UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
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June 27, 1995

Report Nos.: 50-335/95-11 and 50-389/95-11

Licensee: Florida Power and Light Company
9250 West Flagler Street
Miami, Fl 33102

Docket Nos.: 50-335 and 50-389 License Nos.: DPR-67 and NPF-16

Facility Name: St. Lucie Units 1 and 2

Inspection Conducted: May 30 - June 2, 1995

Inspector: _____ 06/23/95
B. A. Parker Date Signed

Approved by: _____ 6/26/95
W. H. Rankin, Chief Date Signed
Facilities Radiation Protection Section
Radiological Protection and Emergency Preparedness Branch
Division of Radiation Safety and Safeguards

SUMMARY

Scope:

This routine, announced inspection of the licensee's Radiation Protection (RP) program was made to review the implementation of the revised 10 CFR Part 20 requirements. The evaluation was made utilizing Temporary Instruction 2515/123, "Implementation of the Revised 10 CFR Part 20." The review focused primarily on the areas of: high and very high radiation areas; Total Effective Dose Equivalent/As Low As Reasonably Achievable (TEDE/ALARA) program implementation; planned special exposures; and dose to the embryo/fetus for declared pregnant women.

Results:

Revisions to the RP program incorporating new requirements of 10 CFR Part 20 were made effective January 1, 1994. The inspection included interviews with licensee personnel, procedure and record reviews, and observations made during tours of the licensee's radiation controlled areas. The new requirements, as focused by the inspection procedure, were appropriately incorporated into the RP program. No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*R. Ball, M/M Supervisor
*E. Benken, Engineer, Licensing
*W. Bladow, Site Manager, Quality
*L. Bossinger, E/M Supervisor
*H. Buchanan, Superintendent, Health Physics
*C. Burton, Plant General Manager
*L. Croteau, Supervisor, Maintenance Training
*P. Fincher, Training
*L. Hefferfinger, Supervisor, Protection Services
*B. Johnson, Health Physics
*L. Large, Supervisor, Health Physics
*H. Leifhelm, Training
*J. Marchese, Maintenance
*C. Marple, Technical Supervisor, Operations
*A. Menocal, Maintenance
*H. Mercer, Technical Supervisor, Health Physics
*R. Olson, I&C
K. Payne, ALARA, Health Physics
*J. Posey, Mechanical M/M
*C. Pell, Outage Manager
*L. Rogers, Acting Manager, Maintenance
*D. Sager, Site Vice President
*M. Snyder, Acting Manager, Technical Staff
*J. Sorrentino, Steward
*J. Walker, Coordinator, Emergency Planning
*T. Ware, Supervisor, Technical Training
*R. Watson, Electrician
*D. West, Site Manager, Engineering
*J. West, Services Manager

Other licensee employees contacted during this inspection included technical and administrative personnel.

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*S. Jang, NRC Trainee (Korea)
*M. Miller, Resident Inspector
*R. Prevatte, Senior Resident Inspector
*S. Sandin, NRC/AEOD

*Attended Exit Interview held on June 2, 1995

2. Preparation and Training for Implementation of the Revised 10 CFR Part 20 Requirements (TI 2515/123)

Training was reviewed to determine whether Radiation Protection (RP) technicians, contractor RP technicians, and radiation workers were receiving appropriate instructions concerning the revised 10 CFR Part 20 requirements for their work assignments.

10 CFR 19.12 requires that licensees instruct all individuals working or frequenting any portion of the restricted areas in the health protection aspects associated with exposure to radioactive material or radiation, in precautions or procedures to minimize exposure, and in the purpose and function of protection devices employed, applicable provisions of the Commission Regulations, individuals responsibilities and the availability of radiation exposure data.

The inspector reviewed and discussed the licensee's general employee training (GET) and how it was affected by the revision of 10 CFR Part 20. The inspector noted that there were two levels of GET: Level I provided instruction designed to familiarize employees with FP&L policies and goals regarding its nuclear facilities, the rights of employees, employee response to unusual and emergency conditions, and requirements for unescorted access in the protected area. Level II training was intended to develop broad understanding of safe work practices in radiological areas, radiation protection requirements in those areas, risk involved in working in those areas, and employee responsibilities while working in those areas. This was accomplished by means of classroom lectures, demonstration and practice of necessary skills, and evaluation by examination. The level of training given depended upon the employee's job function. In addition to the initial GET, GET requalification was required on an annual basis. This instruction was designed to address seldom used skills, observed problems, upcoming/anticipated training needs, industry/plant operating experience, and facility changes.

The inspector noted that the licensee had successfully incorporated the 10 CFR Part 20 revisions into the GET program. The main material used in GET was "A Layman's Guide to Radiation Safety." The inspector reviewed the guide and found it to very straightforward and user-friendly, effectively utilizing four-color graphics and humor to emphasize key points and ideas.

Plant workers were first exposed to revised Part 20 in 1993 during periodic safety meetings. During those meetings, RP personnel discussed the general nature of the revision, including philosophy changes and new terminology. In addition, in 1993, the licensee published and distributed plant-wide a handout/brochure about revised Part 20 that described the reasons for the change, defined new terms, and outlined new dose limits and corresponding FP&L administrative limits.

In November 1993, the licensee implemented formal Part 20 training in the form of radiation controlled area requalification training or "RCAT requal." This training was required for all individuals who entered the RCA. Multiple sessions were held in order to accommodate all of those needing training. The last RCAT requal class was completed in February 1995. The inspector reviewed the training materials utilized and noted that essentially all aspects of 10 CFR Part 20 were addressed in detail. New terminology, limits, respirator reduction, and control of high radiation and very high radiation areas were among the variety of topics and issues covered in the training. In addition to Part 20 revisions, other pertinent topics were also discussed. These included electronic dosimetry, response to alarms, and radiography.

Overall, the training provided to plant workers concerning 10 CFR Part 20 revisions was found to be comprehensive, thorough, and appropriate for the trainees' needs.

No violations or deviations were identified.

3. Audits and Procedures (TI 2515/123)

The inspector discussed with licensee personnel the auditing activities performed to review the implementation of revised 10 CFR Part 20. The inspector noted that licensee auditors had verified through the routine audit program that revised 10 CFR Part 20 was implemented appropriately. The inspector reviewed a variety of Performance Monitoring activities (PMONs) that looked at individual aspects of revised Part 20 requirements. For example, PMON 94-32 reviewed the licensee's ALARA program with regard to 10 CFR 20.1101 requirements, and verified implementation of occupational dose limits per 10 CFR 20.1201-1208. PMON reports were incorporated into monthly auditing reports and the results/findings forwarded for management review. The inspector noted that the PMONs were comprehensive and detailed. No major problems were identified in the PMONs and minor issues were handled in a timely manner.

The inspector reviewed a number of licensee procedures that pertained to or were significantly affected by the Part 20 revisions in order to verify that the licensee had properly incorporated or addressed the revisions within the procedures. The procedures reviewed are listed as follows:

ADM-05.01, "ALARA Program," Revision (Rev). 0, dated December 27, 1993;

JNO-HP-3.0, "Planned Special Exposures," Rev. 0, dated February 28, 1994;

HPP-1, "Radiation Work Permits," Rev. 2, dated September 29, 1994;

HPP-2, "FP&L Health Physics Manual," Rev. 9, dated March 16, 1995;

HPP-3, "High Radiation Areas," Rev. 3, dated March 23, 1995;

HPP-25, "Radiological Controls for Diving Operations," Rev. 0, dated December 21, 1993;

HPP-30, "Personnel Monitoring," Rev. 3, dated March 21, 1995;

HPP-60, "Respiratory Protection Manual," Rev. 0, dated December 29, 1993;

HPP-63, "DAC-hour Assessment," Rev. 0, dated December 20, 1993;

HPP-67, "Respiratory Protection Training," Rev. 0, dated December 20, 1993;

HPP-72, "Determination of Dose to the Skin from Skin Contamination," Rev. 0, dated December 21, 1993;

HP-74, "Access Control Using Alarming Dosimeters," Rev. 1, dated July 28, 1994;

NP-906, "Administrative Radiation Exposure Limits and Prenatal Radiation Exposure Policy," Rev. 1, dated October 17, 1994;

0005737, "Health Physics Training Program," Rev. 10, dated October 10, 1994; and

0005752, "General Employee Training Program," Rev. 3, dated December 27, 1993.

Overall, no problems were noted with the licensee auditing activities or procedural revisions associated with the implementation of the revised 10 CFR Part 20.

No violations or deviations were identified.

4. High and Very High Radiation Areas (TI 2515/123)

This area was reviewed to evaluate the licensee's implementation of requirements specified for the control of high and very high radiation areas (HRAs and VHRAs) as prescribed in 20.1601 and 20.1602 of 10 CFR Part 20, "Subpart G-Control of Exposure from External Sources in Restricted Areas."

10 CFR 20.1601(a) requires that the licensee ensure that each entrance or access point to a HRA has one or more of the following features:

(a) A control device that, upon entry into the area, causes the level of radiation to be reduced below that level at which an individual might receive a deep-dose equivalent of 0.1 rem in one hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates;

(b) A control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the high radiation area and the supervisor of the activity are made aware of the entry; or

(c) Entryways that are locked, except during periods when access to the areas is required, with positive control over each individual entry.

10 CFR 20.1601(c) states that a licensee may apply to the Commission for approval of alternative methods for controlling access to HRAs. The licensee's alternative control measures for entry into high radiation areas were described in the licensee's Technical Specifications (TSs). Licensee TS 6.12.1 required, in part, that each HRA with radiation levels greater than or equal to 100 millirem per hour but less than 1,000 millirem per hour be barricaded and conspicuously posted as a HRA. In addition, any individual or group of individuals permitted to enter such areas were to be provided with one or more of the following:

(a) A radiation monitoring device which continuously indicates the radiation dose rate in the area;

(b) A radiation monitoring device which continuously integrates the radiation dose rate in the area and alarms when a preset integrated dose is received; or

(c) A health physics qualified individual (qualified in radiation protection procedures) with a radiation dose rate monitoring device, responsible for providing positive control over activities within the area and makes periodic radiological surveys.

TS 6.12.2 required that, in addition to the requirements of TS 6.12.1, areas accessible to personnel with radiation levels such that a major portion of the body could receive in one hour a dose greater than 1,000 millirem be provided with locked doors to prevent unauthorized entry; the keys be maintained under the administrative control of the Shift Foreman or Health Physics Supervision; and doors remain locked except during periods of access by personnel under an approved radiation work permit (RWP).

10 CFR 20.1602 requires that in addition to requirements in 10 CFR 20.1601, the licensee institute additional measures to ensure that an individual is not able to gain unauthorized or inadvertent access to areas in which radiation levels could be encountered at 500 rads or more in one hour at one meter from a radiation source or any surface through which the radiation penetrates.

10 CFR 20.1902 specifies the posting requirements for HRAs and VHRAs.

In addition to the review of procedures noted above related to HRAs and VHRAs, the inspector interviewed and discussed access and key controls with cognizant licensee personnel. The inspector noted that RP

personnel were well aware of the requirements associated with HRAs. HRA keys were maintained at the Security gatehouses and were issued to RP personnel by Security. This added an extra layer of control over the keys. A list of persons authorized to be issued a key was also maintained by Security. Security knowledge of the overall process was adequate. Typically, RP supervisors checked out the keys while coming on shift and then issued them to RP technicians during the shift on an as needed basis. A log was maintained in each unit's RP office to keep track of the keys during the shift. The RP supervisors then returned the keys to Security upon leaving site. The inspector reviewed the RP-Security interface and observed the process involved in obtaining a HRA key from a RP supervisor. No significant problems were noted.

VHRAs were individually keyed and the keys were maintained in the Control Rooms. Only RP supervisory personnel could check out VHRA keys, and entries required approval (i.e., signatures on RWP) from the Nuclear Plant Supervisor and Radiation Protection Manager. Typically, only the Reactor Buildings were posted and controlled as VHRAs. A "grand master" VHRA key was also maintained in each Control Room in a glass case strictly for emergency use only.

The inspector spot checked HRA postings and controls during plant tours. Rooms/areas maintained as locked HRAs were appropriately locked and secured. Postings in other HRAs were consistent with area surveys.

Overall, the inspector found the licensee's policy and procedures concerning HRAs and VHRAs to be within the scope and intent of 10 CFR Part 20. In addition, the inspector found the licensee's access and key controls for HRAs and VHRAs to be satisfactory. Personnel were knowledgeable of the requirements and no adverse trends involving HRAs or VHRAs were identified.

No violations or deviations were identified.

5. Declared Pregnant Women and Embryo/Fetus Doses (TI 2515/123)

This program area was reviewed to determine that the licensee's program for declared pregnancies met the regulatory requirements and that doses to the embryo/fetus were within the regulatory limits.

10 CFR 20.1003 defines a declared pregnant woman (DPW) as a woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception.

10 CFR 20.1208(a) requires that the dose to the embryo/fetus not exceed 500 millirem during the entire pregnancy due to the occupational exposure of a DPW.

10 CFR 20.1208(b) requires the licensee make efforts to avoid substantial variation above a uniform monthly exposure rate to a DPW so as to satisfy the limit in 20.1208(a).

10 CFR 20.1208(c) prescribes the method for determining dose to the embryo/fetus as the sum of the deep dose equivalent to the DPW, the dose to the embryo/fetus from radionuclides in the embryo/fetus, and the dose to the embryo/fetus from the radionuclides in the DPW.

10 CFR 20.1208(d) states that if the dose to the embryo/fetus is greater than 500 millirem or is within 50 millirem of the dose limit by the time the woman declares the pregnancy to the licensee, the licensee shall be deemed to be in compliance with 20.1208(a) if the additional dose to the embryo/fetus does not exceed 50 millirem during the remainder of the pregnancy.

10 CFR 20.2106(e) requires each licensee to maintain the records of dose to an embryo/fetus with the records of the DPW. The declaration of pregnancy shall also be kept on file, but may be maintained separately from the dose records.

As indicated above, the inspector reviewed the licensee's policy and procedural guidance regarding DPWs, and verified that DPW-related information was discussed and reviewed in GET and Part 20 training. As part of GET, all women were required to sign a statement that they were informed of the DPW policy and were provided with a copy of Regulatory Guide 8.13, "Instruction Concerning Prenatal Radiation Exposure." All other forms were strictly voluntary, including forms entitled "Declaration of Pregnancy," "Declaration of Intent to Become Pregnant," and "Change of Pregnancy Status." The declaration of pregnancy form gave the woman the option of restricting herself from the RCA for the remainder of her pregnancy. If she chose not to exclude herself, she signed a statement re-stating that she was aware of the DPW exposure limits and had been provided with Regulatory Guide 8.13. The declaration of intent form essentially made management aware of her desire to restrict her dose to the FP&L administrative DPW limits until a pregnancy was declared or a request to reinstate her previous dose limits was made. The change in status form allowed a woman to undeclare a declared pregnancy and/or reinstate her previous dose limits.

After making a declaration, if the woman chose continued access, she remained on the monthly thermoluminescent dosimetry (TLD) program with the remainder of the badged plant personnel. If she chose to exclude herself from the radiologically controlled area (RCA), her TLD was terminated and the dose placed in her permanent record. The inspector reviewed the licensee files for DPWs and those who had declared their intention to become pregnant. The inspector noted that all paperwork was in order and, to date, no dose had been received by DPWs. At the time of the inspection, there was one DPW onsite and she was interviewed by the inspector. The inspector found her to be knowledgeable and well-informed of the policy, the requirements, and her responsibilities.

Overall, the inspector found the licensee's policy and procedures concerning DPWs to be within the scope and intent of 10 CFR Part 20. In addition, personnel were knowledgeable and informed, and doses were well within Part 20 limits.

No violations or deviations were identified.

6. TEDE ALARA and Respiratory Protection (TI 2515/123)

This area was reviewed to determine: (1) whether the licensee had established an adequate training program, policy, and procedures to initiate the implementation of 10 CFR 20.1702, "Use of Other Controls," focusing on the requirement to maintain worker TEDE ALARA while performing work in airborne radioactive material areas; (2) whether the licensee had properly trained its workers to maintain their TEDEs ALARA while working in airborne radioactive material areas; and (3) the degree of success the licensee had achieved in maintaining worker TEDEs ALARA, while performing work in airborne radioactive material areas.

10 CFR 20.1101(b) requires that the licensee use, to the extent practicable, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are ALARA.

The inspector reviewed the licensee's policy and procedures regarding the ALARA concept and the overall intent to maintain TEDEs ALARA. The inspector noted that the licensee implemented engineering controls as much as possible when it was determined or assumed that significant airborne radioactive material were present during work/operation. If engineering controls could not fully reduce the airborne hazard to an acceptable level, the licensee's procedure allowed for evaluating the need for respiratory protection. The inspector reviewed the respirator evaluation method and noted no concerns or problems. The licensee utilized a respirator loss-of-efficiency factor of 25 percent, which was within the widely accepted range of 20-30 percent. That factor, in combination with the dose rate and stay time, was used to determine a justification factor (JF) for using respiratory protection on the job. If the JF was less than one, respirator usage was ALARA and, conversely, if the JF was greater than one, then it was not ALARA to use respirators. Along with the calculations, the inspector noted that the licensee relied upon historical information and operating experience as an underlying part of TEDE ALARA evaluations. In most cases, by procedure, TEDE ALARA evaluations were required to be documented in order to track actual versus projected doses.

One of the major advantages to those types of evaluations was the overall reduction of respirators that was realized. The licensee's intent prior to implementing revised 10 CFR Part 20 was to reduce respirator usage, and the inspector noted that significant progress had been made in that area. In 1990, the licensee used approximately 11,200 respirators, whereas, in 1994, only about 1,200 were used. In the 1990-1993 period, only about one-third of the respirators issued

were bubblehoods; however, in 1994, approximately 1,000 of the respirators issued were bubblehoods. In other words, the licensee not only reduced overall usage by an order of magnitude, but also eliminated a much higher percentage of full-face respirators versus bubblehoods.

As a result of TEDE ALARA efforts, very little internal dose was incurred by the licensee. The inspector noted that the licensee took the conservative approach that if any internal dose was calculated or measured, then it was assigned. No thresholds were used in assigning internal dose. For routine work in 1994, a total of 32 millirem was recorded for internal dose (Committed Effective Dose Equivalent (CEDE)). This dose was spread over six workers, the highest of which received 11 millirem. A special project involving replacement of the reactor water storage tank (RWST) bottom resulted in some higher calculated CEDEs; however, these doses were highly conservative and involved transuranic materials in which worker intakes could not be verified by routine whole body counting methods. In this case, a total of 442 millirem CEDE was calculated and assigned to 12 workers, the maximum of which was assigned 89 millirem.

As a another result of TEDE ALARA efforts, the licensee had a lower rate of personnel contamination events (PCEs) in 1994 compared with previous years. The inspector noted that in 1992 and 1993, the licensee experienced 87 and 76 PCEs, respectively. In 1994, 94 PCEs were incurred; however, 1994 was a two-outage year, as opposed to 1992 and 1993 which each only had one outage during the year. Facial PCEs alone saw the same effect: in 1992, there were 22; in 1993, there were 26; and in 1994, there were only 31, an average of 16 per outage. According to the licensee, much of the reduction in PCEs was credited to the installation of air conditioning into containment during outages. Not only did this reduce PCEs due to "sweat-through" of protective clothing, but it also improved overall safety significantly in that much less heat stress occurred.

The inspector noted that improvements in TEDE have enabled the licensee to lower the annual doses and tighten up dose goals. For example, after a successful outage in early 1994, the licensee lowered the annual goal to 600 person-rem. The actual 1994 dose was 505 person-rem. Lower monthly operating dose (3.5-4.0 person-rem/month) and one outage scheduled in 1995 allowed the licensee to set 215 person-rem as the 1995 annual goal with 240 person-rem as the upper range target. At the time of inspection, the 1995 dose to date was within projected values.

Overall, the inspector determined that the licensee's TEDE ALARA policy and objectives were clearly described in radiation worker training programs and were in accordance with revised 10 CFR Part 20. Also, the licensee made significant efforts to maintain TEDEs ALARA, thereby avoiding excessive internal dose, reducing PCEs, and improving working conditions, all of which resulted in significant individual and collective dose savings.

No violations or deviations were identified.

7. Planned Special Exposures (TI 2515/123)

This area was reviewed to determined whether the licensee's program for planned special exposures (PSEs) met the regulatory requirements.

10 CFR 20.1206 permits the licensee to authorize an adult worker to receive doses in addition to and accounted for separately from the doses received under the limits specified in 10 CFR 20.1201 provided that certain conditions are satisfied. Such exposures cannot exceed the dose limits in 10 CFR 20.1201(a) in any year or five times the annual dose limits during an individual's lifetime.

The inspector discussed the licensee's policy regarding PSEs and noted that although a procedure was developed, the licensee had no intention of ever implementing the procedure. Licensee procedure JNO-HP-3.0, "Planned Special Exposures," Rev. 0, dated February 28, 1994, was reviewed by the inspector and provided the appropriate guidance and instruction for implementing and documenting a PSE. The inspector noted that the procedure recommended the NRC be contacted prior to initiating a PSE for review of the circumstances. In addition, the PSE approval process required prior written approval from the Plant General Manager, Site Vice-President, and the utility Nuclear Division President.

Through discussions with licensee representatives and a review of records, the inspector determined that the licensee had appropriate procedural guidance for allowing PSEs as outlined by revised 10 CFR Part 20. However, the licensee had no intention of ever initiating a PSE, and the inspector verified that no PSEs had been authorized.

No violations or deviations were identified.

8. Exit Meeting (TI 2515/123)

The inspection scope and findings were summarized on June 2, 1995, with those persons indicated in Paragraph 1. The inspector described the areas inspected and discussed in detail the findings of the inspection. Dissenting comments were not received from the licensee. Although proprietary material was reviewed during the inspection, proprietary information is not contained in this report.