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IN 84-24

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

April 5, 1984

IE INFORMATION NOTICE NO. 84-24: PHYSICAL QUALIFICATION OF INDIVIDUALS TO
USE RESPIRATORY PROTECTIVE DEVICES

Addressees:

All nuclear power plant facilities holding an operating license (OL) or construction permit (CP); research and test reactors, fuel facilities, and Priority I material licensees.

Purpose:

This information notice is provided as a notification of the death of an individual that recently occurred while the individual was wearing a respirator. The individual had been medically qualified by the licensee to use respiratory protective devices per the requirement stated in 10 CFR 20.103(c)(2). Guidance is provided that licensees may find helpful in their continuing efforts to ensure respirator users are medically qualified. It is expected that addressees will review the information provided for applicability to their respiratory programs. Suggestions contained in this information notice do not constitute NRC requirements and, therefore, no specific action or written response is required.

Description of Circumstances:

While working in a nuclear power plant's low-level radioactive waste handling building, a 24-year-old licensee contract employee collapsed while wearing a supplied-air hood. The individual died of acute heart failure 2 hours later at a nearby hospital.

The exact cause of death is not known. The individual had complained of fatigue before being stricken. An autopsy failed to uncover any underlying medical condition that could have accounted for the individual's death. An evaluation of the breathing air being supplied to the individual's supplied-air hood and supporting equipment indicated that the breathing air

was safe to use and that the respirator and supporting equipment was functioning properly. Discussions with the licensee's physician and another physician indicated that it was also unlikely that circumstances surrounding the incident, such as the stress of using a respirator, the degree of difficulty involved in performing the work task, or heat stress induced by the work, were sufficient to have caused the individual's acute heart failure. A consulting physician suggested the death

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may have been caused by irregular heart contractions or arrhythmia leading to heart fibrillation and finally to the inability of the heart to pump blood to the lungs and peripheral tissues. This condition is extremely rare, especially in very young people; nonetheless, the incidence is not zero.

Guidance:

10 CFR 20.103(c) states that a licensee may make allowance for the use of respiratory protective equipment in estimating exposures of individuals to airborne radioactive material provided that certain minimum respiratory program requirements are implemented and maintained. One essential program element is the requirement for an initial determination by a physician before respirator use, and at least every 12 months thereafter, that the individual is physically able to use the respiratory protection equipment. A physician is to determine what health and physical conditions are pertinent and the proper method for effectively evaluating these conditions. All the regulatory requirements were apparently satisfied in the case described above. Additional guidance that licensees and their physicians may find useful in implementing and evaluating respiratory protection programs is presented in the following paragraphs.

The degree of employee physical incapacitation, type of respirator, and degree of difficulty associated with the work assignment need to be considered in evaluating overall employee fitness to use respiratory protective equipment. Information concerning previous history or symptoms of cardiovascular and pulmonary diseases are obviously important considerations in making these determinations. Discussions with one physician having responsibility for determining if individuals are physically able to use respiratory protection equipment identified that more individuals fail to

qualify as respirator users because of cardiovascular problems rather than pulmonary function problems. The additional stress caused by use of respiratory protective equipment on workers is not well understood in all cases and may be very difficult to account for when determining an individual's suitability for respirator use. The effects of respirator use range from the obvious physical burden incurred from the weight (up to 35 pounds) of self-contained breathing apparatus to more subtle effects from inhalation and exhalation resistances and the psychological effect of reduced vision and mobility. Licensees should ensure that the physician's findings regarding an individual's ability to use specific kinds of respiratory protective equipment are effectively and consistently implemented. Licensees are reminded of the 10 CFR 20.103(c)(3) requirements to inform respirator wearers of their right to leave the work area and to take relief in the event of physical/mental discomfort (among other things). Recognizing that a wearer's ability to effectively use a respirator can be diminished by such transitory factors as head/chest colds, headaches, and fatigue, one licensee has in place a policy encouraging users to report these temporary physical conditions so that, whenever possible, these affected workers are temporarily assigned routine job tasks not requiring respirator protection.

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A recently published ANSI Standard, ANSI Z88.6, "Physical Qualification for Respirator Use," is a consensus standard written largely by a group of physicians. Licensee physicians may find it useful in evaluating the kinds of various medical conditions that might have contraindications to respirator use, the effect of different types of respiratory protective equipment on individuals, and the means of estimating and matching physical capability with work rates. In some cases environmental factors such as heat and humidity may be the limiting factors in the selection of types of respirators and periods of respirator use. Special attention may be given to those circumstances that necessitate working in very hot or humid environments in protective clothing that impedes the worker's innate physical capability for ridding the body of excess heat. Selection of positive-pressure, air-purifying, or atmosphere-supplying respiratory protective equipment may provide some incidental body cooling but may not be adequate to allow for reasonable periods of respirator use. There are several type of body cooling systems available using various cooling schemes (i.e., ice-pocketed vests, liquid circulation through coils, and vortex cooling).

Recipients should review the information discussed for possible

applicability to the respiratory protection program at their facility. No written response to this information notice is required. If you desire additional information regarding this matter, contact the Regional Administrator of the appropriate NRC Regional Office or this office.

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and Engineering Response
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Attachment:
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