August 2, 1989

Docket Nos. 50-335
and 50-389

Mr. C. O. Woody, Acting Senior
Vice President-Nuclear
Nuclear Energy Department
Florida Power & Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

Dear Mr. Woody:

SUBJECT: EXEMPTION FROM REQUIREMENTS OF 10 CFR PART 20, APPENDIX A, ST. LUCIE PLANT, UNITS 1 AND 2 (TAC NOS. 67138 AND 67139)

The Commission has issued the enclosed exemption from the requirements of 10 CFR Part 20, Appendix A, footnote d-2(c). This exemption permits the use of the Scott Aviation 631-TEDA-H canisters in air-purifying respirators at the St. Lucie Plant.

A copy of the exemption is being forwarded to the Office of the Federal Register for publication.

Sincerely,

Original signed by

Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Enclosure: As stated

cc w/enclosure:
See next page

[EXEMPT2]

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Mr. C. O. Woody
Florida Power & Light Company

St. Lucie Plant

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter	)	
	)	
FLORIDA POWER & LIGHT COMPANY	)	Docket Nos. 50-335 and 50-389
	)	
(St. Lucie Plant, Units 1 and 2)	)	

EXEMPTION

I.

Florida Power & Light Company (the licensee) is the holder of Facility Operating License No. DPR-67, issued March 1, 1976, which authorizes operation of the St. Lucie Plant, Unit 1, and Facility Operating License No. NPF-16, issued April 6, 1983, which authorizes operation of the St. Lucie Plant, Unit 2. These licenses provide, among other things, that the facilities are subject to all rules, regulations and orders of the Nuclear Regulatory Commission (the Commission) now or hereafter in effect. The facilities are pressurized water reactors located in St. Lucie County, Florida.

II.

Appendix A of 10 CFR Part 20 defines protection factors for respirators. Footnote d-2(c) of the appendix states, "No allowance is to be made for the use of sorbents against radioactive gases or vapors."

By their submittal dated February 3, 1988, Florida Power & Light Company (FPL) requested an exemption to 10 CFR Part 20, Appendix A, footnote d-2(c). The licensee submitted this request in accordance with 10 CFR Part 20.103(e). The exemption would allow the use of a radioiodine protection factor of 50 for Scott Aviation (SCOTT) 631-TEDA-H chin canisters to be used at the St. Lucie nuclear power plant.

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Respiratory protection for radioiodine at St. Lucie has normally been provided by use of either an air-supplied or a self-contained breathing apparatus. The use of these appliances is cumbersome and contributes to worker fatigue and lost efficiency. The net result is increased person-rem exposure and a reduction in personnel safety margin. The use of the air-purifying respirators (utilizing the SCOTT 631-TEDA-H canister) can enhance worker comfort and allow greater mobility than the other appliances. FPL estimates that air-purifying respirators would enable a 25-50% reduction in the time required to conduct certain tasks requiring respiratory protection. This correlates to a 25-50% reduction in person-rem exposure for these tasks.

Criteria and background information used for the evaluation includes 10 CFR 20.103; 10 CFR 19.12; 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."

In addition to the information provided in their February 3, 1988 application, FPL provided additional information on May 5, 1988, June 23, 1988, and May 4, 1989 in response to staff requests for additional information in a March 16, 1988 letter and in conference calls on October 4, 1988 and March 15, 1989. Clarifications of the FPL submittals were obtained in telephone discussions with FPL representatives on June 2 and June 7, 1989.

III.

Since a NIOSH/MSHA testing and certification schedule for sorbents for use for protection against radioiodine gases and vapors has not been developed, the NRC staff has evaluated the licensee's request and verified, as required by 10 CFR 20.103(e), that the licensee has demonstrated by testing, or by reliable test data and adequate quality assurance measures, that the material and performance characteristics of the SCOTT 631-TEDA-H canister can provide the proposed degree of protection (i.e., a protection factor of 50), under the anticipated conditions of use, for a maximum of 8 hours. The main considerations of the staff's technical evaluation were canister efficiency and service life, including the effects of temperature, poisons, relative humidity, challenge concentration, and breathing rates on canister efficiency and service life. The staff's programmatic evaluation considered quality control/quality assurance (QC/QA) measures employed to ensure canister performance, and radiation protection/ALARA measures, such as reduction of radioiodine levels using system cleanup, engineering controls, radiological surveillance, and radiological training.

The licensee has provided reliable test information which verifies that the sorbent canister selected (SCOTT 631-TEDA-H) will provide a protection factor of 50 for a period of 8 hours or more of continuous use, provided that the total challenge concentration of radioactive and non-radioactive iodine and other halogenated compounds does not exceed 1 ppm, and temperature does not exceed 120°F at 100% relative humidity. The data provided by SCOTT shows that use of the 631-TEDA-H canister in saturated air (100% relative humidity) at 120°F should provide a nominal 12 hour duration to a 1% methyl iodide penetration.

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

(methyl iodide), which is the most penetrating of the challenge forms. SCOTT data provided by the licensee indicates that the 631-TEDA-H canisters perform adequately under the accepted test conditions. These conditions, the criteria and test methods, are consistent with those recommended in NUREG/CR-3403 and are acceptable.

The licensee has provided commitments that the SCOTT canisters will meet standards for quality assurance and quality control that are recognized by NIOSH, compatible with NRC staff positions, and are, therefore, acceptable. This includes a commitment by SCOTT to establish an MIL-STD-414, Level II, 1% AQL (Acceptable Quality Limit) in a 10 ppm challenge concentration of CH_3I, 90% relative humidity, 120°F, 64 L/min pulsed flow, for a test duration of 8 hours for maximum penetrations equal to 1% of the challenge concentration. Test data provided by the licensee has demonstrated that performance (i.e., service life) of canisters at 100% relative humidity is acceptable.

Coupled with the use of a full facepiece with the capability of providing a minimum fit factor of 500, the protection factor of 50 is conservative under these conditions. Canister efficiency will be retained for the radioiodine gas or vapors of interest (CH_3I, I_2, HOI) for this time period (i.e., 8 hours). Additionally, the licensee has provided data which shows the breakthrough point to be well beyond 8 hours. To preclude aging, a maximum of 8 hours will be stipulated. This service life will be calculated from the time the canister is unsealed, including periods of non-use.

Canisters will be sealed at time of manufacture with an essentially hermetic seal which inhibits water vapor transmission through the seals. The canisters will be stored in air-conditioned rooms and will be discarded after the use

period of 8 hours or less to prevent reuse. The shelf-life of the canisters, under the conditions of storage at St. Lucie, is estimated by the licensee to be 3 years.

Through usage restrictions, provided by a chemical control program, the licensee will preclude the unauthorized and indiscriminate use of organic solvents and chemicals (such as paints, paint solvents, methyl alcohol, ethanol, isopropyl alcohol and acetone) which could cause aging, poisoning, or desorption of the sorbed radioiodines. The chemical controls will not prohibit the use of these organic solvent vapors and chemicals, but the protection factor will be reduced from a value of 50 to a value of 1 when the SCOTT canister is used in their presence. The licensee will modify their health physics and respiratory protection procedures regarding the proper use and limitations of SCOTT 631-TEDA-H canisters prior to use for radioiodine protection. FPL will have an active program to recognize chemical contaminants that may affect the canister. Relevant health physics procedures will be modified to include requirements to evaluate the potential effects to the canister from work involving chemicals.

The 631-TEDA-H canister contains activated carbon impregnated with 5% by weight triethylenediamine (TEDA). This compound has a normal boiling point of 174°C but is known to sublime readily at room temperatures. The volatility of the pure crystals has raised the questions of (1) the volatility of the TEDA impregnated in activated carbon and (2) the possible toxicity of TEDA volatilized from a canister and inhaled. Studies have been performed on the desorption characteristics of TEDA from impregnated activated carbons. It has been found that the desorption vapor concentration of TEDA is not a function of the linear flow rate or sorbent bed depth within the canister. However, the logarithm of

the desorption vapor concentration has been found to be linearly related to the reciprocal of the absolute temperature (°K). The maximum TEDA desorption vapor concentration at 48.9°C (120°F) has been found, by extrapolation from published measurements at higher temperatures [G. O. Wood, Am. Ind. Hyg. Assoc. J. 45 (9):622-625(1984)], to be approximately 2 mg/m^3. There are no toxicological data available for TEDA; however, TEDA belongs to a class of organic aliphatic amines many of which have been shown to be toxic. Threshold limit values for similar amines are as follows:

	(mg/m^3)	(ppm)
Ethylamine	18	10
Diethylamine	30	10
Triethylamine	40	10
Ethylenediamine	25	10
Diethylenetriamine	4	1

The 2 mg/m^3 desorption value at 48.9°C is below the lowest threshold limit value for similar type substances and therefore the licensee does not expect desorbed TEDA to present a toxic hazard to the user.

Certain limitations and precautions based on the sorbent canister manufacturer's recommendations and NUREG/CR-3403 guidance are necessary for effective utilization of the sorbent canisters. The staff agrees with the following such limitations and usage restrictions as proposed by the licensee:

1. Protection factor equal to 50 as a maximum value.

2. Maximum service life of 8 hours (time from unsealing to discarding, including periods of non-exposure).
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 an air-conditioned (office-type) environment.
5. Canisters are to be used with a full facepiece respirator for which the canister has been certified by NIOSH/MSHA (approval number TC-14G-118). These respirators with 631-TEDA-H canisters are to be capable of providing fit factors greater than 500 for each potential user of the respirator as determined by fit testing with a challenge atmosphere. FPL will verify that each individual has, prior to the initial use of the canister, received a respirator fitting with the type of full-face respirator to be used with the canister and has achieved as a minimum a fit factor of 500 (10 times greater than the protection factor of 50). The relevant health physics procedure will be modified to incorporate the minimum required fit factor of 500 for full-face respirators to be used with the SCOTT 631 TEDA-H canisters.
6. Canisters are not to be used in environments where the temperature exceeds 120°F.
7. Canisters are not to be used in challenge atmosphere concentrations of total organic iodines and other halogenated compounds (including nonradioactive compounds) greater than 1.0 ppm.

In addition to the limitations and usage restrictions noted above, the licensee will utilize the following additional administrative and procedural controls:

1. Health physics procedures for maximum permissible concentration hour accountability, bioassay, and respiratory protection will be modified

to reflect the additional efforts that will be necessary to verify the effectiveness of the SCOTT canister program.

2. FPL will perform weekly whole body/thyroid counts for individuals using the SCOTT canister for protection against radioiodines. Relevant health physics procedures will be modified to reflect the need for whole body counting on a weekly basis for those individuals using the canister for protection from radioiodines.

3. In the initial implementation of SCOTT canister use, the following program verification measures will be used:

   a. All personnel who exceed 10 maximum permissible concentration (MPC) hours in seven (7) consecutive days will receive a whole body/thyroid count prior to re-entering a radioiodine atmosphere.

   b. Personnel that have a thyroid burden of 70 nCi or greater as determined by whole body/thyroid count will be restricted from further exposure to radioiodine atmospheres until the reason for the thyroid burden has been evaluated by Health Physics and until the individual is authorized by the Health Physics Department Head to re-enter atmospheres containing radioiodines.

   c. A database of whole body/thyroid count results and maximum permissible concentration hour data will be established to assist in the evaluation of the program's effectiveness.

4. The St. Lucie Plant's chemical control program precludes the unauthorized and indiscriminate use of organic solvents and chemicals. Some organic solvent vapors of concern to the SCOTT cartridges are paints, paint solvents, methyl alcohol, ethanol, isopropyl alcohol and acetone.

The St. Lucie Plant will establish procedural controls over the use of the SCOTT canister in the presence of these chemicals. The controls will not prohibit the use of the SCOTT canister in the presence of these organic solvent vapors and chemicals, but the protection factor of the canister will be reduced from 50 to 1. FPL will have an active program to recognize chemical contaminants that may affect the canister. Relevant health physics procedures will be modified to include requirements to evaluate the potential effects to the canister from work involving chemicals.

5. A quality control (Q.C.) lot acceptance plan will be employed by SCOTT Aviation on each manufacturing lot of 631-TEDA-H canisters produced. Therefore, all canisters consumed by FPL will have been tested per the requirements of the Q.C. plan.

6. MIL-STD-414, level II, AQL 1% will be used to determine the number of criteria based on canister performance results. The canister test conditions will be as follows:

Air Temperature, % Relative Humidity	:	120°F /90% R.H.
Airflow rate conditions	:	192 L/min for 0.82 seconds
	:	0 L/min for 1.64 seconds
Contaminant/Concentration	:	CH_3I/10 ppm
Test Duration	:	8 Hours
Performance Criteria	:	1% maximum penetration

FPL will accept only those canisters that have been certified by SCOTT as meeting the acceptance criteria of the MIL-STD-414 acceptance plan. FPL will perform a receipt inspection of each shipment of the canisters to verify lot number, expiration date of the canisters and physical integrity of the canisters. SCOTT will be required to provide to FPL the results of the acceptance testing for each lot of the canisters that FPL purchases from SCOTT.

7. FPL does not plan to reuse the canisters after initial use. All canisters will be removed after use and discarded to prevent any further use. The canisters will not be used when the radionuclide concentrations of radioiodines, particulates or a combination of each exceed 50 times the applicable limit for the radionuclides in question in 10 CFR Part 20 Appendix B, Table I Column 1 as described in 10 CFR 20.103(c)(1).
8. Existing respiratory protection program requirements and restrictions (e.g., physicals, fit tests, Part 20 requirements, Appendices A and B) still apply. The licensee will modify respiratory protection procedures to include specific aspects of issue and use of SCOTT canisters.

FPL experience has indicated that the use of air-purifying respirators with the SCOTT 631-TEDA-H canister can result in significant savings in collective (person-rem) dose to workers. In 1985 the St. Lucie Unit 1 steam generator channel heads were shielded to reduce exposure during a nozzle dam modification. During mock-up training, time trials were performed using airline respirators vs. air-purifying respirators with iodine canisters. It took 26 minutes of jump time to install the shielding in one channel head using airline respirators vs. 18 minutes using air-purifying respirators. This 31% reduction in time would have resulted in a reduction of 2.4 man-rem (300 mrem/min) per channel head and a total of 9.6 man-rem for all four channel heads. Nozzle dam installation/removal has been identified as a task where significant man-rem reductions could be realized using air-purifying respirators. In 1987, forty-two (42) man-rem were received for this job, whereas 12.6 man-rem would have been avoided if air-purifying respirators had been used. In 1984, the Farley Plant provided a task

analysis showing that the use of similar (Mine Safety Appliances Co. Model GMR-1) canisters at Farley would result in significant dose savings and would be an effective ALARA measure.

Reduction of radioiodine levels at St. Lucie is primarily conducted through system cleanup. Shutdown boron concentrations for refueling operations are reached early in a unit cooldown to create a crud burst and allow for maximum cleanup time with the reactor coolant pumps available. To prevent radioiodine from remaining in the stagnant loops, the reactor coolant pumps are run concurrent with shutdown purification operations until the reactor coolant system iodine levels appear to be stable or decreasing to approximately 0.1 mCi/cc. The pressurizer steam space is vented to the volume control tank and the reactor coolant system degasification is accomplished by following Operating Procedure 1-0030127, entitled "Reactor Plant Cooldown - Hot Standby to Cold Shutdown." The containment purge system and airborne activity removal fans are used to reduce radioiodine concentrations in the containment building. Temporary charcoal filters have also been placed at the inlet side of the containment coolers for additional iodine removal. Portable HEPA units (negative pressure ventilation blowers) are used at the steam generator manway openings and the reactor head during and after the breach of the reactor coolant system. Decontamination of work areas is accomplished throughout an outage. Previous major system decontamination efforts include the steam generator channel head and the refueling pool cavities. If practical, time is allowed for contamination reduction by decay; however, the main emphasis is on system and area cleanup. During normal operation, attempts are made to minimize power transients in order to reduce radioiodine levels. Long-term efforts include QA/QC programs for fuel

quality. Also, the benefits of the fuel reconstitution process are being evaluated by FPL for consideration in subsequent refueling outages. With respect to fuel design improvement, several areas are being evaluated and/or implemented in order to reduce the fretting of fuel pins, therefore reducing the likelihood of fuel pin failures. Additionally, following outages of certain duration, slow power ramp rates are used to precondition the fuel which could result in a lower incidence of fuel failure.

The licensee has developed and is implementing an ALARA program consistent with the staff's position in Regulatory Guide 8.8 and the licensee's efforts to keep radiation exposures ALARA are acceptable to the staff.

In summary, the licensee is required to use process or other engineering controls, to the extent practicable, to limit concentrations of radioactive materials in air to levels below those which delimit an airborne radioactivity area as defined in 10 CFR 20.203(d)(1)(ii). When it is impracticable to apply process or other engineering controls to achieve these concentrations of radioactive material in air, the licensee is required to use other precautionary procedures, such as increased surveillance, limitation of working times, or provision of respiratory protective equipment to maintain worker intake of radioactive material as far below the limits of 10 CFR Part 20 as is reasonably achievable. The licensee has been providing respiratory protection for radioiodine by use of air-supplied or self-contained breathing apparatus. However, the use of these apparatuses is cumbersome and contributes to worker fatigue and lost efficiency. The net result is increased exposure of workers to radiation (increased person-rem). The use of air-purifying respirators can enhance worker comfort and allow greater mobility than the air-supplied or self-contained breathing

apparatus. However, 10 CFR Part 20, Appendix A, Footnote d-2(c) stipulates that no allowance is to be made for the use of sorbents against radioactive gases or vapors in assigning protection factors for respirators. Also, 10 CFR 20.103(e) provides that where equipment of a particular type has not been tested and certified, or had certification extended by NIOSH/MSHA, or where there is no existing schedule for test and certification of certain equipment, the licensee shall not make allowance for this equipment without specific authorization by the Commission. An application for this authorization must include a demonstration by testing, or on the basis of reliable test information, that the material and performance characteristics of the equipment are capable of providing the proposed degree of protection under anticipated conditions of use.

Therefore, the licensee has applied for an exemption, in accordance with the provisions of 10 CFR 20.103(e), to allow the use of a radioiodine protection factor in estimating worker exposure from radioiodine gases and vapors when an air-purifying respirator with a sorbent canister is used to provide this protection. The staff's 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. The licensee has provided usage restrictions and controls which can assure an effective radioiodine protection program. The proposed criteria and test methods for verifying the effectiveness and quality of SCOTT 631-TEDA-H canisters are consistent with the staff's criteria. The licensee's proposed exemption, with the controls and limitations, is consistent with the staff's position in granting similar exemptions, is consistent with the qualification process recommended in NUREG/CR-3403, is consistent with the staff's position in Regulatory Guide 8.8, and is acceptable.

The actions proposed by the licensee are consistent with the requirements of 10 CFR Part 20.103(e), and form an acceptable basis to authorize the granting of an exemption in accordance with the provisions of 10 CFR Part 20.103(e).

IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 20.501, an exemption is authorized by law and will not result in undue hazard to life and property. The Commission hereby grants an exemption from the requirements of footnote d-2(c) of Appendix A of 10 CFR Part 20 to permit the use of Scott Aviation 631-TEDA-H canisters at the St. Lucie Plant, Units 1 and 2.

Pursuant to 10 CFR 51.32, the Commission has determined that granting this exemption will have no significant effect on the quality of the human environment (54 FR 31902, August 2, 1989).

For further details with respect to this action, see the licensee's request dated February 3, 1988, as supplemented by letters dated May 5, 1988, June 23, 1988, and May 4, 1989, which are available for public inspection at the Commission's Public Document Room, 2120 L Street NW., Washington DC, and at the Indian River Junior College Library, 3209 Virginia Avenue, Fort Pierce, Florida 33450.

FOR THE NUCLEAR REGULATORY COMMISSION

Steven A. Varga, Director
Division of Reactor Projects-I/II
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland
this 2nd day of August 1989.