



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 REGION II
 101 MARIETTA STREET, N.W.
 ATLANTA, GEORGIA 30323

Report Nos.: 50-335/86-09 and 50-389/86-08

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 1 and 2

Inspection Conducted: April 14-18, 1986

Inspector: B. K. Revsin 5/21/86
 B. K. Revsin Date Signed

Approved by: C. M. Hosey 5/21/86
 C. M. Hosey, Section Chief Date Signed
 Division of Radiation Safety and Safeguards

SUMMARY

Scope: This routine, unannounced onsite inspection was performed during normal duty hours in the area of radiation protection including: control of radioactive materials, contamination surveys and monitoring; external exposure control and personal dosimetry; internal exposure control; solid radioactive waste; transportation of radioactive materials; program for maintaining exposures as low as reasonably achievable (ALARA); organization and management; and training and qualifications of the radiation protection staff.

Results: Three violations: 1) failure to maintain written procedures regarding respiratory protective equipment issuance records, 2) dose rates on the external surface of packages of radioactive material offered to a carrier for transport in excess of Department of Transportation (DOT) limits and 3) failure to package low specific activity (LSA) radioactive material in a strong, tight package.



REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *K. N. Harris, Site Vice President
- *J. H. Barrow, Superintendent, Operations
- *H. F. Buchanan, Supervisor, Health Physics
- *L. W. Pearce, Supervisor, Operations
- *R. M. McCullers, Operations Coordinator, Health Physics
- *L. E. Jacobs, ALARA Coordinator
- *W. J. Barrow, Supervisor, Fire Protection
- *J. B. Harper, Superintendent, Quality Assurance
- *A. J. Gould, Corporate Health Physics
- *R. A. Symes, Quality Assurance Supervisor Operations
- *G. A. Longhouser, Security Supervisor
- *G. H. Mayer, Corporate Security Service
- *W. G. White, Security
- *C. L. Wilson, Mechanical Maintenance
- *L. L. McLaughlin, Technical Staff
- *J. J. Walls, Quality Control

NRC Resident Inspectors

- *R. Crlenjak, Senior Resident Inspector
- *H. Bibb, Resident Inspector

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on April 18, 1986, with those persons indicated in Paragraph 1 above. Three violations, (1) failure to maintain written procedures for respiratory protective equipment issuance records (Paragraph 8), (2) failure to comply with DOT requirements for radiation levels on the external surfaces of packages (Paragraph 10), and (3) failure to package LSA radioactive material in a strong tight package (Paragraph 10), were discussed in detail. Licensee management took no exceptions. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspector during this inspection.

3. Licensee Action on Previous Enforcement Matters

(Closed) Violation (50-389/84-19-01), Inadequate Calibration of Containment High-Range Radiation Monitors. The inspector reviewed the licensee's response dated July 9, 1984, and verified that the corrective action in the response had been implemented.

(Closed) Violation (50-389/84-35-01), Failure to Follow Radiation Work Permit Procedure. The inspector reviewed the licensee's response dated December 7, 1984, and verified that the corrective action in the response had been implemented.

4. Licensee Audits (83722, 83723, 83724, 83725, 83726, 83728, and 86721)

The inspector discussed the audit and surveillance program with licensee representatives in the area of radiation protection, training and qualifications, and transportation of radioactive materials. The audit function for the facility was divided among three groups. The Quality Assurance (QA) Department, located onsite but which reported to the corporate office, had no official audit responsibilities for radiation protection activities, but had performed audits in 1984 and 1985. A second onsite group which monitored radiation protection operations was the Quality Control (QC) group which covered inplant health physics (HP) activities, e.g., posting, labeling, access to high radiation areas, etc., and provided the QC checks for transportation activities. The corporate HP staff was charged with the responsibility of performing annual reviews of the radiation protection program. The inspector reviewed the following reports:

Audit QAS-BED-84-2, Health Physics Procedures, June 1984.

Audit QSL-OPS-86-420, Solid Radwaste (Spent Resin Transfer),
April 1986.

Audit QSL-OPS-85-394, Facility Staff and Qualifications, October 1985.

Audit QSL-OPS-85-376, Chem-Nuclear Cement Solidification, July 1985.

Audit QSL-OPS-84-334, Plant Indoctrination and Training, December 1984.

Audit QSL-OPS-85-399, Administrative Controls, November 1985.

Audit QSL-OPS-85-400, Implementation of Health Physics Procedures,
December 1985.

The inspector reviewed selected corrective actions for several audits noted above, and for those reviewed, found actions to be adequate and timely.

No violations or deviations were identified.

5. Health Physics Staffing (83522)

Technical Specification (TS) 6.2.2 and Chapters 12 and 13 of the Unit 2 Final Safety Analysis Report (FSAR) specifies the requirements for plant staffing. The HP supervisor stated that 46 staff positions were authorized for HP, 26 of which were involved full time in operations, and that for routine operation, no contract HP technicians were utilized. This level of staffing is generally less than that usually seen for a similar two unit, PWR facility; however, the HP Supervisor stated that he felt the staff was

adequate to provide the needed job coverage. Staff turnover was low, with only one lost position in two years.

The HP Supervisor stated that for the ongoing Unit 2 outage, 87 contract HP technicians, 49 seniors and 38 juniors, had been brought onsite to support outage activities. Technicians from five different vendors were being utilized. When queried about controls, the HP Supervisor stated that no contract technicians were permitted supervisory responsibility but were under the direct supervision of FPL staff.

No violations or deviations were identified.

6. Control of Radioactive Materials and Contamination, Surveys and Monitoring (83526)

The licensee was required by 10 CFR 20.201(b), 20.401 and 20.403 to perform surveys and to maintain records of such surveys as necessary to show compliance with regulatory limits. Survey methods and instrumentation were outlined in the Unit 2 FSAR, Chapter 12, while TS 6.11 required adherence to written procedures for all operations involving personnel radiation exposures.

a. Surveys

The inspector reviewed surveys performed by the licensee on April 9, 1986, to determine gamma and beta radiation levels for steam generators "A" and "B" prior to eddy current testing. The licensee stated that once the manways were removed, prior to any personnel entry into the steam generators, a stick with direct reading dosimeters (DRD) attached at different locations was placed into the generator to determine the dose gradient within. Readings were also taken with portable survey instruments. Examination of the survey sheets showed that the beta radiation component of the field varied extensively depending upon whether an Eberline RO-2 or RO-7 ionization chamber was used to determine dose rates. The licensee stated that a beta correction factor of three had been determined for the RO-2 based upon open/closed window response to a depleted uranium slab whereas a beta correction factor of one was being used for the RO-7 as specified in the technical manual supplied by the manufacturer. It was stated that until further studies were conducted onsite for the RO-7, RO-2 readings as modified by the beta correction factor were being used for radiation protection purposes.

During plant tours, the inspector performed independent radiation level surveys of selected areas in the auxiliary buildings, the Unit 2 fuel handling building and in the Radiation Control Area (RCA) outside the buildings to verify that areas were properly posted. The inspector noted that high radiation areas inside and outside of containment were maintained as required by TS 6.12.

b. Frisking

During tours of the plant, the inspector observed the movement of workers and material from contamination control areas to clean areas of the facility to determine if proper frisking was performed by workers and if adequate direct and removable contamination surveys were performed on materials.

c. Instrumentation

During plant tours, the inspector observed the use of HP survey instruments by plant staff and compared plant survey instrument readings with measurements made by the inspector using NRC equipment. The inspector examined calibration stickers on HP portable instruments in use by licensee staff and on friskers located throughout the plant.

No violations or deviations were identified.

7. External Occupational Dose Control and Personal Dosimetry (83524)

10 CFR 20.202 requires each licensee to supply appropriate personal monitoring equipment and to require the use of such equipment. 10 CFR 20.101 specifies the radiation dose standards for individuals in restricted areas.

During tours of the plant, the inspector observed workers wearing thermoluminescent dosimeters (TLDs) and pocket dosimeters as required. For maintenance activities requiring multibadging of workers, the licensee had designated a single individual to apply the multibadge packets to the workers. At body locations where badging was required, a twirl pack containing a high range DRD, a low range DRD and a TLD was affixed. The inspector examined the placement of these packets on workers in the Unit 2 containment and noted that many were taped onto the worker in such a fashion as to possibly shield the beta window of the TLD. The potential for this to occur was enhanced for workers who had to remove their packets to obtain DRD readings and then retaped them to continue their work. The licensee stated that they realized that such a practice might lead to underestimation of beta dose to the skin and as well as whole body dose from low energy gamma radiation. However, due to the low energy beta spectrum observed at the facility, it was felt that this possibility was negligible. Nonetheless, the licensee took immediate steps to modify their taping practice.

The licensee had recently changed from a two chip to a four chip LiF card for their personal dosimetry. The density thicknesses for the four chips were 7, 90, 310, and 1000 milligrams per square centimeter (mg/cm^2). Skin dose was assigned from the 7 mg/cm^2 chip and whole body dose was assigned from the 310 mg/cm^2 chip. Processing of TLDs was performed in the corporate office and the inspector discussed telephonically with the corporate HP group, the QC program for the Harshaw reader. The licensee stated that calibration checks were run each shift using TLD chips that had been irradiated to 500 mrem. Additionally, the reader itself possessed a C-14



light source that was read prior to the start of each tray (once every 59 badges). The licensee also stated that since National Voluntary Laboratory Accreditation Program (NVLAP) accreditation was required only once per two years, that FPL intended to requalify their program to NVLAP criteria in the off years with a private laboratory. A TLD spiking program was also carried out each month whereby the plant irradiated chips between 200 and 2000 mrem and presented them to the processing facility to be read. Acceptance criteria for the readouts was ± 10 percent.

No violations or deviations were identified.

8. Internal Exposure Control and Assessment (83525)

The licensee was required by 10 CFR 20.103, 20.201(b), 20.401 and 20.405 to control uptakes of radioactive material, assess such uptakes, and keep records of and make reports of such uptakes. Unit 2 FSAR, Chapter 12, includes commitments regarding internal exposure control and assessment. The inspector reviewed the following applicable procedures.

HP-36, Revision 1, MPC Hour Estimation from In Vivo Bioassay Data

HP-62, Revision 6, Inspection, Maintenance and Quality Assurance of Respiratory Protection Equipment

HP-61, Revision 4, Selection and Use of Respiratory Protection Equipment

HP-60, Revision 9, Respiratory Protection Manual

10 CFR 20.103(c)(2) provides that the licensee may make allowance for use of respiratory protective equipment in estimating exposures of individuals to radioactive material in air provided that the licensee maintains and implements a respiratory protection program that includes, as a minimum, written procedures regarding supervision and training of personnel and issuance records.

At the respirator issuance room, the inspector reviewed respirator issuance with the technician in charge. The technician stated that all respirators were issued from that point and that prior to issuance, he verified that the worker requesting the respirator was trained and medically qualified. Once verified, the technician performed a qualitative mask fit for the worker using amyl acetate. Licensee representatives stated that no records were maintained to show that an individual had been issued a respirator and that no licensee procedure required maintenance of such records. Through review of selected Maximum Permissible Concentration (MPC) hour assignment records and discussions with licensee representatives, the inspector determined that the licensee had made allowance for the use of respiratory protective equipment in estimating exposures of individuals to radioactive material in air. Failure of the licensee to maintain written procedures regarding respirator issuance records was identified as an apparent violation of 10 CFR 20.103(c)(2) (50-335/86-09-01 and 50-389/86-08-01).

9. Solid Waste (84722)

10 CFR 20.311 requires that the licensee maintain a tracking system for radioactive waste shipments to verify that shipments have been received without undue delay by the intended recipient. The inspector reviewed the waste shipment log and verified by comparison with return receipts in the shipping files, that shipment tracking for selected 1986 shipments was adequate.

10 CFR 20.311 required a licensee who transfers radioactive waste to a land disposal facility to prepare all waste so that the waste is classified according to 10 CFR 61.55 and meets the waste characteristic requirements of 10 CFR 61.56.

The licensee's program for development of scaling factors to relate the inferred concentration of one radionuclide to another that is measured was examined to verify that the inferential determinations could be related to actual measurements. The licensee had developed separate sets of scaling factors for the various waste streams for Unit 1 and Unit 2 except for dry active waste which utilized a common set of scaling factors. Selected scaling factors were chosen by the inspector who verified that the resulting estimates of activity for difficult to measure radionuclides were within a factor of ten of actual measurements. While examining the results of isotopic analyses of the 1985 annual samples, the inspector noted that the header of the computer printout for process filters designated the sample type as smears rather than filters. The licensee explained that instead of sending actual filter clippings to their offsite vendor for isotopic analysis, smears were taken of the filters and sent for analysis instead. The inspector questioned the licensee as to whether they had data to show that the radionuclide distribution on smears obtained in this fashion were representative of the actual radionuclide distribution of the process filters. The licensee stated that this information was not available but that they, too, had recognized this problem. Consequently, during the current sampling period, they had obtained some filter clippings which would be sent for analysis, and stated that a comparison of the data from the filters and from filter smears would be performed. The inspector stated that this issue would be examined during subsequent inspections (50-335/86-09-02 and 50-389/86-08-02).

No violations or deviations were identified.

10. Transportation (86721)

10 CFR 71.5 requires that licensees who transport licensed material outside the confines of their plants, or other places of use, or who deliver licensed material to a carrier for transport, shall comply with the applicable requirements of the regulations appropriate to the mode of transport of the Department of Transportation (DOT) in 49 CFR Parts 170 through 189.

49 CFR 173.441(a) states that except as provided in 49 CFR 173.441(b) each package of radioactive materials offered for transportation shall be designated and prepared for shipment so that under conditions normally incident to transportation, the radiation level does not exceed 200 millirem per hour at any point on the external surface of the package.

On December 13, 1985, radioactive waste shipment No. 85-61 containing 12 B-25 boxes of compacted and non-compacted dry active waste, (DAW), was shipped to the land disposal facility at Barnwell, SC. The shipment contained a total of 200.15 millicuries of radioactivity and was designated as Class A. The shipment was made on an open, flat-bed truck and was an exclusive use vehicle. Licensee survey of the shipment prior to leaving the site showed that Box No. 85-105 and Box No. 85-112 had dose rates of 250 mR/hour and 400 mR/hour respectively.

On December 16, 1985, the licensee was notified by the land disposal facility that the two boxes noted above, which were in excess of the DOT limit specified for open, flat-bed trucks, were not in compliance with DOT requirements. Discussion between the licensee, the land disposal facility and the State of South Carolina Department of Health and Environmental Control resulted in the classification of the event as a "Legitimate Technical Difference of Opinion" and as a consequence no action was taken by the State of South Carolina.

Licensee representatives informed the inspector that they had been aware that the two boxes in Shipment No. 85-61 were in excess of 200 millirem per hour but that their interpretation of the radiation limits as specified in 49 CFR 173.441(b) permitted dose rates greater than 200 mR/hour on the surface of the package so long as the excess dose rate was on a non-accessible surface and did not exceed 200 mR/hr at any point on the vertical planes projected from the outer edges of the transport vehicle.

The licensee further stated that due to proposed rule making in this area, they had held a discussion with a DOT representative telephonically on August 21, 1985, and that the DOT representative had verbally concurred with the licensee's interpretation. The inspector stated that prior to the final rule making, which became effective December 1, 1985, the licensee's interpretation had been correct, but with adoption of the new regulation shipment of packages with external radiation levels in excess of 200 millirem per hour was permissible only in enclosed, exclusive use vehicles. During the inspection the licensee had a copy of the Federal Register, Volume 50, No. 200, Wednesday, October 16, 1985, which provided the notice of final ruling for 49 CFR 173 and gave the effective date as December 1, 1985. This notice eliminated the exception previously stipulated by 49 CFR 173.441(b)(1) which had permitted dose rates in excess of 200 millirem per hour on nonaccessible external package surfaces, not to exceed 1000 millirem per hour. The inspector informed the licensee that dose rates on the external surface of two packages in Shipment No. 85-61 in excess of 200 millirem per hour was an apparent violation of 10 CFR 71.5 (50-335/86-09-03 and 50-389/86-08-03).



49 CFR 173.425(b)(1) requires that packaged shipments of low specific activity (LSA) material consigned as exclusive use must be packaged in a DOT Specification 7A Type A package or in a strong, tight package so that there will be no leakage of radioactive material.

On October 14, 1985, radioactive waste Shipment No. 85-49 containing 12 B-25 metal boxes of DAW was shipped to the land disposal facility near Richland, Washington. The shipment contained 162.834 millicuries of radioactivity and was designated as Class A waste. The shipment was made on an open, flat-bed truck and was an exclusive use vehicle. Before leaving the plant, the shipment was covered with a tarpaulin.

Shipment No. 85-49 was received at the burial site on October 22, 1985, at which time the licensee was notified that Box No. 85-75 of the shipment had arrived onsite with a hole in one side which had been covered by gray duct tape. The hole was approximately one half by two inches in size. The licensee sent representatives to the site to examine the shipment. They determined that the damaged box was the last box on the bed on the left side of the truck and that when the truck arrived at the burial ground the tarpaulin was still in place and undamaged. The truck and the box were smeared to determine if radioactive material had escaped from the box but no activity was detected. All other boxes remained intact.

An investigation was conducted by the licensee to determine the etiology of the hole. Prior to leaving the licensee's facility, shipping papers show that HP had verified that the container was intact and undamaged and that the QC department had concurred with this assessment. The licensee further denied responsibility for the gray duct tape covering the gash, stating that gray duct tape had not been permitted within the RCA at the facility for over a year and that only red tape was in use. A licensee representative told the inspector that after the event a search had been conducted to determine whether any gray duct tape was available within the RCA and several rolls had been found.

The licensee was unable to come to any conclusion about the hole, how it came to be present, when it came into being or who was the responsible party. In consequence, the State of Washington Department of Social and Health Services declined to suspend burial privileges and issued a warning letter instead. Failure to ship LSA radioactive material in a DOT Specification 7A Type A package or a strong, tight package was identified as an apparent violation of 10 CFR 71.5 (50-335/86-09-04 and 50-389/86-08-04).

11. Statistics

a. Solid Waste

During 1985, the licensee made 35 shipments of radioactive waste consisting of 29,180 cubic feet of waste containing 1,592 curies of radioactivity.

b. Contaminated Area

The licensee began tracking square footage of contaminated area of the plant on February 1, 1986. At that time, 46,565 square feet or 35% was contaminated. On March 31, 1986, the square footage had increased to 51,042 or 38% of the facility due to the refueling outage of Unit 2. Neither reactor buildings were included in this inventory.

c. Personnel Contaminations

The licensee began tracking personnel contaminations on October 20, 1985. From October 20 to December 31, 1985, 461 skin and clothing contaminations had been documented.

d. Collective Man-Rem

For 1985, the collective dose for the facility as measured by TLD was 1274 man-rem which exceeded the 990 man-rem projection. The overage was attributed to unplanned reactor coolant pump maintenance, nozzle dam modification, and steam generator tube plugging.

For 1986, the collective dose projected for the facility was 600 man-rem and as of April 12, 1986, the actual collective dose was 111 man-rem.

12. IE Information Notices (92717)

The following IE Notices were reviewed to ensure their receipt and review by appropriate licensee management.

84-75, Calibration Problems - Eberline Instrument Model 6112B Analog Detectors.

85-60, Failure of Air-Purifying Respirator Filters to Meet Efficiency Requirement.

85-56, Respirator Users Notice for Certain 5 Minute Emergency Escape Self-Contained Breathing Apparatus.

85-48, Respirator Users Notice: Defective Self-Contained Breathing Apparatus Air Cylinder.

85-43, Radiography Events at Power Reactors.

85-46, Clarification of Several Aspects of Removable Radioactive Surface Contamination Limits for Transport Packages

85-42, Loose Phosphor in Panasonic 800 Series Badge Thermoluminescent Dosimeter (TLD) Elements

85-57, Lost Iridium - 192 Source Resulting in the Death of Eight Persons in Morocco

85-07, Contaminated Radiography Source Elements

85-06, Contamination of Breathing Air Systems

85-92, Surveys of Wastes Before Disposal from Nuclear Reactor Facilities

13. Enforcement Conference

An Enforcement Conference was held at FPL's Juno Beach Office on May 9, 1986, to discuss the transportation of radioactive materials. The following persons were in attendance:

1. Florida Power and Light Company

E. A. Adomat, Executive Vice President
 J. W. Dickey, Vice President, Nuclear Operations
 K. N. Harris, Vice President, St. Lucie Nuclear Plant
 D. A. Sager, Plant Manager, St. Lucie Nuclear Plant
 H. F. Buchanan, Supervisor, Health Physics, St. Lucie Nuclear Plant
 A. J. Gould, Corporate Health Physics
 J. L. Danek, Corporate Health Physicist

2. Nuclear Regulatory Commission

J. N. Grace, Regional Administrator
 G. R. Jenkins, Director, Enforcement and Investigation Coordination Staff
 E. Holler, IE Enforcement Staff
 L. A. Reyes, Acting Director, Division of Reactor Projects
 D. M. Verrelli, Chief, Reactor Projects Branch 2,
 S. A. Elrod, Chief, Reactor Projects Section 2C
 C. M. Hosey, Chief, Facilities Radiation Protection Section
 R. Crlenjak, Senior Resident Inspector, St. Lucie
 R. Brewer, Resident Inspector, Turkey Point
 J. D. Ennis, Physical Security Inspector
 B. K. Revsin, Radiation Specialist
 D. R. McGuire, Chief, Physical Security

Licensee representatives discussed the circumstances of the transportation events.

1. Shipment No. 85-61 - Dose Rates on Packages in Excess of Regulatory Limits

The licensee explained that the dose rates on two packages in shipment No. 85-61 were in excess of regulatory limits due to a misunderstanding of the regulations. The licensee had been aware that rule making had been proposed which concerned dose rates on packages being transported,

and consequently, they had sought and received a verbal interpretation of the regulations from DOT in August, 1985. The DOT interpretation coincided with the manner the licensee had been preparing shipments of LSA material for a number of years. In October 1985, the notice of final rule making was published in which the exemption which had permitted transportation of packages in non-enclosed vehicles with external dose rates in excess of 200 millirem per hour on inaccessible surfaces of the packages was no longer allowed. The licensee stated that due to their previous interaction with DOT, their understanding was that the practice of "nesting" packages, i.e. arranging packages such that surfaces with external dose rates in excess of 200 millirem per hour were inaccessible, met regulatory requirements. They did not consider obtaining a further clarification from DOT even though they were aware of the new wording of the regulations. Prior to the Enforcement Conference, the licensee contacted the DOT for confirmation as to the intent of the new regulation at which time the licensee was informed that there had been a professional difference of opinion in the interpretation of the requirement within the DOT at the time of the August 1985, telephone conversation. With the publication of final rule making, DOT was unanimous in their interpretation that shipment of "nested" packages in open vehicles with dose rates in excess of 200 millirem per hour were no longer permitted.

2. Shipment No. 85-49 - Breach of Package Integrity

The licensee stated that they had still been unable to reach a definitive conclusion as to the origin of the hole in box No. 85-105. The licensee stated upon travel to the burial ground, examination of the package showed that the hole had been punctured from the outside inward but that the covering tarpaulin had remained intact. The licensee further acknowledged that the hole had been rusty underneath the duct tape. The licensee passed around pictures that had been taken of the damaged box at the burial ground at the Enforcement Conference.

The licensee stated that their usual program for insuring package integrity had consisted of inspection of new boxes upon arrival at the site and inspection prior to departing the site. The licensee had initiated as their corrective action, increased inspection at various stages of the shipping process by an increased number of individuals.

NRC representatives emphasized the sensitivity of the transportation area and the need for conservative measures in implementing regulatory requirements in this area.