



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 67 TO FACILITY OPERATING LICENSE NO. DPR-31
AND AMENDMENT NO. 59 TO FACILITY OPERATING LICENSE NO. DPR-41
FLORIDA POWER AND LIGHT COMPANY
TURKEY POINT PLANT UNIT NOS. 3 AND 4
DOCKET NOS. 50-250 AND 50-251

I. Introduction

By letter dated April 2, 1981, as supplemented April 17, 1981, Florida Power and Light Company (the licensee) submitted the results of the March 1981 steam generator inspection and implemented plugging program for Unit 3 and requested permission to return Unit 3 to power operation for a period of six equivalent full power months.* The staff has reviewed the license conditions for steam generator inspections. Based on this review, the staff has concluded that the licensee conditions for Unit 3 and Unit 4 should be modified as proposed. The modifications clarify the inspection requirements, and substitute 24 hour reporting requirement, and a licensee safety analysis in place of the requirement of NRC permission for return to power operation.

*For purposes of this SER, equivalent operation is defined as operation with primary coolant temperature greater than 350°F.

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II. Steam Generator Inspection for Unit 3

Turkey Point Unit 3 is one of several Westinghouse PWR facilities which have experienced extensive denting of the steam generator tubes. By letter dated April 2, 1981, Florida Power and Light Company (the licensee) submitted the results of the March 1981 steam generator inspection at Turkey Point Unit 3. The March 1981 inspection followed 3.5 equivalent months of operation (i.e. operation with the reactor coolant temperature greater than 350 F) since the previous inspection in October 1980. Based upon March 1981 inspection results and implemented plugging repairs, the licensee has requested approval to operate Unit 3 for an additional six equivalent months.

DISCUSSION

The steam generator tube inspection performed at Turkey Point Unit 3 during October 1980 included programs to assess tube degradation associated with both the denting and wastage phenomena. For denting, tube gauging was performed in all three steam generators using .650 inch, .610 inch, and .540 inch (diameter) eddy current probes. The implemented gauging program was similar to those implemented previously at this and other similarly degraded units and included the gauging of all unplugged tubes within areas (tubelane, periphery, wedge, and patch plate regions of the hot leg, and tubelane region of the cold leg) where significant denting activity had been observed previously.



Denting activity was observed to be generally consistent with previous experience at this and other similarly degraded units. Tubes in the tubelane region that restrict passage of a .650 inch probe continue to occur at or adjacent to areas where such restrictions have been observed during previous inspections. Only a single tube restricted passage of a .540 inch probe after 3.5 EFPM of operation, compared to 13 such restrictions observed in October 1980 after approximately 8.5 EFPM of operation.

The plugging criteria implemented during the steam generator inspection are the same as those implemented previously at this and other similarly degraded units to support six months operation. These criteria include the plugging of .540 inch and .610 inch restricted tubes and .650 inch restricted tubes in the periphery of the hot leg wedge region and on either side of the patch plate boundary. Implementation of these criteria resulted in the plugging of 10, 23, and 25 tubes in steam generators A, B, and C, respectively, compared to 57, 7, and 22 tubes which were plugged in these steam generators following the previous inspection in October 1980.

The results of the Regulatory Guide 1.83 inspections for wastage in the central bundle region revealed no tubes with indications in excess of the 40% wall penetration plugging limit. A comparison of the eddy current indications equal to or greater than 20% with the corresponding data from the previous outage indicate essentially no change in the average wall penetration during the most recent operating interval of 3.5 EFPM. These comparisons were performed for the cold leg where most of the wastage indications have been observed. As a conservative measure, two tubes exhibiting distorted tubesheet entry signals in March 1981 were plugged. This was done to cover any possibility that sizable defect indications may have been masked by the tubesheet signal. These tubes

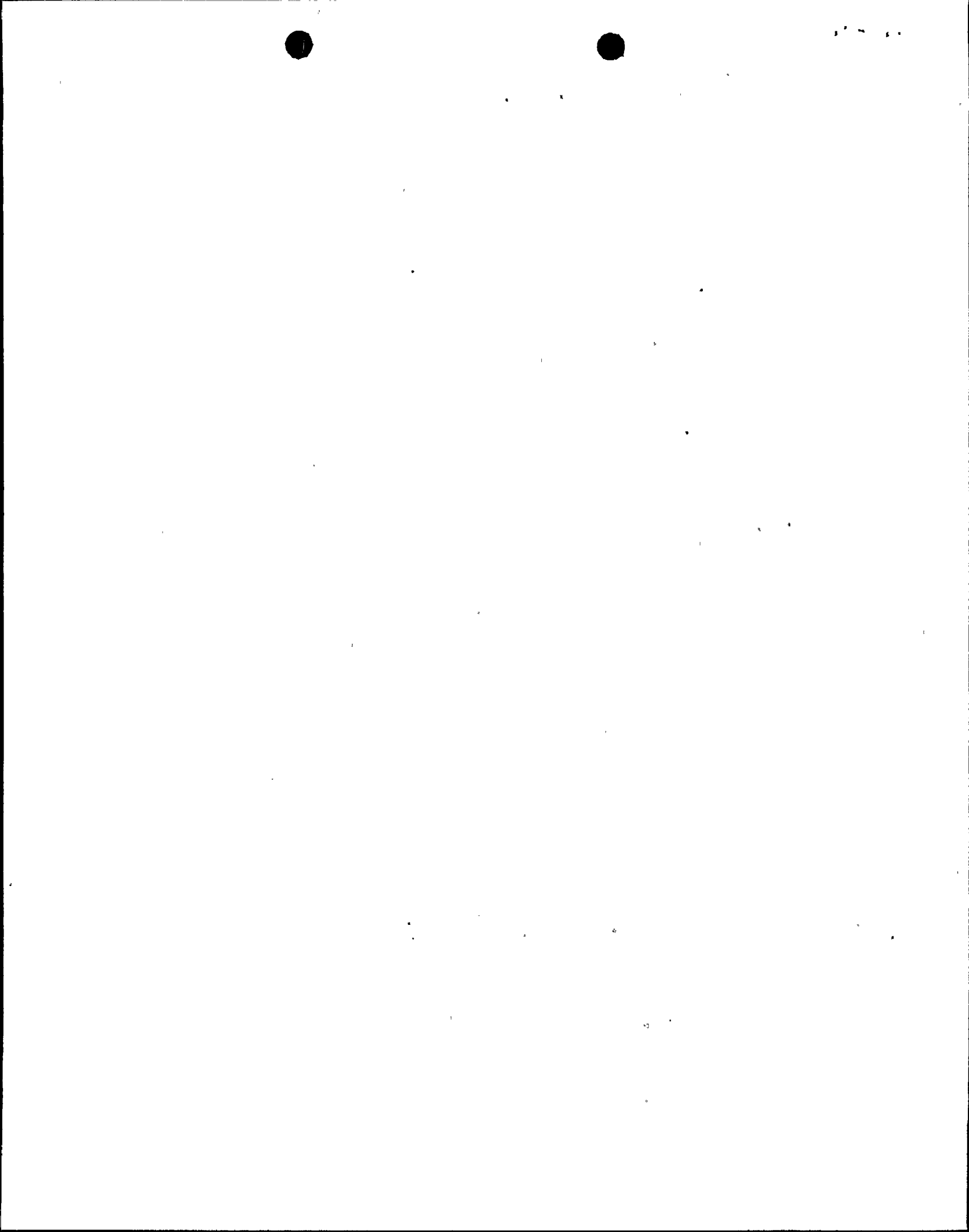
had been reported in 1974 as continuing 43 and 44% through wall indications, respectively, which were less than the plugging limit as specified at that time. Inspection of these tubes in subsequent years revealed less than a 20% indication in one tube and no indication in one other.

The small radius u-bends of unplugged tubes in rows 3 through 5 in steam generator C were inspected at 100 KHZ, and no indications were found. All row 1 and 2 tubes were plugged in previous outages.

Recurrence of Foreign Matter in Steam Generators

In an April 1, 1981 update to LER 250-79-24, the licensee reported the finding and retrieval of foreign material from the C steam generator hot leg inlet during the March 1981 outage. The foreign material is described as one piece of sheet metal type, ferromagnetic material weighing 255 grams. Eleven pieces (359 grams total) of this material had been found and retrieved from the B and C steam generators during the December 1979 outage. Analyses of a sample of this material showed that the sample is an unalloyed plain carbon steel. The licensee's investigation did not reveal the source of this material. The licensee believes that this material was introduced during a previous refueling shutdown, steam generator inspection outage, or during construction.

Visual examination of the piece of foreign material found in March 1981 supports the conclusion that it originated from the same base piece which was previously discovered. A metal-impact-monitoring system had been used to monitor startups following the previous shutdowns; however, no abnormalities were detected. An inspection of the upper internals and of a 90° sector of the reactor vessel where the reactor coolant piping connects to C steam generator revealed no damage or additional foreign material. The licensee has concluded that the steam generator inspection program augmented by a visual examination of both



the steam generator primary side and the reactor vessel provides assurance that all foreign objects were retrieved from the reactor coolant system. However, the licensee plans to employ the Metal Impact Monitoring System to monitor startup.

Evaluation

The March 1981 gauging and preventive plugging program at Turkey Point Unit 3 is similar to previous programs conducted at this and other similarly degraded units. Based upon our review of the gauging results, we find that the observed denting activity is generally consistent with previous experience at this and other similarly degraded units, and that the implemented gauging program was sufficient to adequately determine the condition of the steam generator from a denting standpoint.

Preventive plugging criteria implemented in March 1981 and in previous inspections have proven successful in removing from service leaks over the next six months of operation. No forced shutdowns because of denting related tube leaks occurred during the 3.5 EFPM of operation since the October 1980 steam generator inspection, nor during the preceding 8.5 EFPM of operation following the December 1979 inspection. The Technical Specification 0.3 gpm leak rate limit provides adequate assurance that even if through wall cracks and leaks occur, they will be detected and appropriate corrective action taken before excessive leakage can occur from tube degradation during normal operating, transient, or accident conditions.

With regards to the wastage phenomenon, the March 1981 wastage inspection (per Regulatory Guide 1.83) and associated plugging criteria are similar to those implemented in previous inspections. A comparison of the eddy current signals



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for tubes containing pluggable indications with corresponding signals from previous inspections indicate that wastage degradation is not developing at a significant or unexpected rate. We consider that the March 1981 inspection was adequate to establish the condition of the steam generators from a wastage standpoint and that with the implemented plugging criteria provides reasonable assurance that unacceptable wastage degradation will not occur during the next operating interval.

With regard to the pieces of foreign material which have been found in the Unit 3 steam generators during recent outages, we do not believe these fragments represent a significant hazard to the safe operation of the steam generators. The staff position regarding the significance of these foreign fragments from the standpoint of the overall reactor coolant system was provided in the staff response dated September 18, 1980 (Docket No. 50-250) to a petition dated July 30, 1980.

In conclusion, we find that the inspection results, implemented plugging, and existing leak rate limits adequately support six equivalent months of operation from the time of this inspection. We recommend that Turkey Point Unit 3 be required to shut down for steam generator inspection at the conclusion of the six (6) month operating interval.



III. Revision of License Amendments

Since October 29, 1976, at which time the NRC requested that Turkey Point Unit Nos. 3 and 4 be shutdown (November 1 and November 15, respectively), and the steam generators inspected to ascertain the potential for excessive stress or other conditions that may be conducive to intergranular corrosion of steam generator tubes, both Turkey Point Units have been operating under restrictive conditions. Unit 4, the unit with the most advanced steam generator tube degradation, was operated under Orders from December 3, 1976 until September 22, 1978. The period of operation was authorized by the orders began with a 60 day period, was increased to 120 days and then to six months as confidence was built in the inspection and plugging program. From September 28, 1978 until the present time essentially the same restrictions were imposed by amendments to the license rather than by Orders. The Unit 3 steam generator tubes were degraded but not in as advanced a stage as Unit 4. Consequently, the operating periods were of six months duration from the first amendment to the license on January 14, 1977. Further, the restrictions were imposed by amendments to the license from the outset, rather than by Orders.

The eventuality of requests for extensions of the operating period were included in the license conditions for each unit. Unit 3 operated on nearly an annual inspection period by use of extensions to the base operating period of six months. Unit 4 had a six week extension in February 1978, a 10 day extension in March of 1979, and three extensions of one or two months were granted in 1980.

These extensions were all granted after appropriate review and were based, at least in part, on favorable operating experience. The favorable experience reflected the success of the inspection and plugging program for the Turkey Point steam generator as well as other similarly degraded units.

During the period of time from October 1976 until the present the number of plugged tubes has gradually increased to 20 and 24% respectively. At the same time the outages caused by tube leakages were reduced; there have been no forced outages due to leaks in either unit since February 1978 and July 1977 respectively.

The above brief history serves to point out that the steam generator tube inspection and plugging program has curtailed the leakage. The degradation has continued at a gradually decreasing pace. However, the steam generator integrity has been maintained to the extent that the degraded tubes were plugged before they got to the leaking stage. In addition, an ECCS evaluation was performed each time a new ceiling for plugging percentage was reached.

The staff has therefore concluded that it is time to reevaluate the license conditions that restrict the operation of the Turkey Point Units as proposed. Unit 3 had essentially four license conditions; a limit on the primary coolant activity; a limit on the primary to secondary leakage; a limit of two tube leaks due to denting in a 20 day period between inspections; and an overall limit of six equivalent full power months between inspections. In addition, NRC approval was required before resuming power operation after inspections.

A staff review of the proposed conditions has resulted in approval of the seven conditions. This includes the four listed above but does not include the requirements of NRC approval before return to power operation. Instead, new conditions requiring inspection results within 14 days after return to power operation; special notification to the NRC of any unusual results found in an inspection, a clear delineation of the requirements of the inspection, and a licensee safety evaluation prior to resumption of power operation.

Unit 4 had the same license conditions as Unit 3 and in addition, a requirement for a Metal Impact Monitoring System (MIMS) and a core barrel movement test at startup. In addition to the requirements described for Unit 3, these latter two requirements have been retained in the revised Unit 4 license.

In summary, based on past experience with the Turkey Point Units as well as other units with similarly degraded steam generators, we find that the inspection procedures, plugging criteria, etc.; have reduced the frequency of denting related leaks for periods of six to ten months. NRC approval for restart is no longer necessary. Additional assurance in the form of reactor coolant leakage limits and iodine concentration will be retained. To further assure the health and safety of the public prompt notification of unusual inspection results is included.

IV. Conclusion

We have determined that the amendments do not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we

have concluded that the amendments involve an action which is insignificant from the standpoint of environment impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental impact appraisal need not be prepared in connection with issuance of these amendments.

We have concluded, based on the considerations discussed above, that: (1) because the amendments do not involve a significant increase in the probability or consequences of accidents previously considered and do not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) 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.

Date: June 23, 1981

