UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
THE CLEVELAND ELECTRIC	)	Docket Nos. 50-440
ILLUMINATING COMPANY, ET AL.	)	50-441
	)	
(Perry Nuclear Power Plant,	)	
Units 1 and 2)	)	

APPLICANTS' DIRECT TESTIMONY
OF
ROGER E. LINNEMANN
ON ISSUE NO.1- CONTENTION P

1. I am Vice Chairman and Chief Medical Officer, Radiation Management Corporation ("RMC"), University City Science Center, Philadelphia, Pennsylvania. I am also Clinical Associate Professor of Radiology, University of Pennsylvania School of Medicine and Visiting Associate Professor of Clinical Radiology, Northwestern University Medical School. I am licensed to practice medicine and surgery in Pennsylvania, Illinois and Minnesota and am certified by the American Board of Radiology and the American Board of Nuclear Medicine. I have represented the Commonwealth of Pennsylvania in the Medical Liaison Officer's Network, a national organization of physicians established by the U.S. Environmental Protection Agency and the Department of Defense to consult on radiation problems associated with federal installations. As Chief Medical Officer of RMC, I am responsible for the training which

RMC has provided to hospitals in the area surrounding the Perry Nuclear Power Plant. I am also familiar with the capability of hospitals to treat injured individuals who are contaminated with radioactive materials, as well as individuals suffering from radiation exposure.

2. Sunflower's Contention P alleges that emergency plans "are deficient with respect to hospital designations and medical services as well as procedures required to assist contaminated individuals."

3. Radiation injuries result from either exposure to radiation or contamination by radioactive materials. In the case of radiation exposure, the patient suffers injury from the energy deposited in the cells during the period of radiation, but the patient is not radioactive and presents no hazard to response personnel. Contamination results from loose radioactive particles adhering to the body. An exposure hazard remains until these particles are removed. Radioactive contamination is easy to detect and decontamination is easily accomplished by removing contaminated clothes and bathing the affected area.

4. Should a patient be exposed and injured, no special emergency facilities are needed. The patient can be handled as any other injured patient. If the patient is contaminated, procedures are implemented to reduce exposure and control the spread of any contamination. However, these procedures are not unique to radiation injury cases; similar steps are taken for chemical contamination or septic cases.

5. The characteristics of radiation injury make it one of the easiest medical emergencies to handle. Radiation injuries are seldom if ever immediately life-threatening. The consequences unfold over a period of time with predictable sequence. Therefore, treatment of any life-threatening traumatic injury or serious illness always takes precedence over treatment of the radiation injury. Once the patient is resuscitated and stabilized, he can be decontaminated and placed in a regular hospital bed. There is then time for assessment and treatment of the radiation injury. No special equipment is needed (such as lead-lined operating rooms, radiation resistant equipment, etc.) because of the nature of the radiation exposure and the conditions of treatment. Any contaminated materials would be disposed of following the same procedures used for nuclear medicine departments; no special equipment would be needed to handle this disposal.

6. Even in the extremely unlikely event of an accident at a nuclear plant with substantial off-site release of radiation, there would not be the need for any large number of hospital beds for an injured population. Such an accident would not involve the generation of large numbers of traumatic casualties. The only way in which an off-site population can be affected is through overexposure to radiation.

7. The characteristics of a radiation release mitigate against the possibility that an individual would receive the level of exposure (about 150,000 millirem over a period of a

few hours) which would require hospitalization. Distance, dispersion and absorption of radiation by other materials (by shelter, for example) make it unlikely that anyone off-site would receive a large enough exposure to initiate the first symptoms of radiation sickness (about 75,000 millirem), let alone hospitalization. Given the relative ease of decontamination (changing clothes and bathing), overexposure from contamination is alsc unlikely. To cause a redness to the skin from fission product radiation would require a total dose of about 800,000 millirem; one would literally have to leave caked radioactive dirt on the skin for hours to deliver these kinds of doses.

8. Based on these considerations, one could reasonably expect that the medical responsibilities of a major nuclear power plant accident would be the treatment of a few injured plant workers who were also contaminated or exposed, and a larger number of the public who might be slightly contaminated. These cases could readily be handled by present medical resources.

9. The emergency plans relating to the Perry Nuclear Power Plant identify Lake County Memorial Hospital East, Lake County Memorial Hospital West, Geauga Community Hospital and Ashtabula County Medical Center as the local hospitals designated to handle members of the general public who may have radiation uptake or exposure. Lake County Plan, § L-03; Ashtabula County Plan, § L.3; Geauga County Plan, § L-2. The

Perry Emergency Plan (§ 5.3.3.2) designates Lake County Memorial Hospital East as the hospital to receive highly-contaminated-injured persons from on-site for initial treatment and decontamination. (If Lake County Memorial Hospital East were being evacuated due to an accident at Perry -- it is within the 10 mile EPZ -- these persons would be taken directly to Lake County Memorial Hospital West.) Definitive, long-term care for contaminated injuries and significant radiation overexposure is available through RMC's arrangements with Northwestern Memorial Hospital in Chicago, and the Hospital of the University of Pennsylvania, Philadelphia.

10. RMC has provided extensive training to personnel of both Lake County Memorial Hospitals (East and West), Ashtabula County Medical Center and Geauga Community Hospital. The training program has as its objectives to first insure that immediate emergency medical care is provided to an injured individual and, secondly, to perform appropriate decontamination and contamination control techniques. The topics of the training include the biological effects of ionizing radiation, personnel protective actions, use of emergency room equipment and supplies for the contaminated patient, contamination control techniques, and decontamination and bioassay procedures. Eighty-five hospital personnel have been trained, including fifteen physicians, fifty-three nurses, eleven nuclear medicine and radiology personnel, and six emergency medical technicians.

11. In the event of multiple contaminated and injured personnel, the four support hospitals would be able to handle the increased numbers. Since hospitals already have procedures to handle mass casualty situations (for example, a bus accident), these can easily be applied to handle multiple injured contaminated patients. Incoming patients would be triaged on the basis of their injuries, since traumatic injury always takes precedence over contamination. If additional treatment rooms are necessary, the designated Radiation Emergency Area can readily be expanded. However, multiple injuries would be very rare. In my fifteen years experience at twenty-five nuclear power plant sites, only two cases involved multiple injuries -- in each case involving two employees each.

12. In addition to these four hospitals, there are some fifty hospitals in the counties around the 10 mile EPZ which can receive and care for most radiological accident cases. These are listed in the State Plan, Fig. II-L-2. They should be capable of dealing with contaminated and exposed individuals, including those who have been otherwise injured. Thirty-seven of these hospitals have diagnostic and/or therapeutic radioisotope facilities. This requires that they are able to handle contaminated and injured patients which could result from injuries within their own facilities.

13. The State has indicated that all of the hospitals listed in the State Plan are accredited by the Joint Commission on Accreditation of Hospitals. Standard V of the Commission's

Accreditation Manual for Hospitals (1984) requires each accredited hospital to have procedures for:

> The emergency management of individuals who have actual or suspected exposure to radiation or who are radioactively contaminated. Such action may include radioactivity monitoring and measurement; designation and any required preparation of space for evaluation of the patient, including, as required, discontinuation of the air circulation system to prevent the spread of contamination; decontamination of the patient through an appropriate cleansing mechanism; and containment, labeling, and disposition of contaminated materials. The individual responsible for radiation safety should be notified.

Given the existing emergency room facilities of all the hospitals identified in the State plan and the radioisotope facilities in 37 of them, these facilities would be able to handle any conceivable patient load arising from an accident at the Perry facility. Because there are many hospitals available, and because the radiation health effects which might be observed are seldom if ever life threatening, the present plans and procedures are more than adequate to handle the medical consequences of an accident at the Perry Plant.

14. In summary, the Perry, State and County emergency plans have adequately addressed the hospital designations and the medical services to be provided by hospitals, including assistance to contaminated individuals, in the event of an accident at the Perry Nuclear Power Plant.