September 14, 2005

Mr. Charles D. Naslund
Senior Vice President and Chief Nuclear Officer
Union Electric Company
Post Office Box 620
Fulton, MO 65251

SUBJECT: CALLAWAY PLANT, UNIT 1 - USE OF DELTA PROTECTION RESPIRATORY PROTECTION EQUIPMENT (TAC NO. MC7242)

Dear Mr. Naslund:

In your letter dated June 1, 2005 (ULNRC-05152), as supplemented by letter dated July 14, 2005 (ULNRC-05170), you submitted a request to use certain air-supplied respiratory protection equipment for persons working in areas with airborne radioactivity. Specifically, you requested authorization (1) to use French designed respiratory protection equipment, Mururoa models BLU, V4 F1, and V4MTH2, 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 5000 for this equipment.

The Mururoa BLU model is a powered air purifying suit, with different technical issues than the Mururoa F1 and MTH2 models, which are atmosphere supplying suits. This first-of-a-kind review of the BLU suit will be more involved than those needed for the current Mururoa F1 and MTH2 models. Therefore, the review of the Mururoa BLU suit will be addressed in a separate letter.

Enclosed is the Nuclear Regulatory Commission staff's related Safety Evaluation that concludes that authorization of your three requests is acceptable for the Mururoa model V4 F1 and V4MTH2 suits. This authorization is within the provisions of Title 10 of the *Code of Federal Regulations*, Part 20; therefore, no exemption is needed.

Sincerely,

/RA/
Jack Donohew, Senior Project Manager, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-483

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

USE OF FRENCH DESIGNED RESPIRATORY PROTECTION EQUIPMENT

UNION ELECTRIC COMPANY

CALLAWAY PLANT UNIT 1

DOCKET NO. 50-483

1.0 INTRODUCTION

By letter dated June 1, 2005, as supplemented by letter dated July 14, 2005, Union Electric Company (the licensee) requested to use an air-supplied suit with a protection factor greater than that listed in Appendix A to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 20 for persons working in areas of airborne radioactivity with certain respiratory protection equipment that has not yet been certified by the National Institute for Occupational Safety and Health (NIOSH). Specifically, the licensee requested authorization to use an assigned protection factor (APF) of 5000 with the Mururoa, models V4 F1 and V4 MTH2, air-supplied suits manufactured by Delta Protection.

The licensee also requested authorization for the Mururoa BLU powered air-purifying suits; however, this request will be the subject of a separate evaluation.

2.0 REGULATORY EVALUATION

Part 20 of 10 CFR, "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.

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 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 fit testing, are met (i.e., § 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, Section 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 Respiratory Protection."

3.0 TECHNICAL EVALUATION

NRC guidance provided in NUREG/CR-0041 encourages the use of air-supplied 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 (IPSN), 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 the Mururoa V4 F1 suit (IPSN Certificate No. 0073/197/162/12/97/0028) and V4 MTH2 suit (IPSN Certificate No. 0073/197/162/01/96/0001) during normal (non-emergency) operations. Both models have been approved by IPSN as a single-use suit (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. The Mururoa V4 F1 and V4 MTH2 suits 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 5,000 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.

In general, when compared with other air-fed respirators, the Mururoa V4 F1 and V4 MTH2 suits 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 can 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 (polyvinyl chloride) 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. It is fire resistant up to 65 ^{o}C and can be used in temperatures up to 60 ^{o}C. Reinforced construction is also provided in the elbow, knee, and crotch areas.

The licensee intends to use this suit in highly contaminated areas, including cavity decontamination and equipment decontamination. The Mururoa V4 F1 and V4 MTH2 suits 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. The existing practice of using a combination of rain suits and NIOSH-certified air-supplied hoods provides cooling only to the head and forces workers to wear the ensemble in a manner that makes self-rescue nearly impossible; thus, a rescue worker is required to be stationed nearby. The Mururoa V4 F1 and V4 MTH2 suits provide improved cooling over the entire body, and the ease of removal features provide a means to undress that minimizes the potential for personnel contamination events and an easy-escape design.

Upon loss of supplied air to the suit, a worker can 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. 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 requirement for standby rescue personnel in Section 20.1703(f) does not apply because the Mururoa suits are designed such that an unaided individual would not have difficulty extricating himself or herself.

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 its existing, ongoing respiratory protection program that satisfies Part 20 requirements. The NRC staff finds this approach acceptable. The following summary of controls and program elements generally follows the specific Part 20 requirements pertinent to the use of air-supplied suits. Since the licensee has a viable, ongoing respiratory protection program, 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 suit's features; how to don, use and doff the suits; 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 an equipment malfunction. The radiation protection 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). The licensee has committed to report any defects experience with this suit to the manufacturer and other U.S. users.

3. Section 20.1703(c)(4)(vii) requires, among other things, written procedures governing respirator storage and quality assurance. The licensee has committed to implement all of the provisions in the manufacture's "Instructions for Use."

4. The Mururoa suits are single use only, and are not approved for use in atmospheres that are immediately deleterious to life or health.

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, and take credit for an APF of 5,000, with the Mururoa V4 F1 and V4 MTH2 supplied air suits, and not require standby rescue people, is acceptable.

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Date: September 14, 2005

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