UNITED STATES
NUCLEAR REGULATORY COMMISSION
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ENCLOSURE

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SAFETY EVALUATION FOR THE USE OF A

RADIOIODINE PROTECTION FACTOR FOR GMR-I CANISTERS

ALABAMA POWER COMPANY

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DOCKET NOS. 50-348 AND 50-364

Introduction

By submittal dated January 13, 1984, supplemented on February 10 and 13, March 5, and May 8, 1984, Alabama Power Company (ACPo) requested an exemption to 10 CFR Part 20, Appendix A, footnote d-2(c). APCo provided the request in accordance with 10 CFR Part 20.103(e) and further justification for the exemption in response to our request for additional information. On April 25, 1984 an in-depth meeting was held between APCo, the NRC staff and our contractor representative from the Los Alamos Scientific Laboratory, and the canister vendor, Mine Safety Appliances Company (MSA).

At that meeting APCo and MSA provided test data and canister qualification information in response to NRC staff concerns expressed in our letter dated February 17, 1984. Following this meeting APCo provided a detailed response to all NRC staff concerns relating to the request for exemption to 10 CFR Part 20, Appendix A, footnote d-2(c). The exemption would allow the use of a radioiodine protection factor of 50 for MSA Company's GMR-I canisters (Part Number 466220) at the Joseph M. Farley facilities. Criteria and background information used for our evaluation includes 10 CFR 20.103; Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection; Regulatory Guide 8.20, "Applications of Bioassay for I-125 and I-131; NUREG/CR-3403, "Criteria and Test Methods for Certifying Air-Purifying Respirator Cartridges and Canisters Against Radioiodine", and Regulatory Guide 8.8, "Information Relevant to Ensuring That Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable." Our discussion and evaluation follows.

Discussion and Evaluation

Since a NIOSH/MSHA testing and certification schedule for sorbents for use of protection against radioiodine gases and vapors has not been developed, the NRC staff evaluated the APCo request to verify that the licensee has demonstrated by testing, or by reliable test data, that the material and performance characteristics of the MSA GMR-I canister (No. 466220) can

provide the proposed degree of protection (i.e., a protection factor of 50) under the anticipated conditions of use. We considered canister efficiency and service life, and the effects of temperature, poisons, relative humidity, concentration and breathing rates on canister efficiency and service life. The programmatic evaluation considered quality control/quality assurance, and radiation protection/ALARA consideration, including preparation and planning, on-the-job and post-task evaluations, use of engineering controls, surveillance, and training.

The licensee has provided reliable test information which verifies that the GMR-I canister will provide a protection factor of 50 for over a period of 8 hours of continuous use, provided that the total challenge of radioactive and non-radioactive iodine and other halogenated compounds does not exceed 1 ppm, and temperature does not exceed 110°F.

Coupled with the use of a full facepiece with the capability of providing a protection factor of greater than 100, the protection factor of 50 is conservative under these conditions. GMR-I canister efficiency will be retained for the radioiodine gas or vapors of interest (CH_3I, I_2, HOI) for this time period. Additionally, the licensee has provided data which shows the breakthrough point to be well beyond 8 hours (i.e., the average service life was about 22.6 hours within a range of 15.4 to 33.5 hours at 99% prediction interval). To preclude aging, service life will be calculated from unsealing time, including periods of non-use, and the canister will not be used in the presence of organic solvents or high temperatures. Canisters will be stored in sealed humidity-barrier packaging in a cool, dry environment, and discarded after the 8-hour use period to prevent reuse. Through usage restrictions and air sampling, the licensee will preclude exposures to organic vapors and chemicals (such as decontamination compounds, lubricants, volatized paint; alcohols, freon) which could cause aging, poisoning or desorption of the absorbed radioiodines.

Testing has been conducted under acceptable conditions of pulsed flow, and under worst case conditions for those environmental factors affecting service life-temperature, relative humidity, and challenge concentration of CH_3I (methyliodide/methyl radioiodine which is the most penetrating of the challenge forms). Data provided by the licensee indicate that the canisters perform adequately under the accepted test conditions. These conditions - the criteria and test methods - are consistent with those derived for the NRC for use with the NIOSH program for testing and certification of canisters (i.e., NUREG/CR-3403) and are acceptable.

The licensee has provided commitments that the GMR-I canisters will meet standards for quality assurance and quality control which are recognized by NIOSH, compatible with NRC staff positions, and are therefore acceptable. This includes a commitment to establish a 1% AQL (Acceptable Quality Limit) in a 5 to 10 ppm challenge concentration of CH_3I, 90% relative humidity, 110°F, 64 LPM pulsed flow, for a service life of 8 hours or more at 1% of the challenge concentration penetration. Testing data provided by the licensee demonstrated that the performance (i.e., service life) of canisters at 90% relative humidity is not expected to be significantly different than performance at 100% relative humidity.

The primary bases for the licensee's request for exemption are the potentials for both work effort reduction and dose reduction. The utilization of air purifying respirators in lieu of air-supplied or self-contained apparatuses, where possible, can result in person-rem reductions of from 25% to 50% for several major tasks. The light weight, less cumbersome air purifying respirators (i.e., GMR-I canisters) provided increased comfort and mobility in most cases, resulting in increased worker efficiency and decreased time on-the-job. The licensee has provided a task analysis which shows that the use of GMR-I canisters at Farley site would result is significant dose savings and would be an effective ALARA measure.

Other actions taken by the licensee to assure that exposures to radioiodine are as low as is reasonably achievable (ALARA) are: radioiodine air sampling conducted before and during activities involving the use of GMR-I canisters for radioiodine protection; engineering controls such as local HEPA ventilation and the containment purge system used to reduce airborne levels to as low as practical levels; purification and degasification of the primary coolant conducted prior to refueling resulting in reduced radioiodine levels; area decontamination and strippable paint used to control contamination levels; maintenance planning allowing for radioiodine decay times, where practical, prior to breaching primary systems. Whole body counts will be conducted routinely (e.g., weekly and at 20 MPC hours) and radioiodine data will be trended to detect problems; an investigation level for radioiodine uptakes has been established (at 70 μCi); training of workers and health physics technicians in the use and restrictions for use of GMR-I canisters for radioiodine protection will be conducted prior to their use; and procedures iterating the controls, restrictions, and requirements have been developed and will be implemented. The licensee's efforts to keep exposures ALARA are consistent with our positions in Regulatory Guide 8.8 and are acceptable.

Certain limitations and precautions recommended by APCO based on MSA recommendations and NUREG/CR-3403 guidance would be required for utilization of the GMR-I canisters. We agree with the following such limitations and usage restrictions:

1. Protection factor equal to 50 as a maximum valve.
2. The maximum permissible continuous use time is eight hours after which the canister will be discarded.
3. Canisters are not to be used in the presence of organic solvent vapors.
4. Canisters are to be stored in sealed, humidity barrier packaging in a cool, dry environment.*

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*GMR-I canisters will be maintained in licensee "Class A" storage (i.e., 70°± 10°F; Relative Humidity $\leq$ 40% Design, $\leq$70% Maximum) after receipt of site, except for those maintained for ready issue in the respirator issue area.

5. Canisters allowable service life is to be calculated from the time of unsealing the canister, including periods of non-exposure.
6. Canister is to be used with a full facepiece capable of providing protection factors greater than 100.
7. Canisters are not to be used in total challenge concentrations of organic iodines and other halogenated compounds greater than 1 ppm, including nonradioactive compounds.
8. Canisters are not to be used in environments where temperatures are greater than 110°F.

In addition to the limitations and usage restrictions noted above, the following additional controls will be utilized by the licensee:

1. Temperatures will be measured each shift and/or coincidently with operations which heat the work areas to assure that temperatures do not exceed 100°F during GMR-I canister use.
2. In initially implementation GMR-I canister use, the following program verification measures will be used:
   a. weekly whole body counts for individuals using the GMR-I canister for radioiodine protection;
   b. for individuals who exceed 20 MPC hours, a whole body count will be required prior to their next entry into a radioiodine atmosphere (i.e., effectively a 20 MPC hour stay time);
   c. if an individual's measures 70 nCi or greater iodine uptake to the thyroid during a whole body count, the individuals entry into radioiodine atmospheres will be restricted pending health physics evaluation;
   d. a whole body count/survey data base will be compiled to evaluate the results of the program.
3. Technical Specification controls currently existing which restrict painting and chemical releases in areas served by safety related ventilation filtration systems will provide sufficient restrictions for GMR-I use in these areas also. For other areas, painting or the use of organic substance will be prohibited while the GMR-I canister is in use.
4. Specific plant procedures will incorporate the limitations and usage restrictions listed as 1 through 8 above prior to GMR-I use. Additionally, a specific APCo procedure, FNP-O-RCP-117, "Issue and Use of GMR-I Iodine Canisters" has been prepared for field use of the GMR-I canister.
5. Existing respiratory protection program requirements and restrictions (e.g., physicals, fit tests, Part 20 requirements, Appendices A and B) still apply.

Safety Summary

Our review of the licensee's proposal indicates that the actions proposed by the licensee can result in significant dose savings over alternative methods while still providing effective protection. This exemption would enable the licensee to use a protection factor for air purifying radioiodine gas and vapor respirators in estimating worker exposures to radioiodine gases and

vapors. The licensee has provided usage restrictions and controls which can assure an effective radioiodine protection program. The proposed criteria and test methods for verifying GMR-I canisters effectiveness and quality are consistent with our criteria. The licensee's proposed exemption, with the controls and limitations, meet our positions in NUREG/CR-3403 and Regulatory Guide 8.8, and are acceptable. The actions proposed by the licensee are consistent with the requirements of 10 CFR Part 20.103(e), and are an acceptable basis to authorize the granting of an exemption in accordance with the provisions of 10 CFR Part 20.103(e).

Environmental Consideration

These amendments involve a change in the installation or use of the facilities components located within the restricted areas as defined in 10 CFR 20. The staff has determined that these amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupation radiation exposure. The Commission has previously issued a proposed finding that these amendments involve no significant hazards consideration and there has been no public comment on such finding. Accordingly, these amendments meets the eligibility criteria for categorical exclusion set forth in 10 CFR Sec 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of these amendments.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Dated: October 23, 1984

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