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NOVAK,T.M. Assistant Director for Operating Reactors

SUBJECT: Forwards responses to NRC 800717 questions concerning radwaste from condensate polishing demineralizing sys.

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Assistant Director for Operating Reactors

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FLORIDA POWER & LIGHT COMPANY

August 29, 1980
L-80-283

Office of Nuclear Reactor Regulation
Attention: Mr. Thomas M. Novak,
Assistant Director for
Operating Reactors
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Novak:

Re: Turkey Point Units 3 & 4
Docket No. 50-250, 50-251
Radwaste from Condensate
Polishing Demineralizing System

Florida Power & Light has reviewed the NRC letter dated July 17, 1980 concerning the above subject. Our answers to the questions in that letter are attached.

Very truly yours,

Robert E. Uhrig

Robert E. Uhrig
Vice President
Advanced Systems & Technology

REU/PLP/md

cc: J.P. O'Reilly, Region II
Harold F. Reis, Esquire

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PEOPLE . . . SERVING PEOPLE

ATTACHMENT

Re: Radwaste from Condensate
Polishing Demineralizing System

1) The information listed in Appendix B to Regulatory Guide 1.112, Item 3 for Turkey Point Unit 4 is provided below as requested. Unless otherwise noted the information is also applicable to Unit 3. It should be noted that although the condensate polisher is unrelated to the steam generator repair effort, our anticipated schedule for its installation coincides with the steam generator repair outage. In that regard, the information provided in this response considers that the replacement steam generators are in place.

3. Secondary System

a) Turkey Point, Unit 4 will have three vertical steam generators which were specifically designed as replacements for the steam generators originally supplied with the nuclear steam supply system at Turkey Point Unit 4.

The type of chemistry considered for the replacement steam generators is volatile chemistry.

Although it is unlikely that steam generator tube leakage will occur in the replacement steam generators, the carryover factors to be assumed are 0.01 for iodine and 0.001 for non volatiles - NUREG 0017.

b. The total design steam flow from the replacement steam generators is 3.21×10^6 Lb/h.

c. The liquid mass contained in each steam generator at 100% load is 1.589×10^5 Lb. (design)

d. Although it is unlikely that steam generator tube leakage will occur in the replacement steam generators, the primary-to-secondary leakage rate to be assumed is 100 lb/day - NUREG 0017.

e. The replacement steam generator blowdown system is planned to accommodate a total steam generator blowdown of up to 6 per cent of the steaming rate. The design provides for a maximum of 1 per cent to be returned to the secondary condensate system upstream of the condensate polishers.

f. The condensate polishers are being designed to process 100 per cent of condensate system flow.

g. The approximate flow rate of condensate passing through the condensate polisher systems will be 6.8×10^6 lb/hr. (design).

The condensate polishers will be of the powdex resin type.

The condensate polisher system consists of four 1500 ft^2 (active filter area) vessels. During normal operation, three vessels are in service.

The expected replacement frequency per vessel for the condensate polisher precoat media is approximately every 21 days.

Ultrasonic resin cleaning is not utilized in the Turkey Point condensate polisher system.

Each backwash of a condensate polisher vessel will produce approximately 300 pounds of spent resin and filtered solids and approximately 6000 gallons of water.

2) The following provides a description of the operation of the spent resin handling system. A preliminary drawing of the spent resin handling system is attached for reference.

Spent filter media is flushed from a condensate polisher vessel into the backwash receiver tank. The first phase of water/solids separation occurs in the backwash receiver tank where the heavier solids settle to the bottom of the tank.

The second phase of water/solids separation occurs in the pressure filter. At a preset level in the backwash receiver tank, a backwash recovery pump starts to recirculate the liquid contents within the tank. The water recirculating through the pressure filter is further cleaned of solids. If necessary, a representative sample of the tanks liquid contents can be collected at this time. The liquid contents of the tank can either be directed to the plant's radioactive liquid waste effluent system or directly to the facility cooling system as warranted.

The third phase of water/solids separation takes place in the de-watering filter. Solids from the backwash receiver tank (which is sized to hold the solids from ten backwashes) are processed via the backwash transfer pump and dewatering filter. This process completes the separation of the high density solids from the liquid which is returned to the backwash receiver tank. The de-watered solids are then transferred to a suitable container. Here samples can be collected and analyzed for radioactivity.

3) The Turkey Point 3 & 4 condensate polisher systems will be used to filter and purify steam generator feed water in Turkey Point's secondary condensate systems. The condensate systems condense the steam produced by the steam generators after it has passed through the turbines. During normal operation, fluid in the secondary system of a PWR such as Turkey Point would contain no radioactivity.

The new steam generators will renew the integrity of the boundary between the steam generator secondary side and the primary coolant at Turkey Point 3 & 4. In the unlikely event that leakage does occur at the steam generator tube boundary, minute quantities of radioactivity may carry over with the steam possibly resulting in low level radioactive contamination of the condensate polisher filter media.

Liquid

We plan to establish the following procedure and limits to handle the waste generated by our condensate polishers:

After a condensate polisher vessel run, the vessel will be removed from service, and the filter media backwashed into a backwash receiver tank. In the backwash receiver tank, the resin will settle to the bottom of the tank leaving approximately 6000 gallons of liquid to be discharged. Complete separation of resin and water will be accomplished by the spent resin handling systems.

Under normal circumstances no radioactivity will pass through the Turkey Point 3 & 4 condensate polisher systems. However, the secondary systems at Turkey Point are continuously monitored for evidence of primary to secondary leakage, and, the steam generators are sampled and analyzed for radioactivity each day in accordance with Turkey Point 3 and 4 Nuclear Chemistry Procedure - NC-77, DETERMINATION OF GROSS BETA-GAMMA ACTIVITY IN THE SECONDARY COOLANT AND OTHER UNMONITORED SYSTEMS.

During normal operation, the liquid contents of the backwash receiver tank should contain no radioactivity. Consequently, if there is no indication of primary to secondary leakage or radioactivity in a steam generator, there will be no need to sample the liquid contents of the backwash receiver tank, and the liquid can be discharged directly to the facility cooling system.

If, however there is evidence of primary to secondary leakage or radioactivity in a steam generator, then a representative portion of the liquid contents of the backwash receiver tank will be collected and analyzed for radioactivity. The analysis for radioactivity will be consistent with the provisions of Turkey Point Units 3 and 4 Nuclear Chemistry Procedure NC-43, SAMPLING AND ANALYSIS OF THE CONTENTS OF LIQUID WASTE TANKS FOR GROSS BETA-GAMMA OR ISOTOPIC RADIOACTIVITY.

If the specific radioactivity of the liquid contents of the backwash receiver tank equals or exceeds 1×10^{-7} µci/ml (Gross beta-gamma) or 5×10^{-7} µci/ml (isotopic), then the liquid contents of the tank would be transferred to the radwaste system for release or further processing. In this case, a liquid release permit would be prepared prior to release. Preparation of the release permit would be consistent with the provisions of Turkey Point Units 3 and 4 Nuclear Chemistry Procedure NC-44, PREPARATION OF A LIQUID RELEASE PERMIT.

If the specific radioactivity of the liquid contents of the backwash receiver tank is below 1×10^{-7} µci/ml (Gross beta-gamma) or 5×10^{-7} µci/ml (isotopic), the liquid contents of the backwash receiver tank can be discharged without restriction.

Solids

During normal operation, there should be no radioactivity in the solids contained in the spent resin storage tank, thus we expect that the solids removed from the backwash receiver tank will be handled as "non

radioactive." Since however, the condensate polisher filter media may act as a concentrator of radioactivity, a representative sample of solids from the backwash receiver tank will be screened even if there is no indication of primary to secondary leakage or radioactivity in a steam generator. The screening will be accomplished by using an HP-210 or other portable survey instrument with a sensitivity equal to or better than the HP-210.

If screening of the solids from the backwash receiver tank indicates above minimum detectable radioactivity, or there is evidence of primary to secondary leakage or radioactivity in a steam generator, then a representative sample of the solid contents of the backwash receiver tank will be analyzed isotopically for radioactivity. Under these circumstances, solids from the backwash receiver tank will not be released as "non-radioactive" if the specific radioactivity of the solids equals or exceeds the values listed in 10 CFR 20 Appendix B, Table II expressed in µci/gram.

4) During normal operation, water passing through the Turkey Point condensate polishers will contain no radioactivity, thus the contents of the backwash receiver tank will contain no radioactivity. If there is no indication of primary to secondary leakage or radioactivity in a steam generator, there will be no requirement to sample and analyze the liquid contents in the backwash receiver tank. However, in the event there is evidence of primary to secondary leakage or radioactivity in a steam generator, a representative sample of the liquid contents of he tank will be analyzed for radioactivity. The test used to analyze this sample is described in Turkey Point Units 3 and 4 Nuclear Chemistry Procedure NC-77 DETERMINATION OF GROSS BETA-GAMMA ACTIVITY IN THE SECONDARY COOLANT AND OTHER UNMONITORED SYSTEMS. The minimum sensitivity for this test is 1×10^{-7} µci/ml (Gross Bγ) or 5×10^{-7} µci/ml (isotopic).

Since the condensate polisher filter media may act as a concentrator for radioactivity, solids from the backwash receiver tank will be screened even if there is no evidence of primary to secondary leakage or radioactivity in a steam generator. Screening will be accomplished by surveying a representative sample of solids from the backwash receiver tank using an HP 210 or other portable survey instrument having an equivalent or better sensitivity.

If there is evidence of primary to secondary leakage or radioactivity in a steam generator, or if the screening test indicates radioactivity above minimum detectable, an isotopic survey will be done on a representative sample of solids from the backwash receiver tank. The isotopic analysis will be conducted so that a minimum detectable activity of 5×10^{-8} µci/gram for Cs 134 can be obtained.

5. a. The current design of the continuous steam generator blowdown system at Turkey Point 3 & 4 is for blowdown effluent to be discharged untreated to the facility cooling system. The design of the blowdown system for the replacement steam generators however provides for the capability to recover steam generator blowdown up to one percent of the steaming rate using a condensate polisher. Consequently in the unlikely event that primary to secondary leakage does occur in the replacement steam generators, the amount of radioactivity which is released to the plant

effluent will be reduced while the condensate polishers are in operation.

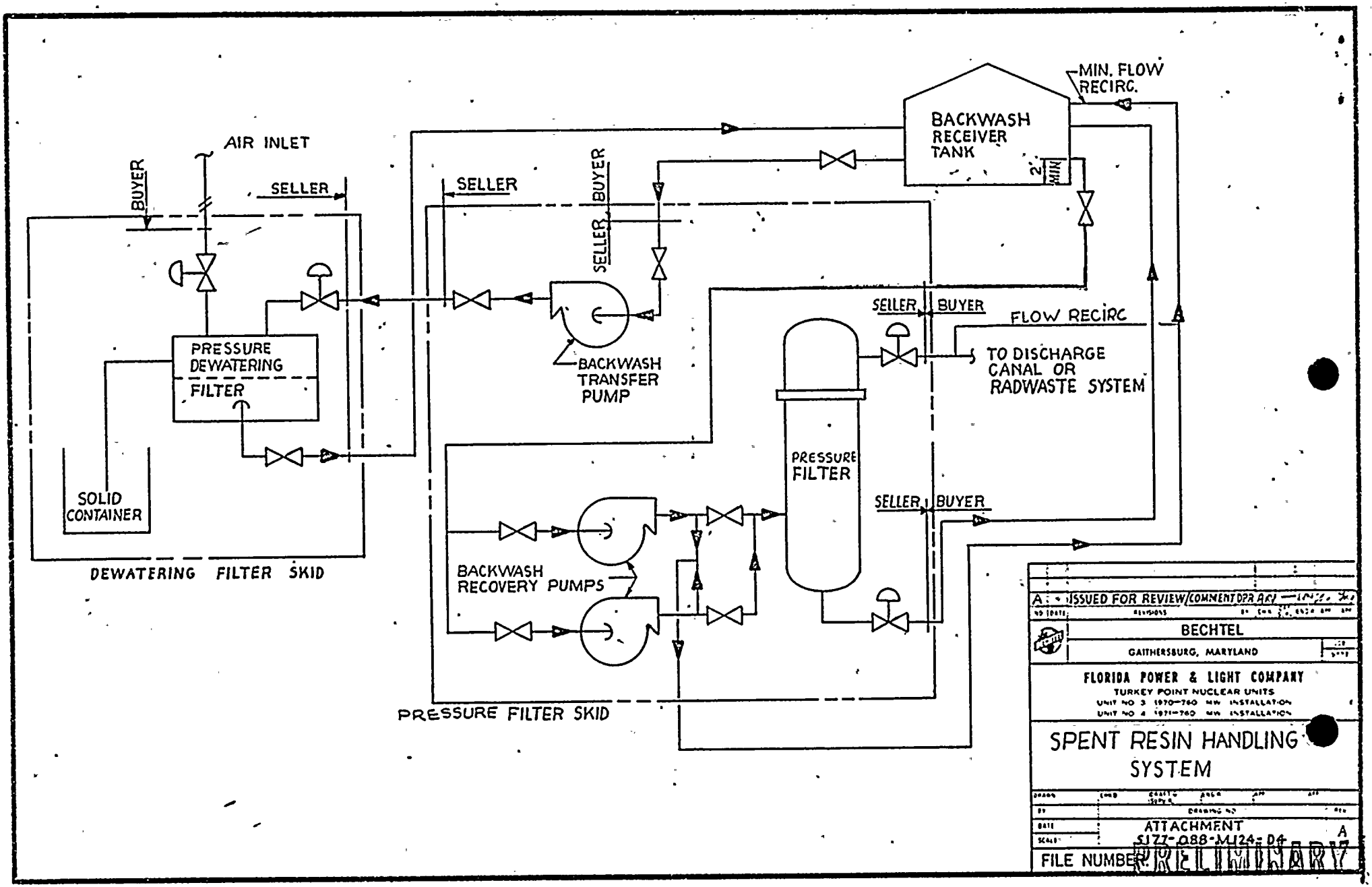
We estimate that operation of the condesnate polishers at Turkey Point 3 & 4 will result in powdex material usage of approximately 57,000 lbs./year. We also estimate that under the evaluated conditions, primary to secondary leakage of 100 lbs/day with 0.1% failed fuel, the radioactivity in the powdex material will not exceed 0.05μ ci/gram. Consequently the amount of radioactivity generated from radioactive solids associated with the operation of condensate polishers at Turkey Point 3 & 4 will be a small fraction of the radioactivity associated with normal operation of the CVCS demineralizers.

b. Since it can be concluded that the amount of radioactivity released to the effluent of the facility can be reduced by operation of the condensate polishers, it logically follows that maximum exposures to individuals in unrestricted areas will likewise be reduced.

c. Treatment of condensate and steam generator blowdown by the condensate polishers will result in a reduced contribution of radioactivity to the plant's liquid effluents. Based upon decontamination factors listed in NUREG 0017, the radioactivity in the steam generator blowdown water could be reduced by as much as 10 for most isotopes if blowdown recovery is in operation.

The question concerning solid wastes was discussed in 5A above.

d. During normal operation the dose rates in the immediate vicinity of the condensate demineralizers will be well within the Zone 1 classification of 0.5 mr/hr. The dose rate 12 ft away is estimated to be less than 0.1 mr/hr., based on continuous operation for 3 weeks with 0.1% failed fuel and a primary to secondary leak rate of 100 lbs/day. If the secondary system activity increases excessively, the blowdown to the condenser hotwell would be discontinued and/or the condensate demineralizers bypassed to maintain acceptable exposures to plant operating personnel.



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