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November 4., 1994

Report Nos.: 50-250/94-19 and 50-251/94-19

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

Docket Nos.: 50-250 and 50-251

License Nos.: DPR-31 and DPR-41

Facility Name: Turkey Point Units 3 and 4

Inspection Conducted: October 3-7, 1994

Inspector: Donald B. Forbes 10/31/94
 D. B. Forbes Date Signed

Approved by: William H. Rankin 10/31/94
 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, unannounced inspection of the licensee's radiation protection (RP) program involved review of health physics (HP) activities. The specific areas evaluated included organization and staffing, self-assessment programs, training, external and internal exposure, control of radioactive material and contamination, surveys and monitoring, and As Low As Reasonably Achievable (ALARA) program implementation.

Results:

Based on interviews with licensee personnel, records review, and observation of work activities in progress, the inspector found the RP program to be functioning adequately to protect the health and safety plant workers. RP staffing levels appeared adequate to support on-going activities. The licensee continued to implement effective internal and external exposure



control programs with all exposures less than 10 CFR Part 20 limits. The ALARA program continued to be effective in controlling overall collective dose. The inspector reviewed two separate contamination events, one involving a worker arriving at the plant after becoming contaminated at a local hospital and the other involving two foreign nationals arriving at the plant after becoming contaminated at a European nuclear facility. Turkey Point's immediate follow up actions, prompt notification and assistance to the NRC and the State of Florida in response to these contaminations demonstrated appropriate and aggressive actions in responding to such events.



REPORT DETAILS

1. Persons Contacted

Licensee Employees

*T. Abbatiello, Manager, Site Quality
J. Bates, Support Supervisor - Health Physics
S. Blitchington, Supervisor, Operations
R. Brown, ALARA Supervisor - Health Physics
*J. Danek, Corporate, Health Physics
M. Eades, Quality Assurance Specialist
D. Jernigan, Manager, Operations
*J. Knorr, Engineer, Licensing
*J. Lindsay, Supervisor, Health Physics
*L. Pearce, Plant General Manager
*T. Plunkett, Vice President
*E. Weinkam, Manager, Licensing
J. Williams, Dosimetry and Records Supervisor

Other licensee employees contacted included engineers, technicians, operators, and office personnel.

Nuclear Regulatory Commission

B. Desai, Resident Inspector
*T. Johnson, Senior Resident Inspector
*L. Trocine, Resident Inspector

*Attended October 7, 1994 Exit Meeting

2. Organization and Management Controls (83750)

The inspector reviewed the licensee's organization, staffing levels, and lines of authority as they related to the Radiation Protection (RP) Department to verify that the licensee had not made organizational changes which would adversely affect the ability to control radiation exposures or radioactive material.

There had been no structural changes in the RP Department since the previous inspection conducted April 11-15, 1994, and documented in Inspection Report (IR) No. 50-250, 251/94-09. The RP staff employees approximately 76 personnel including 40 Radiation Protection Men (RPMs). The RPMs observed performing work and interviewed by the inspector appeared knowledgeable and well trained.

At the time of inspection, the licensee was beginning a planned 44 day cycle 15 refueling outage on Unit 4. The inspector discussed with licensee representatives the planned staffing for the ongoing Refueling Outage. Licensee representatives stated that approximately 76 HP senior temporary contractor technicians were employed to supplement the plant organization during the outage along with 40 decon contractor



technicians, 6 laundry contractor technicians, and 6 dosimetry clerks. Approximately 15 Turkey Point employees were trained to assist RP in specific task during the outage; such as, issuing equipment, surveying laundry, and assisting personnel entering and exiting access control points into the Radiological Control Area and the Unit 4 Containment.

Based on discussions with licensee representatives and observation of activities in progress, the RP staffing levels appeared adequate to support on-going and planned outage activities.

No violations or deviations were identified.

3. Audits and Appraisals (83750)

a. Quality Assurance (QA) Audits

10 CFR 20.1101(c) requires that the licensee periodically review the RP program content and implementation at least annually.

Technical Specification (TS) 6.5.2.8 requires audits of facility activities to be performed under the cognizance of the Company Nuclear Review Board (CNRB) encompassing conformance of facility operation to all provisions contained in the TSs and applicable License Conditions at least once per 12 months, and the Process Control Program (PCP) and implementing procedures at least once per 24 months.

The licensee's independent audits and appraisals in the radiation control area consisted of formal audits per TS requirements, documented observations and specific surveillance. A qualified auditor with health physics and chemistry experience was assigned to the station to implement the licensee's assessment activities.

Licensee activities, audits, and appraisals were reviewed by the inspector to determine the adequacy of identification and corrective action programs for deficiencies or weaknesses related to the control of radiation or radioactive material. Observations by the inspector and discussions with cognizant licensee personnel indicated that these efforts were accomplished by reviewing procedures, observing work, reviewing industry documentation, and performing plant walkdowns to include surveillance of work areas by supervisors and technicians during normal work coverage. Documentation of problems by licensee representatives was included in Monthly Monitoring Reports and Quality Assurance Audits. The Quality Assurance Audit, QAO-PTN-94-013, Radioactive Waste Handling and Shipping, conducted August, 1994, reviewed by the inspector was in draft awaiting final review signature by licensee management personnel.

In general, the audits were determined to be well planned and conducted, and contained items of substance relating to the radiation protection program. Based on these observations by the



inspector, the Audit and Appraisal Process continued to be adequate.

b. Radiological Incident Reporting System

The inspector reviewed the licensee's RP internal program for identifying and correcting deficiencies and weaknesses related to radiation exposure and the control of radioactive material. The program consisted of the Radiation Deficiency Report (RDR). The inspector reviewed the selected RDRs written in 1994 and determined the RDRs were well documented and corrective action was assigned.

No violations or deviations were identified.

4. Training and Qualifications (83729)

10 CFR 19.12 requires, in part, that the licensee instruct all individuals working in or frequenting any portions of a restricted area in the health protection aspects associated with exposure to radioactive material or radiation; in precautions or procedures to minimize exposure; in the purpose and function of protection devices employed; in the applicable provisions of the Commission regulations; in the individual's responsibilities; and in the availability of radiation exposure data.

The inspector discussed with cognizant licensee management, training requirements for contractor health physics personnel and observed contractors performing radiation and contamination surveys during work evolutions. The inspector interviewed RP personnel, managers, and plant workers to determine the effectiveness of 10 CFR Part 20 training. The revised 10 CFR Part 20 training was a part of a continuing training program to prepare RP personnel for procedural changes which were required to be implemented January 1, 1994. The inspector reviewed a training checklist used by QA personnel to evaluate Part 20 implementation.

The senior contractor HP's are required to successfully complete a written examination prior to performing work at Turkey Point Nuclear Plant. Discussions with licensee representatives and procedure review indicated senior contractor HP technicians may be trained to perform specif task. During tours of the facility the inspector interviewed contractor HP technicians and observed the technicians providing job coverage.

Based on observations and discussions with plant personnel, training in these areas appeared adequate to support ongoing work. The inspector noted specific training for RP and selected craft personnel had been conducted for work on the seal table/flux mapper in an effort to reduce personnel exposure and minimize the spread of radioactivity during this evolution.



5. External Exposure Controls (83750)

10 CFR 20.1201 (a) requires each licensee to control the occupational dose to individual adults, except for planned special exposures under 20.1206, to the following dose limits:

- (1) An annual limit, which is the more limiting of:
 - (i) The total effective dose equivalent being equal to 5 rems; or
 - (ii) The sum of the deep-dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 50 rems;
- (2) The annual limits to the lens of the eye, to the skin, and to the extremities, which are:
 - (i) An eye dose equivalent of 15 rems; and
 - (ii) A shallow-dose equivalent of 50 rems to the skin or to any extremity.

TS 6.11.1 requires procedures for personnel radiation protection to be prepared consistent with the requirements of 10 CFR Part 20 and be approved, maintained, and adhered to for all operations involving personnel radiation exposure.

The inspector discussed the cumulative whole body exposures for plant and contractor employees. Licensee representatives stated and the inspector confirmed that all whole body exposures assigned since the previous NRC inspection of this area were within 10 CFR Part 20 limits. A discussion with licensee representatives and a review of pertinent records determined the licensee had established an annual site exposure goal for 1994 of approximately 475 person-rem. The licensee's annual site exposure goal was based on operational exposure and 1994 dual outage exposure for Units 3 and 4. The licensee had established a Unit 4 refueling outage exposure goal of 175 person-rem.

During a tour of the Unit 3 containment Building, the inspector observed workers standing by in low dose waiting areas and observed interaction between RP technicians and workers during pre-containment entry briefings. The inspector also observed external exposure controls being implemented by the RP technicians during steam generator maintenance setup and during reactor head detensioning work activities.

Personnel Dosimetry

10 CFR 20.1501(c)(1) and (2) requires that dosimeters used to comply with 10 CFR 20.1201 shall be processed and evaluated by a processor accredited by the national Voluntary Laboratory Accreditation Program (NVLAP) for the types of radiation being



monitored.

10 CFR 20.1502(a) requires each licensee to monitor occupational exposure to radiation and supply and require the use of individual monitoring devices by:

- (1) Adults likely to receive, in one year from sources external to the body, a dose in excess of 10 percent of the limits in 10 CFR 20.1201(a);
- (2) Minors and declared pregnant women likely to receive, in one year for sources external to the body, a dose in excess of 10 percent of any of the applicable limits of 10 CFR 20.1207 or 10 CFR 20.1208; and
- (3) Individuals entering a high or very high radiation area.

The licensee continued to implement both Direct Reading Dosimeters (DRDs) and self-reading pocket dosimeters (SRPDs); however, the former were being used as the primary devices for containment entries. Thermoluminescent Dosimeters (TLDs) were required for all entries into the RCA. The inspector discussed and reviewed comparisons between SRPDs and TLDs with licensee representatives. Licensee representatives informed the inspector that the DRDs were tracking within approximately 95 percent of the actual exposure recorded from the TLDs. The licensee had obtained additional DRDs to support the ongoing Unit 4 outage and was evaluating replacing their existing DRDs with ones that would support a more integrated dose tracking system. Additional wireless DRDs (teledosimetry) had been purchased for remotely monitoring the dose rates of areas and exposure of personnel during selected higher dose work activities.

During tours of the plant, the inspector observed personnel wearing appropriate monitoring devices on the location of the body as specified by the RWPs. The inspector reviewed and discussed the licensee's dosimetry program with site personnel and determined licensee dosimetry was being processed under NVLAP certification.

Based on observations, records reviews, and interviews with plant workers the inspector concluded the licensee was effectively controlling external exposure.

No violations or deviations were identified.

6. Internal Exposure (83750)

a. Respiratory Protection

10 CFR 20.1703(a)(3) permits the licensee to maintain and to implement a respiratory protection program that includes, at a

minimum: air sampling sufficient to identify the hazard; surveys and bioassay to evaluate the actual intakes; testing of respirators immediately prior to each use; written procedures regarding selection, fitting, issuance, maintenance and testing of respirators; written procedures regarding supervision and training of personnel and monitoring, including air sampling and bioassays; record keeping; and determination by a physician prior to the use of respirators, that the individual user is physically able to use respiratory protective equipment.

The inspector reviewed records for selected employees who had recently worn respiratory protection equipment. The inspector verified that for the records reviewed, each worker had successfully completed respiratory protection training, was medically qualified, and was fit-tested for the specific respirator type used in accordance with licensee procedural requirements.

The inspector reviewed the respirator log sheets indicating the number and types of respirators used during 1994 which included approximately 150 full face respirators. The inspector discussed with the licensee respirator reduction efforts for the ongoing Unit 4 outage with respect to engineering controls methods to be used by the licensee for future respirator reductions to enhance ALARA concepts such as, worker training, successful decontamination efforts, and various engineering controls to include worksite ventilation and face shields. During tours of the facility the inspector observed numerous portable worksite ventilation systems in use. The licensee reduced respirator usage during the 1994 Unit 3 outage by approximately a factor of 10 since the 1993 Unit 4 outage. The primary use of respirators has been during work activities on the flux mapper system and during steam generator maintenance.

b. Breathing Air Quality

30 CFR 11.121 requires that compressed, gaseous breathing air meet the applicable minimum grade requirements for Type 1 gaseous air set forth in the Compressed Gas Association (CGA) Commodity Specification for Air, G-7.1 (Grade D or higher quality).

The inspector reviewed and discussed with the licensee representatives the program for testing and qualifying breathing air as Grade D. The inspector inspected the in-use breathing air system which included a plant in-line system using two permanently installed compressors labeled as A and B compressors. The inspector examined breathing air manifolds for physical integrity, current calibration of gauges, and the presence of carbon monoxide monitoring equipment. In addition, the inspector further noted that the supplied air hoods and hoses available for use were compatible per manufacturer's instructions as were air supplied respirators and hoses.



Review of breathing air testing records verified that the licensee was calibrating in-line carbon monoxide monitors and sampling in-use breathing air systems for certification in accordance with procedural requirements. For the tests reviewed, breathing air met Grade D requirements.

c. Whole Body Counting and Exposure Tracking

10 CFR 20.1204(a)(3) requires, in part, that the licensee, as appropriate, use measurements of radioactivity in the body, measurements of radioactivity excreted from the body, or any combination of such measurements as may be necessary for timely detection and assessment of individual intakes of radioactivity by exposed individuals.

The inspector was informed by licensee representatives that 2 positive internal contaminations had been identified to date in 1994. The inspector reviewed licensee survey records for these individuals and determined the exposures to be well below regulatory limits of 5 Rem per year for Total Effective Dose Equivalent (TEDE). The licensee considered any count that gave a result greater than the minimal detectable activity for any nuclide other than potassium-40 to be "positive." No problems were noted by the inspector during a review of selective records of the bioassay program.

Based on the above, the inspector concluded that the licensee was effectively controlling internal contaminations.

No violations or deviations were identified.

7. Control of Radioactive Materials and Contamination, Surveys, and Monitoring (83250)

10 CFR 20.1902 specifies the posting and control requirements for radiation areas, high radiation areas, very high radiation areas, airborne radioactivity areas, and radioactive material areas.

10 CFR 20.1904(a) requires the licensee to ensure that each container of licensed material bears a durable, clearly visible label bearing the radiation symbol and the words "Caution, Radioactive Material," or "Danger, Radioactive Material." The label must also provide sufficient information (such as radionuclides present, and the estimate of the quantity of radioactivity, radiation levels, kinds of materials, and mass enrichment) to permit individuals handling or using the containers, to take precautions to avoid or minimize exposures.

10 CFR 20.1501(a) requires each licensee to make or cause to be made such surveys as (1) may be necessary for the licensee to comply with the regulations and (2) are reasonable under the circumstances to evaluate the extent of radioactive hazards that may be present.

TS 6.11.1 requires procedures for personnel radiation protection to be prepared consistent with the requirements of 10 CFR Part 20 and be approved, maintained, and adhered to for all operations involving personnel radiation exposure.

a. Routine Surveys, Posting, and Labelling

The inspector independently verified radiation and/or contamination levels of selected areas during tours of the Dry Storage Warehouse, RadWaste Building, Auxiliary Building, and outside radioactive material storage areas and no concerns for area postings were noted. The inspector also reviewed selected records of radiation and contamination surveys and concluded the licensee was effectively maintaining survey records.

b. High Radiation Areas

TS 6.12.1 required, in part, that each High Radiation Area (HRA) with radiation levels greater than or equal to 100 mrem/hr but less than or equal to 1000 mrem/hr be barricaded and conspicuously posted as a HRA. In addition, any individual or group of individuals permitted to enter such areas are to be provided with or accompanied by a radiation monitoring device which continuously indicates the radiation dose rate in the area or a radiation monitoring device which continuously integrates the dose rate in the area, or an individual qualified in radiation protection procedures with a radiation dose rate monitoring device.

During plant tours, the inspector noted that high radiation areas (HRAs) were locked as required and other entry controls were in place as necessary. In addition, the inspector determined HRA keys were adequately controlled by RP and no problems were noted at the time of the inspection.

c. Area and Personnel Contamination

The licensee maintained approximately 117,746 square feet (ft²) of floor space as a Radiologically Controlled Area (RCA). The licensee maintained approximately 4300 ft² as contaminated or 4 percent of the RCA. As of April 14, 1994, the licensee was tracking approximately 6084 ft² of floor space as contaminated which equated to approximately 5 percent of the RCA.

The inspector reviewed Personnel Contamination Event (PCE) reports prepared by the licensee to track, trend, determine root cause, and any necessary followup action. Approximately 146 PCEs had occurred in 1994, primarily during the Unit 3 outage in April. The licensee had established a 1994 goal of 200 PCEs; which included outages on both Unit 3 and Unit 4. The licensee had planned and implemented several contamination control initiatives during the Unit 4 outage to reduce PCEs which included cooling of

the Unit 4 containment to prevent contamination caused by sweat through while wearing protective clothing, increased use of containments for work involving high levels of contamination, plant supplied modesty garments to add additional protection factor from clothing, and the procurement of a large portable facility to be used as an entry/exit control point to the Unit 4 containment for the purpose of providing workers with a larger area in which to remove protective clothing.

d. Radiation Detection and Survey Instrumentation

During facility tours, the inspector noted that survey instrumentation and continuous air monitors in use within the RCA were operable and displayed current calibration stickers. The inspector toured the instrument calibration room and observed instruments staged for issue. The inspector further noted an adequate number of survey instruments were available for use.

e. Inspector Followup on Radiological Contamination Events

The inspector reviewed a personnel contamination event involving two foreign contractors which occurred at the time of the onsite inspection. The contractors, two German Nuclear Specialist, arrived at the Turkey Point site on October 3, 1994, to perform maintenance work at the plant. Upon arrival at the site, the contractors were whole body counted in a whole body counter. Low levels of contamination was detected on the workers skin, clothing and other personal articles such as a gold chain, a wristwatch, and a pair of glasses. A maximum skin contamination level of approximately 5,000 disintegrations per minute (dpm) was detected on the wrist of one of the workers. A maximum skin contamination level of approximately 1,000 dpm was detected on the leg of the second worker. The contamination was determined to be Cobalt 58, Cobalt 60, Manganese 54, and Cesium 137. The workers were fully decontaminated by the Turkey Point RP Staff.

Turkey Point immediately notified the NRC and State of Florida of this event. The inspector observed radioactive contamination surveys being performed of the vehicle the workers arrived in at the site and of a nearby motel at which the workers were registered. Contamination surveys of the rental car and the motel rooms did not detect any radioactive contamination. However, during surveys of one of the motel rooms occupied by the contractors, 3 pairs of socks and one notebook indicated low levels of contamination of approximately 1,000 to 2,000 dpm on the articles. These items were properly contained by plant and state officials. Contaminated personnel items belonging to the workers which were not decontaminated on site were transferred to the State of Florida Radiological Health Officials for proper dispositioning.

The NRC, State of Florida, and the licensee conducted an



investigation to determine other areas in which the workers may have come in contact with. During the investigation of this event, it was determined the individuals last worked in Nuclear Power Plants in Bulgaria and France. The common link between the work locations for both workers was a Bulgarian Plant. The NRC Office of International Programs (OIP) notified the appropriate foreign governments and organizations regarding this event. The NRC also notified the Federal Aviation Administration (FAA) of this event and provided the radiological safety perspective of this issue. The air carrier for the contractors was also notified and the airplanes on which the contractors were passengers were surveyed for radioactive contamination. Surveys of the airplanes did not detect any radioactive contamination.

The inspector also reviewed another contamination event which occurred on October 5, 1994. A licensee employee reporting to the site for duty alarmed an entry radiation/contamination monitor. Additional licensee surveys determined the worker had low levels of Technetium 99m on his hands and face. Technetium 99m is a radioactive isotope with a radioactive half life of approximately 6 hours; which, is commonly used in nuclear medicine application in a clinical environment. The onsite investigation determined the worker had been at a local hospital that day with a relative who was receiving medical treatment. The licensee informed the NRC and the State of Florida of the event. The State of Florida performed contamination surveys of the hospital and determined Technetium 99m had been inadvertently spread to an area not properly posted as a radioactive materials area. The NRC was informed by the State of Florida health officials that the hospital area had been decontaminated and that based on the short radioactive half life and the low levels of contamination found on the worker and at the hospital, no public safety concerns were noted.

Based on a review of these contamination events, the inspector informed licensee management during the exit that Turkey Point's immediate follow up actions, prompt notification, and assistance to the NRC and State of Florida demonstrated appropriate and aggressive actions in responding to such events. The prompt notification enabled coordination between state and federal agencies to investigate the potential sources of the contaminations and to identify any potential public safety concerns that may have existed.

No violations or deviations were identified.

8. Operational and Administrative Controls (83750)

a. Radiation Work Permits (RWPs)

The inspector reviewed selected routine and special RWPs for adequacy of the radiation protection requirements based on work



scope, location, and conditions and observed several pre-job briefings. For the RWPs reviewed, the inspector noted that appropriate protective clothing, respiratory protection, and dosimetry were required. During tours of the plant, the inspector observed the adherence of plant workers to the RWP requirements and discussed the RWP requirements with selected plant workers. The inspector reviewed Radiological Status Boards used to enhance RWP survey information.

The inspector found the licensee's program for RWP implementation to adequately address radiological protection concerns, and to provide for proper control measures.

b. Notices to Workers

10 CFR 19.11(a) and (b) require, in part, that the licensee post current copies of 10 CFR Part 19, Part 20, the license, license conditions, documents incorporated into the license, license amendments and operating procedures, or that a licensee post a notice describing these documents and where they be examined.

10 CFR 19.11(d) requires that a licensee post form NRC-3, Notice to Employees. Sufficient copies of the required forms are to be posted to permit licensee workers to observe them on the way to or from licensee activity locations.

During the inspection, the inspector verified that NRC Form-3 was posted properly at plant locations permitting adequate worker access. In addition, notices were posted referencing the location where the license, procedures, and supporting documents could be reviewed. The inspector interviewed selected licensee and contractor personnel and verified personnel were familiar with the requirements of 10 CFR 19.11(d).

No violations or deviations were identified.

9. Program for As Low As Reasonably Achievable (ALARA) (83750)

10 CFR 20.1101(b) requires that the licensee shall 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 As Low As Reasonably Achievable (ALARA).

The inspector interviewed the ALARA Supervisor, ALARA staff, the RP Supervisor and other licensee representatives to discuss ALARA program implementation and ALARA initiatives to reduce dose during the Unit 4 outage. Outage planning efforts, outage goals, the ALARA feedback program, and specific mockup training for work performed on the Flux Mapper were discussed. The inspector also reviewed the licensee's Unit 4 Outage ALARA plan which listed the implementation of the planned ALARA

activities to include:

- ALARA holdpoints to review work in progress by the ALARA committee based on job history.
- Expanded implementation of the valve locator books and brief site and contractor personnel on the use of the books to minimize time spent locating valves.
- Containment air conditioning to improve worker comfort and productivity in radiation and high radiation areas.
- Improved shutdown chemistry techniques to reduce primary system radioactive source term.
- Increased use of temporary shielding for work performed on the Unit 4 Pipe and Valve Room, the Seal Table, The Containment Building 14 foot level Safety Injection System (SIS) lines, the 200/300 series valves and the Reactor Cavity Shadow Shield.
- Reduction of Source term in the Flux Mapper system.
- Increased use of audio/video communication, telemetric dosimetry, and remote survey instrumentation.
- Postings to identify low dose staging areas.
- Increased promotion of ALARA awareness at safety meetings.
- Increased use of video recordings of mockups and selected task.

Based on the above, the inspector informed the licensee representatives that the ALARA program continued to be effective in controlling exposures. Overall, collective dose expended was consistent with the work performed.

No violations or deviations were identified.

10. Exit Interview (83750, 92701)

At the conclusion of the inspection on October 7, 1994, an exit meeting was held with those licensee representatives indicated in Paragraph 1. The inspector summarized the scope and findings of the inspection. The licensee did not indicate any of the information provided to the inspector during the inspection as proprietary in nature and no dissenting comments were received from the licensee.