



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 27, 2009

Mr. Thomas Joyce
President and Chief Nuclear Officer
PSEG Nuclear
P.O. Box 236, N09
Hancocks Bridge, NJ 08038

SUBJECT HOPE CREEK GENERATING STATION AND SALEM NUCLEAR
GENERATING STATION, UNIT NOS. 1 AND 2 - REQUEST FOR
AUTHORIZATION TO USE RESPIRATORY PROTECTION EQUIPMENT
(TAC NOS. MD9199, MD9200, AND MD9201)

Dear Mr. Joyce:

By application dated July 3, 2008, as supplemented by letter dated November 21, 2008, PSEG Nuclear LLC (PSEG or the licensee) requested authorization, pursuant to Section 20.1703 of Title 10 of the *Code of Federal Regulations* (10 CFR), for Hope Creek Generating Station (Hope Creek) and Salem Nuclear Generating Station, Unit Nos. 1 and 2 (Salem), to: (1) use French-designed respiratory protection equipment that has not been tested and certified by the National Institute for Occupational Safety and Health; (2) take credit for an assigned protection factor of 2,000 for this equipment; and, (3) not provide standby rescue persons whenever this equipment is used.

As documented in the enclosed safety evaluation, the Nuclear Regulatory Commission staff concludes that PSEG's request is acceptable. Therefore, you are authorized to use the Mururoa V4 F1 and V4 MTH2 respiratory protection suits manufactured by Delta Protection, with an assigned protection factor of 2,000. In addition, whenever this equipment is used, standby rescue persons are not required. This authorization is applicable to both Hope Creek and Salem.

Implementation of this authorization shall include revision of the Hope Creek and Salem Updated Final Safety Analysis Reports consistent with Attachment 2 of PSEG's letter dated November 21, 2008.

T. Joyce

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If you have any questions concerning this matter, please contact the Project Manager for Hope Creek and Salem, Mr. Richard Ennis, at (301) 415-1420.

Sincerely,

A handwritten signature in black ink, appearing to read "Harold K. Chernoff". The signature is fluid and cursive, with a large, sweeping flourish at the end.

Harold K. Chernoff, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-354, 50-272, and 50-311

Enclosure:
Safety Evaluation

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
REQUEST FOR AUTHORIZATION TO USE RESPIRATORY PROTECTION EQUIPMENT
FOR
HOPE CREEK GENERATING STATION
AND SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2
DOCKET NOS. 50-354, 50-272 AND 50-311

1.0 INTRODUCTION

By application dated July 3, 2008, as supplemented by letter dated November 21, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML081980090 and ML083370298, respectively), PSEG Nuclear LLC (PSEG or the licensee) requested authorization, pursuant to Section 20.1703 of Title 10 of the *Code of Federal Regulations* (10 CFR), for Hope Creek Generating Station (Hope Creek) and Salem Nuclear Generating Station, Unit Nos. 1 and 2 (Salem), to: (1) use French-designed respiratory protection equipment that has not been tested and certified by the National Institute for Occupational Safety and Health (NIOSH); (2) take credit for an assigned protection factor (APF) of 2,000 for this equipment; and, (3) not provide standby rescue persons whenever this equipment is used.

Specifically, the licensee requested authorization for use of the Mururoa V4 F1 and V4 MTH2 respiratory protection suits manufactured by Delta Protection in France (hereafter referred to as the "Delta Suits"). The Delta Suits are atmosphere supplying suits that fully enclose the wearer. Breathing and cooling air is supplied from the plant's air system through an air hose and a regulator that is integral to the suit.

2.0 REGULATORY EVALUATION

Subpart H, "Respiratory Protection and Controls To Restrict Internal Exposure in Restricted Areas," of 10 CFR Part 20, "Standards for Protection Against Radiation," provides requirements and procedural controls associated with the use of respiratory protection equipment to limit and estimate the intake of airborne radioactive materials. Subpart H includes Sections 20.1701 through 20.1705 of 10 CFR Part 20.

10 CFR 20.1702, "Use of other controls," paragraph (a) states that:

When it is not practical to apply process or other engineering controls to control the concentrations of radioactive material in the air to values below those that define an airborne radioactivity area, the licensee shall, consistent with maintaining the total effective dose equivalent [as low as reasonably achievable] ALARA, increase monitoring and limit intakes by one or more of the following means-

Enclosure

- (1) Control of access;
- (2) Limitation of exposure times;
- (3) Use of respiratory protection equipment; or
- (4) Other controls.

10 CFR 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 except as otherwise noted in this part. Paragraph (b) of 10 CFR 20.1703 states, in part, that if the licensee wishes to use respiratory protection equipment that has not been tested or certified by NIOSH, the licensee shall submit an application to the Nuclear Regulatory Commission (NRC or the Commission) for authorized use of this equipment.

Paragraph (f) of 10 CFR 20.1703 requires, in part, that standby rescue personnel be provided whenever one-piece atmosphere-supplying suits are used from which an unaided individual would have difficulty extricating himself or herself.

The licensee's application dated July 3, 2008, requested authorization, pursuant to 10 CFR 20.1703(b), to take credit for an APF of 2,000 for the Delta Suits. As discussed in 10 CFR 20.1003, an APF denotes the expected level of respiratory protection that would be provided by a properly functioning respirator to a properly fitted and trained user. The inhaled concentration can be estimated by dividing the ambient airborne concentration by the APF. Therefore, a respirator with an APF of 2,000 would reduce the potential radioactive material intake by a factor of 99.95 percent, for purposes of estimating a user's internal dose.

Appendix A, "Assigned Protection Factors for Respirators," of 10 CFR Part 20 does not provide an APF for suit-type atmosphere supplying respirators. 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)." Since no protection is credited in Appendix A for suit-type atmosphere supplying respirators, this implies an APF of 1.0. As such, authorization to use an APF of 2,000 (as proposed by PSEG) is required under 10 CFR 20.1705 (not 10 CFR 20.1703(b)). Specifically, 10 CFR 20.1705, "Application for use of higher assigned protection factors," requires that a licensee obtain authorization from the Commission before using APFs in excess of those specified in Appendix A to 10 CFR Part 20.

In addition to the regulatory requirements discussed above, the NRC staff used the following in performing its technical evaluation:

- (1) 10 CFR 19.12, "Instruction to workers;"
- (2) Regulatory Guide 8.15, Revision 1, "Acceptable Programs for Respiratory Protection;"

- (3) NUREG/CR-0041, Revision 1, "Manual of Respiratory Protection Against Airborne Radioactive Material;"
- (4) 42 CFR Part 84, which addresses NIOSH testing and certification regulations;
- (5) Los Alamos National Laboratory Report LA-101560MS, "Acceptance Testing Procedures for Air-Line Supplied Air Suits;" and
- (6) American National Standards Institute standard ANSI Z88.2-1992, "Practices for Respiratory Protection."

3.0 TECHNICAL EVALUATION

NRC guidance provided in NUREG/CR-0041 notes that, in certain nuclear industry applications (e.g., control rod drive removal at boiling water reactors), supplied-air suits may be the best overall respiratory device choice when considering respiratory protection; heat stress; trying to minimize skin contamination; and trying to maintain worker doses ALARA.

The licensee has requested authorization to use, and to take credit for, the protection provided by the Delta Suits during normal (non-emergency) operations. The suits are identified as Mururoa V4 F1 (Certificate No. 0073/197/162/12/97/0028) and V4 MTH2 (Certificate No. 0073/197/162/01/96/0001). Both models have been approved as a single-use suits (i.e., 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.

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 European Standard EN 1073-1 (January 1998), "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. 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 such workplace factors as higher heat and humidity conditions, longer work durations, and greater worker fatigue. The NRC staff finds that crediting an APF of 2,000 for the Delta Suits would provide a conservative safety factor for

estimating the actual protection provided to the user by the suit in the actual working environment (given an overall measured fit factor of 50,000 (averaged over all exercise activities)).

In general, when compared with other air-fed respirators, both Delta 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 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.

The removable emergency breathing strip, and the over the head egress strip, provided on both models of the Delta Suits, allows an unaided wearer to escape from the suit in case of loss of breathing air supply or other emergency. 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. Therefore, when used in a manner that does not impede the use of these safety features, the requirement for providing a standby rescue person, in accordance with 10 CFR 20.1703(f), is not necessary for the Delta Suits.

Other features of the Delta Suits include light-weight (2.5 pounds), and a one-piece construction with welded gloves and booties with tie straps. The helmet is made with polyvinyl chloride material that provides distortion-free vision and is 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 Delta Suits provide two additional vents near the chin for cooling to the face. Both models are heat resistant to 65 °C and can be used in temperatures up to 60 °C. The suits are constructed with reinforced elbow, knee, and crotch areas.

The Delta Suits are preferable to the currently used bubblehoods because the ease of removal features provide a means to undress that minimizes the potential for personnel contamination events. In addition, eliminating the need for using standby rescue personnel helps to minimize occupational radiation exposures.

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 Delta Suits into their existing, ongoing respiratory protection program that satisfies 10 CFR Part 20 requirements, using the following information provided by the manufacturer:

- (1) "Mururoa V4 Fully Enclosed Suit - General Description" (Attachment 2.5.1 to Enclosure 1 of the licensee's application dated July 3, 2008);
- (2) "Instructions for Donning and Removal the Mururoa V4 Fully Enclosed Suit "(Attachment 2.5.5 to Enclosure 1 of the licensee's application dated July 3, 2008); and

- (3) "Donning and Removal Instructions for Mururoa V4 MTH2" (Attachment 2.5.8 to Enclosure 1 of the licensee's application dated July 3, 2008).

The NRC staff finds that the above approach for implementing the Delta Suits into the PSEG respiratory protection program is acceptable. Note, as discussed in Section 2.3.4 of Enclosure 1 of the licensee's application dated July 3, 2008:

PSEG intends to adhere to all of the manufacturers "instructions for donning and removal", "instructions for use", and "emergency features" technical information/directions provided, with one exception. PSEG will not incorporate the "instructions for donning and removal", Attachment 2.5.5, Caution Step 2, which states, "The buddy system must be in effect with the use of this suit fed with a sufficient breathable air source with either both persons in it or the second person nearby in view with a particulate respirator ready." As discussed previously, the inherent safety features of this suit (mouth and wrist tear-away strips), combined with the use of headsets for communication and remote video monitoring, make the use of a stand-by rescue person or "buddy system" unnecessary. Additionally, it is noted that PSEG standard practice is to have individuals standing by to assist workers in removing the suits.

The NRC staff finds that the above exception is acceptable based on the finding above that providing a standby rescue person, in accordance with 10 CFR 20.1703(f), is not necessary for the Delta Suits.

4.0 LICENSEE COMMITMENTS

As required by 10 CFR 50.34(b)(3), the Updated Final Safety Analysis Report (UFSAR) shall include information describing the means for controlling and limiting radiation exposures within the limits set forth in 10 CFR Part 20. Consistent with this requirement, the licensee, in Attachment 2 of its letter dated November 21, 2008, committed to establish controls related to implementation of the requested authorization. Specifically, the following controls will be incorporated into the Hope Creek and Salem UFSARs as part of the implementation of the authorization:

1. The manufacturer's instructions for use and storage of the Delta Protection Mururoa V4F1 and V4 MTH2 suits will be adhered to and integrated into the respiratory protection programs, with the exception of "instructions for donning and removal", Attachment 2.5.5, Caution Step 2 (stand-by rescue person not required).
2. New lesson plans will be developed to train workers on Mururoa's features, donning, use and removal, cautions and use of mouth strip and tear off strips for routine and emergency egress.
3. Radiation Protection personnel will be provided additional training for selection, approval, issue, equipment set-up, operation and maintenance instructions for the Mururoa suit.

4. The Mururoa V4F1 and V4 MTH2 suits will be discarded after a single use and will not be used in atmospheres that are immediately dangerous to life and health (IDLH).
5. Any defects discovered with the Mururoa suit will be entered into the Corrective Action Program and reported to the manufacturer, as necessary. Industry notifications, when required, will be made through the Operating Experience Program.

The NRC staff finds that the above controls are appropriate and meet the intent of 10 CFR 50.34(b)(3). In addition, the staff finds that incorporation of the above information into the Hope Creek and Salem UFSARs provides assurance that future changes will be adequately controlled under the provisions of 10 CFR 50.59 and 10 CFR 50.71(e).

5.0 CONCLUSION

Based on: (1) the testing performed on the Delta Suits; (2) the design features of the suits which would allow an unaided wearer to escape from the suit in an emergency; (3) incorporation of the manufacturer's instructions into PSEG's existing respiratory protection program; and (4) incorporation of appropriate controls into the Hope Creek and Salem UFSARs; the NRC staff finds that the proposed use of the Delta Suits meets the intent of the 10 CFR Part 20 ALARA requirements and will provide the suit wearer with an adequate level of protection to limit the intake of airborne radioactive materials. Therefore, the NRC staff concludes that the proposed request is acceptable. As such, the licensee is authorized to use the Mururoa V4 F1 and V4 MTH2 respiratory protection suits manufactured by Delta Protection, with an APF of 2,000. In addition, whenever this equipment is used, standby rescue persons are not required. This authorization is applicable to both Hope Creek and Salem.

Principal Contributors: R. Pedersen
R. Ennis

T. Joyce

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If you have any questions concerning this matter, please contact the Project Manager for Hope Creek and Salem, Mr. Richard Ennis, at (301) 415-1420.

Sincerely,

/ra/

Harold K. Chernoff, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-354, 50-272, and 50-311

Enclosure:
Safety Evaluation

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