

June 30, 2003

Mr. M. S. Tuckman  
Executive Vice President  
Nuclear Generation  
Duke Energy Corporation  
526 South Church Street  
Charlotte, NC 28201-1006

SUBJECT: USE OF FRENCH DESIGNED RESPIRATORY PROTECTION EQUIPMENT  
RE: OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3; MCGUIRE NUCLEAR  
STATION, UNITS 1 AND 2; AND CATAWBA NUCLEAR STATION, UNITS 1  
AND 2 (TAC NOS. MB7952, MB7953, MB7954, MB7955, MB7956, MB7957,  
AND MB7958)

Dear Mr. Tuckman:

In your letter dated March 4, 2003, as supplemented by letter dated May 1, 2003, you submitted a request to use certain air-supplied respiratory protection for persons working in areas with airborne radioactivity. Specifically, you requested authorization (1) to use French designed respiratory protection equipment that has not been tested and certified by the National Institute for Occupation Safety and Health, (2) to not provide standby rescue persons whenever this equipment is used, and (3) to take credit for an assigned protection factor of 2000 for this equipment.

Enclosed is our Safety Evaluation that concludes that authorization of your three requests is acceptable, and within the provisions of Title 10 of the *Code of Federal Regulations*, Part 20; therefore, no exemption is needed.

Sincerely,

*/RA/*

Leonard N. Olshan, Project Manager, Section 1  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, 50-287,  
50-369, 50-370, 50-413, and 50-414

Enclosure: As stated

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Enclosure: Safety Evaluation

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

USE OF FRENCH DESIGNED RESPIRATORY PROTECTION EQUIPMENT

DUKE ENERGY CORPORATION

OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3

McGUIRE NUCLEAR STATION, UNITS 1 AND 2

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-269, 50-270, 50-287, 50-369, 50-370, 50-413, AND 50-414

1.0 INTRODUCTION

By letter dated March 4, 2003, as supplemented by letter dated May 1, 2003, Duke Energy Corporation (the licensee) submitted a request to use certain air-supplied suits that provide respiratory protection for persons working in areas of airborne radioactivity. Specifically, the licensee requested authorization (1) to use French designed respiratory protection equipment that has not been tested and certified by the National Institute of Occupational Safety and Health (NIOSH), (2) to not provide standby rescue persons whenever this equipment is used, and (3) to take credit for an assigned protection factor (APF) of 2000 for this equipment.

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20, "Standards for Protection Against Radiation," Subpart H, "Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas," concerns the use of respiratory protection equipment for protection against airborne radioactive materials.

Section 20.1703, "Use of individual respiratory protection equipment," paragraph(a), requires that respiratory protection equipment used by a licensee to limit the intake of radioactive material be tested and certified by NIOSH. Section 20.1703(b) states that a licensee can submit an application to the NRC for authorized use of respiratory protection equipment that has not been tested and certified by NIOSH.

Section 20.1703(f) requires that standby rescue personnel be provided whenever respiratory protection equipment from which an unaided individual would have difficulty extricating himself or herself is used.

Appendix A, "Assigned Protection Factors for Respirators," does not provide an APF for atmosphere supplying respirator (air-line respirator) suits in a continuous-flow operating mode. Instead, it references footnote (g) that states, "No NIOSH approval schedule is currently available for

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atmosphere supplying suits. This equipment may be used in an acceptable respiratory protection program as long as all the other minimum program requirements, with the exception of testing, are met (i.e., Section 20.1703)."

Section 20.1705, "Application for use of higher assigned protection factors," states that a licensee shall obtain Nuclear Regulatory Commission (NRC) authorization before using assigned protection factors in excess of those specified in Appendix A to Part 20. Thus, the licensee must obtain NRC approval to take credit for an APF for the French designed respiratory protection equipment.

Criteria and background information used for the NRC staff's technical evaluation include 10 CFR Part 20, Subpart H; 10 CFR Part 19, paragraph 19.12, "Instruction to Workers"; Regulatory Guide 8.15, Revision 1, "Acceptable Programs for Respiratory Protection"; NUREG/CR-0041, Revision 1, "Manual of Respiratory Protection Against Airborne Radioactive Materials"; 42 CFR Part 84, which addresses NIOSH testing and certification regulations; Los Alamos National Laboratory Report LA-101560MS, "Acceptance Testing Procedures for Air-Line Supplied Air Suits"; and American National Standards Institute standard ANSI Z88.2-1992, "American National Standard Practices for Regulatory Protection."

### 3.0 TECHNICAL EVALUATION

NRC guidance provided in NUREG/CR-0041 encourages the use of suits, noting that in certain work environments, air-supplied suits may be the best respiratory device when considering heat stress, trying to minimize skin contamination, and trying to maintain worker doses as low as reasonably achievable (ALARA).

Testing conducted by the Institute for Nuclear Protection and Security, the European certifying agency (comparable to NIOSH), and over 20 years of successful use in European power plants of similar certified suits form the basis for the licensee's request. The licensee has requested authorization to use, and to take credit for, the protection provided by two suits during normal (non-emergency) operations. The two suits are made by the same manufacturer and are identified as MURUROA V4 F1 (Certificate No. 0073/197/162//12/97/0028) and MURUROA V4 MTH2 (Certificate No. 0073/197/162/01/96/0001). Both models have been approved as single-use suits (a suit that is disposed of after one use), and the licensee proposes to use the suits in the approved configurations, relative to the suits' form, fit, and function.

The European Standard CEN/TC 162N738 (July 1996), "Protective Clothing Against Radioactive Contamination, Part 1: Requirements and Test Methods for Ventilated Protective Clothing Against Particulate Radioactive Contamination," provided testing and acceptance criteria used for certification of the suits. This standard is generally consistent with the pertinent acceptance criteria provided in Los Alamos National Laboratory Report LA-10156-MS, which is used to test and authorize the use of air-supplied suits at Department of Energy sites.

The certification-testing regime was broadly based and encompassed a range of various functional areas, including: suit material strength, tear and puncture resistance, material flammability, wearer comfort, noise level, wearer visibility, air flow, carbon dioxide concentrations, and degree of contaminate in-leakage during a series of varied simulated work practices and exercises. Both models passed all required tests, and both provided a measured average protection level (fit factor) of 50,000. A fit factor, which was developed in a simulated work environment, is the ratio of contaminate concentration outside the suit to the contaminate concentration inside the suit. Given an

overall measured fit factor of 50,000 (averaged over all exercise activities), allowing an APF of 2,000 provides a conservative safety factor for estimating the actual protection provided to the user by the suit in the actual working environment. APFs are generally lower than fit factors for all types of respirators, since workplace demands are typically greater on the user of the respirator than are laboratory conditions and simulated work activities due to higher heat and humidity, longer work durations, greater worker fatigue, etc.

The licensee evaluated the MURUROA F1 suit performance using the manufacturer's written instructions and guidance. This onsite evaluation focused on wearer comfort and acceptance, ease of use, user visibility and communication capability, and adequacy of user air supply and cooling. While this model was judged to be acceptable (and an improvement over NIOSH-certified air-supplied hoods), the licensee provided feedback to the manufacturer on some desired improvements. This prompted the manufacturer to provide the licensee with the MURUROA V4 MTH2 suit, which provides enhanced cooling for the user, more sizes to fit a larger population, and compatible air fittings. In general, when compared with other air-fed respirators, both suit models provide the following advantages to the user: (1) dual zippers (metal zipper inside and plastic zipper outside); (2) a welded sleeve-to-insert communication cable; (3) a removable strip near the mouth that could be used for emergency breathing in case of loss of supplied air; (4) an egress strip stretching from the left arm, over the head, and to the right arm that is used for undressing and for self-rescue in an emergency, such as loss of supplied air; (5) an air intake located at the waist with a built-in regulator that can adjust, but not block, air flow; (6) dual magnetic valves that provide ventilation and relief of excess pressure in case the suit is squeezed or pinched unexpectedly; (7) a very low noise level at maximum air flow; and (8) air flow to the hands, feet, face, and chest.

Safety features also include light-weight (2.5 pounds), one-piece construction with welded gloves and booties with tie straps. Helmets are made with PVC material that provides distortion-free vision and are large enough for wearing a headset. Noise levels are less than 80 decibels at maximum air flow, and air flow can be adjusted by the user for comfort, but cannot be shut off below the required minimum air flow. The MURUROA V4 MTH model also provides two additional vents near the chin for cooling to the face. Both models are fire proof up to 65 °C and can be used in temperatures up to 60 °C. Suits are constructed with reinforced elbow, knee, and crotch areas.

The licensee intends to use the suits in highly contaminated areas, including the steam generator bowls (on the primary coolant side). Licensee site testing at its mockup facility was successful, with the user being provided excellent visibility and easy access to and from the bowl. Based on the licensee's evaluation, both suits were found to offer a safer and more efficient means to protect workers in areas of high radiological contamination and in areas where there is a potential for airborne contamination. While these suits provide improved cooling over the entire body, the existing combination of rain suits and air-supplied, NIOSH-certified hoods used by the licensee provide cooling only to the head and force workers to wear the ensemble in a manner that make self-rescue nearly impossible; thus, a rescue worker is required to be stationed nearby. Ease of removal of the MURUROA suits provide more desirable self-rescue features and provide a means to undress that minimizes the potential for personnel contamination events.

Additionally, the suits' easy-escape design in the event of loss of supplied air was tested and evaluated by the licensee. Upon loss of supplied air to the suit, the licensee found that a worker could easily extricate himself or herself from the suit by pulling off the mouth strip and then opening the hood, or by pulling the egress strip from the forearm to the head. Based on these safety features, the NRC staff finds that the suit design provides for easy and effective self-rescue, thus,

avoiding asphyxiation if the air supply is interrupted or lost. As a result of external radiation levels present in typical job sites, suit users are usually provided with radiological protection (RP) coverage, such as closed-circuit television or on-scene RP coverage, and continuous audio communication. This communication and coverage adds to the assistance available to the suit user. The design features of the suit, coupled with the required training on escape methods that is given to all suit users, are adequate for the staff to conclude that the standby rescue personnel addressed in Section 20.1703(f) are not required. However, the licensee has elected to provide a rescuer for some jobs or situations. Mockup training and pre-job briefings will be used to determine if rescue workers should be provided and what their responsibilities would be for that specific situation.

Subpart H of 10 CFR Part 20 establishes the requirements for implementing a respiratory protection program. These programmatic requirements ensure that worker doses from airborne radioactive materials are maintained ALARA. The licensee intends to integrate the use of the MURUROA suits into the licensee's existing, ongoing respiratory protection programs that satisfy Part 20 requirements. The NRC staff finds this approach acceptable. The following summary of controls and program elements generally follow the specific Part 20 requirements pertinent to the use of air-supplied suits. Since the licensee has a viable, ongoing respiratory protection program and has successfully used air-supplied hoods in the past, only items pertinent and specific to the use of suits are discussed below.

1. Section 20.1703(c) requires, among other things, written procedures governing the training of respirator users (workers). The licensee has committed to develop new lesson plans to train workers on the suits' features; how to don, use and doff the suit; and instructions on using the built-in escape strips for routine and emergency egress conditions. This training should include appropriate hands-on and classroom instruction. Specific training will be provided on actions to be taken by the user in the event of equipment malfunction. The RP personnel will be trained to ensure that they are competent to issue the suits, assist in helping the user don and doff the suits, and set up and operate the unit (including the regulated air supply).
2. Communication channels will be established and maintained between the licensee, the manufacturer and the European certification authority to ensure that users are notified in a timely manner of significant problems that may affect suit safety, performance, or function. Depending on the severity of a problem or defect, the certification agency or the manufacturer may issue a product recall (e.g., a stop-use advisory or user warning issued to all registered users). This communication network is analogous to the NIOSH-vendor-user link established in the USA.
3. Section 20.1703(c)(4)(vii) requires, among other things, written procedures governing respirator storage and quality assurance. The suits have a 3-year shelf life and must be stored in the original packing at temperatures between 32 and 140 °F. Since the suits are approved for only single use, there are no maintenance requirements. The vendor's manufacturing process is inspected annually by ASQUAL, a European quality assurance organization, to ensure that the required level of process and product quality is maintained. Additionally, on a formalized sample basis, the vendor performs destructive and non-destructive testing of the product line.

#### 4.0 CONCLUSION

Based on the testing data provided; and when used in accordance with the applicable manufacturer's instructions, licensee commitments, and requirements of Subpart H of 10 CFR Part 20; the NRC staff concludes that the licensee's request to use the two suits, MURUROA V4F1 and MUROROA V4 MTH2, is acceptable. The staff also concludes that the licensee can take credit for an APF of 2,000 for both of these suits and that standby rescue persons, discussed in Section 20.1703(f), are not required when these suits are used.

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Date: June 30, 2003

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