elements.

In 1963 I joined the National Bureau of Standards in Washington, D.C. as Chief of the Analytical Chemistry Division where I directed the activities of 120 technical personnel in research and application in 57 different areas of chemical and physical measurements, with emphasis on

measurement in trace contaminant analysis. I worked with the Division's section leaders to reorganize Division programs to place special emphasis on accuracy of measurement in areas of national need as diverse as air and water pollution, low level radiation and nuclear accountability, clinical chemistry, oceanography and solid state physics. Concurrent with the position of Chief, Analytical Chemistry Division, as Chief of NBS Office of Standard Reference Materials, I reorganized and managed within NBS the non-profit business in Standard Reference Materials (SRMs) with a catalog listing more than 600 different kinds of certified materials and sales of 40,000 units per year. NBS SRMs are used as a primary calibration of measurement systems (e.g. effluent and environmental monitors of nuclear power plants, and mass spectrometers for nuclear accountability analyses). I redirected the SRM program from primary emphasis on steels and minerals to new areas of national need such as clinical chemistry, environmental analyses and nuclear accountability.

In 1973 I left government service to join KMS Fusion, Inc. in Ann Arbor, Michigan to help accelerate application of fusion energy to the national energy needs through my special experience in applying nuclear radiation. I worked with chemists and engineers to develop processes to convert laser fusion energy into chemical energy of portable fuels to replace natural gas, oil and gasoline. Later I provided in-depth staff backup in science, technology, and administration to the Chairman of KMS Fusion and developed for the company an overview of problems and business potential of the entire energy field with emphasis on thermonuclear fusion.

I have published more than 150 scientific papers, edited 66 scientific monographs and 2 books, and presented more than 250 scientific lectures. I have received six (6) national and international awards, including the American Nuclear Society Special Award for Industrial Applications of Radiation Techniques and the First George Hevesy Medal for Radioanalytical Chemistry.

Dr. Fankhauser's Contentions 2(b),(e),(f), and (g) state as follows:

> 2. The Applicants' plans for monitoring radiological releases from the plant are inadequate because:
>
> (b) no provision has been made for directly involving the citizenry in the vicinity of the site in the monitoring of the plant's activities,
>
> (e) the statement by Applicants that the monitoring will be "as comprehensive as possible" is vague and monitoring methods are unclear,
>
> (f) no monthly assays of isotopic concentrations in area food-stuffs are provided for, and
>
> (g) there are no plans for a ring of monitoring stations around the site to continuously monitor gaseous emissions.

My affidavit addresses Dr. Fankhauser's contentions as set out above.

NRC regulations require that radiological environmental monitoring programs be established as part of the Plant Operating License Technical Specifications to provide data on measurable levels of radiation and radioactive materials in the site environs. These monitoring programs are conducted to verify the effectiveness of in-plant systems used to control the release of radioactive materials and to ensure that unanticipated

buildups of radioactivity will not occur in the environment. An annual surveillance (Land Census) program is also established to identify changes in the use of unrestricted areas to provide a basis for modifications of the monitoring programs.

These programs are discussed in detail in NRC Regulatory Guide 4.1, Rev. 1, "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants," and the Radiological Assessment Branch Technical Position, Rev. 1, November 1979, "An Acceptable Radiological Environmental Monitoring Program."

The preoperational phase of the monitoring program provides for the measurement of background levels of radioactivity and radiation and their variations along the anticipated important pathways in the areas surrounding the facility, the training of personnel and the evaluation of procedures, equipment and techniques. The Zimmer Nuclear Power Station proposed a radiological environmental-monitoring program to meet these objectives in the Environmental Report-Construction Permit and it was discussed in Section 6 of the NRC Staff's Final Environmental Statement - Construction Permit of September 1972. This early program has been updated and expanded; it was described in Revision 2 of the Zimmer Environmental Report - Operating License and evaluated in Section 6 of the NRC Staff's Final Environmental Statement - Operating License (NUREG-0265). The Zimmer preoperational program was implemented March 1, 1976 to document background radiation levels of direct radiation and concentrations of radionuclides that exist in the environment. A detailed report of the first two years of operation of this program was issued September 19, 1978

and successive reports will record the results of the continuation of this program up until the initial criticality of Unit 1 at which time the operational radiological monitoring program will commence.

The NRC Staff has reviewed this continuing preoperational environmental monitoring plan of Zimmer and finds that it is acceptable as presented. In 1979 the NRC Staff position was changed to augment existing requirements by requiring that the applicants install a total of about 40 gamma radiation monitoring stations in the Zimmer area, to be placed as follows: an inner ring of stations in the general area of the site boundary and an outer ring in the 4 to 5 mile range from the site with a station in each sector of each ring (16 sectors x 2 rings = 32 stations). The remaining 8 stations should be placed in special interest areas such as population centers, nearby residences, schools, and in 2 or 3 areas to serve as control stations. Recently, changes have been made in the Zimmer preoperational monitoring plan to conform to this NRC Staff position.

The operational, offsite radiological-monitoring program is conducted to measure radiation levels and radioactivity in plant environs. It assists and provides backup support to the effluent-monitoring program as recommended in NRC Regulatory Guide 1.21, "Measuring, Evaluating and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water Cooled Nuclear Power Plants."

The Zimmer operational monitoring program will closely resemble the preoperational program described above with some periodic adjustment of sampling frequencies in expected critical exposure pathways.

The final operational-monitoring program proposed by Zimmer is being reviewed in detail by the NRC Staff and compared with the guidance provided for An Acceptable Radiological Environmental Monitoring Program by the Radiological Assessment Branch Technical Position. The specifics of the required monitoring program will be incorporated into the Zimmer Operating License Radiological Technical Specifications.

The continuing Zimmer preoperational monitoring program has clearly followed NRC regulatory requirements and guidance and the current NRC Staff review of the Technical Specifications will insure that the operational monitoring program also follows these requirements.

Specifically in relation to Contention 2b, NRC requirements for protecting the health and safety of the public do not provide for involvement of citizenry in monitoring plant activities. I would point out, however, that NRC's Office of Inspection and Enforcement has itself installed monitors around the Zimmer Facility in addition to the 41 TLD's to be installed by the Applicants. They provide sufficient information to determine levels of radioactivity in the area.

In response to Contention 2e that the Zimmer statement in section 11 of the FSAR on monitoring is vague and that monitoring methods are unclear, the NRC Staff has evaluated both the plans and results of the preoperational monitoring program as well as the plans for the operational monitoring program set forth in Section 11 of the Final Safety Evaluation Report and in Chapter 6 of the Environmental Report, Operating License. (ER/02). The Staff finds the documentation of the Zimmer radiological monitoring program to be specific and detailed; it follows closely the guidance of the NRC Radiological Assessment Branch Technical Position in all areas. Results of the preoperational monitoring program have been

recorded in detail and provide a solid basis of information for comparison with future operational monitoring results.

Contention 2f questions the adequacy of the Zimmer radiological monitoring plans because monthly radioassays of area food stuffs are not included. The Radiological Assessment Branch Technical Position (BTP) provides for radioassay of milk from 3 locations within 5 km having the highest dose potential, on a semi-monthly basis when the animals are in pasture and monthly at other times. Also, the NRC requires a sample from a control or background location 15-30 km distant and in the least prevalent wind direction. If milk sampling is not performed, sampling broad leaf vegetation from the above locations will be made.

Experience in environmental monitoring with over 400 reactor years of operation with light water reactors such as Zimmer has shown that cow's (or goat's) milk is an excellent indicator of any radioactive effluents that deposit on growing vegetation and food stuffs. The radioiodine and other fission product contaminants that would deposit on the leafy vegetables are "collected" and concentrated by the cow as it grazes and are secreted into the cow's milk. Thus radioassay of the milk provides a very sound indicator of contamination over the area of vegetation habited by the cow.

This experience is borne out in the report of the Zimmer Preoperational Environmental Radiological Monitoring Program dated September 18, 1978 where samples of leafy vegetables and of milk were collected and assayed early in October, 1977, soon after the September 17, 1977 Chinese nuclear weapons test. The radioiodine content of a green leafy vegetable (cabbage) at Sample site Z-16 (the nearest residence/garden to the plant) was found

to be only slightly above the limit of detection of the measurement procedure and still below the "reportable level" that will be required by the Zimmer Operating Technical Specifications, while at nearby farms the amount of radioiodine found in milk samples was about 100 times the detection limit of the procedure and more than 10 times the "reportable level" that will be required by the Zimmer Operating Technical Specifications.

The Staff considers that the health and safety of every member of the public is protected (no matter how much local produce, milk and meat that individual may eat) when the guidance of the BTP is followed -- and that the bi-monthly radioassay of milk as proposed by Zimmer for their operational monitoring program will provide a much better indicator of the presence of contamination from the Zimmer facility in food stuffs then monthly assays of the foodstuffs themselves. Thus monthly assays of area foodstuffs are not required and are not necessary.

In regard to Contention 2(g), it is clear that Title 10 Code of Federal Regulations Parts 20 and 50 requires that radiological environmental monitoring programs be established to provide data on measurable levels of radiation and radioactive materials in the site environs. The results of the Zimmer radiological environmental monitoring are intended to supplement the results of the radiological effluent monitoring by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and modeling of the environmental exposure pathways.

The primary monitoring of gaseous radioactive emissions from the vents and discharge points of the plant during normal operations is by the effluent

monitors installed to measure directly the radioactive content of the effluent streams.

To provide a back-up during normal operations to the effluent monitors inside the plant, the Branch Technical Position of the NRC Radiological Assessment Branch sets forth guidance for an acceptable program for monitoring radioactive gaseous emissions outside of the plant boundaries. The 40 thermoluminescent detector (TLD) dosimeter monitoring stations proposed by CG&E for their operational monitoring program satisfies the provisions of the NRC guidance set forth in the BTP for such monitoring.

The NRC regulations do not require and the Staff finds no basis for requiring during normal operations a system/ring of continuously recording air monitors in the environs of a nuclear power plant to monitor airborne radioactive emissions. The small amounts of airborne effluents that are released through vents and discharge points will be much dispersed and diluted by the time they reach unrestricted areas that are open to the public. The measurement levels of such airborne emissions during normal operation are so low that they would be indistinguishable from the normal background radiations recorded by such a continuous monitoring system.

Summary

The NRC regulations do not require involving citizens in the vicinity of a nuclear power reactor in the routine or accident monitoring of radioactive releases from the facility. In my professional judgment, such citizen involvement in not necessary for adequate protection of public health and safety.

In my professional judgment the applicants' monitoring program is well defined and comprehensive and provides adequate information to protect the public health and safety.

In my professional judgment the proposed program in FSAR § 11 and ER/OL § 6 for the monitoring of milk and/or leafy vegetation provides adequate protection for the public health and safety.

The NRC does not require a ring of real-time monitors around a nuclear power facility nor in my professional judgment are they necessary for routine releases.

W. Wayne Meinke

Subscribed and sworn to before me
this [illegible] day of December, 1981.

Notary Public

My Commission expires: July 1, 1982