U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-293/92-24

Docket No. 50-293

License No. DPR-63

Licensee: Boston Edison Company
RFD #1 Rocky Hill Road
Plymouth, Massachusetts 02360

Facility Name: Pilgrim Nuclear Power Station

Inspection At: Plymouth, Massachusetts

Inspection Conducted: November 2 - 6, 1992

Inspector: David Mann 11/23/92
D. Mann, Radiation Specialist Date
Facilities Radiation Protection Section

J. Noggle 11/23/92
J. Noggle, Radiation Specialist Date
Facilities Radiation Protection Section

Approved by: W. Pasciak 11-23-92
W. Pasciak, Chief, Facilities Date
Radiation Protection Section

Areas Inspected: Areas covered in this inspection included a review of: audits and surveillances, collective personnel exposure status, outage radiological controls, and the implementation of the internal and external exposure radiological programs during mid-cycle outage conditions.

Results: The licensee has demonstrated a very good performance in the areas inspected. Weaknesses were identified in posting of the spent fuel pool to warn against the inadvertent withdrawl of accessible high radiation sources stored in the pool, in staffing of the maintenance ALARA planning section, and in following procedures for issuing Radiation Work Permits (RWPs). Within the scope of this inspection, other than the weaknesses identified above, no safety concerns or violations of regulatory requirements were identified.

DETAILS

1.0 Persons Contacted

1.1 Boston Edison Company

* E. Boulette, Vice President/Station Director
A. Bowens, Supervisor Dosimetry
W. Caithness, Supervisor Radiological Operations
M. Christopher, Supervisor Radiological Operations
P. Drazek, Radiological Protection Technician
* N. Desmond, Compliance Division Manager
B. Eldredge, Quality Control Surveillance Inspector
* F. Famulori, Quality Assurance Division Manager
* R. Gay, Compliance Engineer
G. Gordon, ALARA Planning Specialist
* R. Grammont, Maintenance Section Manager
M. Hollander, Lead HP Technician, Condenser Bay
* E. Kraft, Plant Manager
S. Landahl, Radiological Operations Support Division Manager
J. McClellan, Quality Control Surveillance Inspector
F. Munroe, Supervisor Dosimetry Records
K. Norman, Radiological Protection Technician
* H. Oheim, Regulatory Affairs Manager
B. Olson, Supervisor Radiological Instruments
R. O'Neill, Technical Program Supervisor
J. Posselt, Senior Alara Engineer
* W. Rothert, Director, Nuclear Engineering
E. Sanchez, Senior Radiological Engineer
L. Sasser, Senior Radiological Protection Technician
* L. Schmeling, Nuclear Services Department Manager
T. Tetzloff, Supervisor Radiological Operations
D. Twomey, Lead HP Technician, 51 Ft Control Point
B. Vazquez, Lead Radiological Engineer
* L. Wetherell, Radiological Section Manager
A. Williams, Radwaste Division Manager
J. Wudyka, Supervisor Respiratory Protection

1.2 NRC Personnel

* J. MacDonald, Senior Resident Inspector
W. Pasciak, Chief, Facilities Radiation Protection Section

* Denotes attendance at the exit interview on November 6, 1992.

2.0 Purpose

This inspection was an unannounced safety inspection of the Pilgrim Nuclear Power Station radiation control programs during a mid-cycle maintenance outage.

3.0 Previously Identified Items

(Closed) Inspector Followup Item (92-11-02): Powdered resin samples were not dewatered prior to analysis.

The inspector reviewed a licensee memorandum dated September 15, 1992 from C. Goddard to N. Desmond which provided an evaluation of sample results taken before and after dewatering of powdered resins. The evaluation determined that dewatering of samples was not necessary to obtain accurate results. Nevertheless, the appropriate sample and analysis procedures will be changed so that future resin samples will be dewatered to more closely resemble the final waste form for burial. The licensee has committed to revising the applicable procedures by December 30, 1992. This issue is closed.

4.0 ALARA Status

The licensee had an annual station personnel exposure goal of 298 person-rem for 1992, which included a four-week mid-cycle maintenance outage estimated to cost 79 person-rem. With eight weeks remaining in the year and approximately one-third of the way through the mid-cycle outage, the licensee has accrued 124.4 person-rem during routine operations and 48.5 person-rem during the mid-cycle outage for a total of 173 person-rem to date. The licensee set an annual goal of not more than 90 personnel contamination incidents as compared to a current record of 79 personnel contaminations reported for the year. Standard drywell shielding packages were developed and implemented during this maintenance outage which helped reduce the general drywell dose rates. Other specific job shielding efforts were marginally effective.

Job specific ALARA efforts were provided by two ALARA specialists reporting to the planning office of the maintenance section. These ALARA specialists provide the review of all Maintenance Requests. Included in this review they determine those that will require RWPs, they write the initial portion of the RWPs and complete the ALARA checklists, and develop ALARA shield designs. In addition, they instruct station services personnel in the shielding requirements and evaluate the final ALARA shield installation. The two ALARA specialist normally are provided with between one and three HP technicians to assist in the completion of these specified work duties.

The inspector reviewed the drywell In-Service Inspection (ISI) weld examination work locations. The inspector noted that the RWP review and the ALARA review did not require any shielding for ISI weld examinations of the N6B penetration piping although

survey maps indicated general dose rates of 600 mR/hr with contact dose rates of 2 R/hr in the work area. Only 2 person-rem was estimated for this job. As a result, HP had determined that shielding was not required. The maintenance section ALARA group had planned for shielding the N6B piping and a drum of lead shielding had been delivered to the drywell entry lay-down area for this purpose. The controlling drywell HP technicians were unaware of the shielding requirement for this work area and were uninformed of the licensee's intention to shield this area before allowing work to commence. This was a communication breakdown and the licensee agreed to ensure that shielding requirement documentation is provided to the responsible work area HP technicians. The initial shielding planning was not too effective in this case as following the placement of shield material on the N6B pipe location, high radiation dose rates still persisted.

The inspector reviewed work associated with the Reactor Water Clean-Up (RWCU) heat exchangers. The RWCU heat exchanger area had been shielded and signed-off allowing work to commence although the shielding was insufficient and according to the licensee, the general area dose rates were not significantly reduced as a result of the shield installation. The shield design plans were not documented but were orally transmitted to the station ... ices workers by a maintenance ALARA Specialist, calling for two layers of 3/16 ...ck lead blankets over fourteen feet of the regenerative and non-regenerative heat exchangers lengths. The final shield consisted of one-layer of lead blankets distributed over approximately five feet of the heat exchangers. In this particular case, exposure was wasted in installing the shielding blankets since the final dose rates were not substantially affected. Through discussions with the ALARA Specialists, it appears a breakdown in communication and effective shield installation followup were the causes.

5.0 Audits and Surveillances

The licensee had just recently completed an audit of the radiation controls program which had not yet been reviewed by licensee's management chain, and as a result, was not reviewed during this inspection. The inspector reviewed 26 HP surveillance reports which were issued during 1992. There were a number of surveillances conducted over a wide breadth of subjects indicating an appropriate level of quality control oversight was provided. Deficiencies in work supervisors fulfilling RWP responsibilities, and the lack of radioactive material area storage inventories were reported. The surveillance findings were reported as Deficiency Reports (DRs) which were appropriately tracked. At the time of the inspection the radioactive material area storage inventories issue had been adequately dispositioned, but the work supervisor RWP issue had not yet been completely addressed and will be reviewed in a later inspection.

6.0 Outage HP Operations

During this scheduled mid-cycle maintenance outage, the normal HP staff was complimented with 32 contract HP technicians to provide three satellite HP control points located in the turbine building condenser bay, at the drywell entry, and on the reactor building 51 foot elevation. The inspector reviewed all of the major work locations, radiological surveys, RWPs, and log book records at each of these control points. In general, the work areas did not contain radiological postings including dose rate postings or hot spot warnings. One area in the turbine building condenser bay was an exception to this. The licensee depends almost exclusively on the review of surveys and pre-job briefings of the workers to communicate the work area radiological information. For the work evolutions witnessed during this inspection, the licensee provided appropriate HP job coverage and no discrepancies were noted. Surveys were also found to be routinely performed and of good quality.

The inspector noted an area of concern involving a few RWPs that were issued improperly according to station procedure. The licensee has a well written RWP procedure entitled "Issue, Use, and Termination of Radiation Work Permits", 6.1-022, Rev. 31. Section 8.5, requires the HP technician to obtain work area radiological survey information and enter the pertinent information on the RWP. The HP technicians are instructed to ensure that the radiological survey information is the most recent and reflects the current conditions in the work area. Roughly 5 - 10% of the active RWP's had been issued with either outdated information in the radiological conditions section of the RWP, or with no information at all. The licensee assured the inspector that actual surveys were performed and further, that the workers were briefed using the current survey information (survey sheets) and not the radiological conditions as specified on the RWPs. The worker is required to sign the RWP sign-in sheet which specifies that the worker has read, understands, and will comply with the RWP and has reviewed the current radiological survey sheets for the RWP. Apparently a number of RWPs were written and issued before actual work condition radiological surveys had been performed and although current radiological surveys had subsequently been performed, the RWPs still listed incorrect radiological information. The licensee agreed to provide greater attention to this area to ensure that the RWPs are issued with accurate radiological condition information.

While touring the refueling floor, the inspector noted a number of ropes tied to the railing around the spent fuel pool which were attached to submerged high radiation reactor hardware components. The area immediately around the pool was posted as a hot particle exclusion zone, however there were no postings or barricades to warn or prevent workers in the area from pulling up the ropes and causing an unintentional exposure situation. The licensee indicated that workers are instructed during RWP briefings not to pull up any of the ropes without proper radiological controls. The lack of visible postings associated with the tied off high radiation sources is considered a weakness in light of the potential safety significance of the unintentional withdrawl of one of these high radiation sources. The licensee did correct the posting deficiency by placing signs around the spent fuel pool area which state,"Do not handle any ropes or

pull any material up from the fuel pool without RPM permission".

7.0 Internal Exposure Control

The inspector reviewed the respiratory protection equipment issue and control program. The licensee maintains a central issue location for respirators. The station issues, through dosimetry records, a respirator ID card to those individuals who have completed the requirements for wearing a respirator. The dosimetry clerks verify that the individual requesting a respirator ID card has the required qualification to wear the device. These qualifications include: a current whole body count, up-to-date training in respiratory protection, a valid fit-test, and a current physical examination certifying eligibility. The Radiation Protection (RP) technician issuing the respirator takes possession of the ID card in exchange for the respirator. The individual may then perform work while wearing the respirator. After completing the work, the individual returns the "used" respirator and receives the ID card in exchange.

The licensee's respiratory protection fit-test program utilizes the PortaCount-Plus system instead of the traditional corn-oil booth. The calibration and cleaning of this equipment is performed annually by the manufacturer. The licensee performs a daily quality control zero check using a HEPA filter. The licensee performs fit-testing using appropriate procedures in accordance with the ANSI/ANS Z88.2-1980.

The licensee maintains a whole body counter (WBC) that utilizes two stacked sodium iodide (NaI) detectors to perform one minute bioassay counts. The licensee's quality assurance program for the WBC includes a daily count using a $^{137}Cs/^{60}Co$ check source. The result of this count is plotted on appropriate control charts to determine that the results are within three standard deviations ($\pm 3\sigma$) of the mean. In addition, the licensee participates in a quarterly "blind" cross check sample program. WBCs of personnel are considered to be valid if ^{40}K is identified and no unidentified peaks are identified. In addition, a count is considered valid if the minimum detectable activities determined by the computer for isotopes that are not present are less than that activity which corresponds to 10 MPC-hrs.

The inspector reviewed the air sample counting equipment and associated procedures. The licensee uses a Geiger-Muller (GM) tube detector for gross beta, a scintillation detector for gross alpha determinations, and a gamma spectroscopy system for isotopic determinations. A daily source check, a background determination, and a minimum detectable activity (MDA) determination are required by procedure for these counters. The results of the daily source checks are plotted on appropriate control charts. A source check result that is greater than $\pm 3\sigma$ from the mean requires the instrument to be removed from service for repair. The gamma spectroscopy system is involved in the quarterly "blind" cross check sample program which is analogous to the WBC program.

The inspector noted that the licensee's QC program for these instruments did not outline any requirement for review of the check source (control chart) data. In addition, the

program did not include any specific criteria for increased review or corrective action based on the results of the daily source check. The licensee indicated that the analytical instrument and whole body counting QC programs would be reviewed.

The inspector reviewed the MPC-hour tracking program and noted that the licensee begins tracking at 0.1 MPC-hrs. The primary method of determining exposure to airborne radionuclides is by air sample analysis. However, the licensee's program includes appropriate feedback to the MPC-hr tracking system for non-routine in-vivo (whole body counting) measurements. No violations associated with the internal exposure control program were identified.

8.0 External Exposure Control

The inspector reviewed the licensee's programs for multiple whole body dosimetry and extremity dosimetry monitoring. The licensee's program requires multiple whole body dosimetry when the exposure rates exceed 100 mR/hr, the exposure rates differ between the chest and any other location on the whole body by greater than 2 times, and the total dose that the worker is expected to receive exceeds 300 mrem. The licensee's program requires extremity dosimetry when the exposure rate at an extremity exceeds 4 times the exposure rate at the chest and the total dose that the worker's extremity is expected to receive exceeds 400 mrem. These criteria fall within regulatory monitoring requirements. No discrepancies were noted.

The inspector also reviewed the dose conversion factors used by the licensee to calculate personnel exposures. These factors were based on the assumption that the contaminating isotopes were ^{60}Co and ^{137}Cs in a 75/25 ratio. A monthly analysis is performed to reverify the validity of the isotopic mixture assumption. The inspector reviewed the licensee's technical basis document which is the basis for the skin dose calculation coefficients. The inspector noted that the technical basis document was very well done.

The inspector reviewed the licensee's program for issuing and controlling survey instruments. The licensee performs a daily source check to verify that the instrument responds appropriately (±20%) for at least one point on each of the readout scales. The licensee allows qualified individuals to self-issue survey instruments. Information in the instrument issue log book includes current calibration information and daily check source data. The inspector reviewed selected log book entries and did not find any discrepancies. In addition, the inspector reviewed the quality assurance department audit of the instrument issue program and noted that the audit of the log book entries did not result in any findings.

The licensee implemented some changes to the personnel monitoring program on July 1, 1992. The inspector reviewed the technical basis document written by the licensee supporting the changes. The revised monitoring program removed the licensee's self-imposed requirement to provide everyone who entered the protected area with a thermoluminescent dosimeter (TLD). To change this self-imposed requirement the

licensee had to classify individuals who were "required" by regulation to be monitored as radiation workers. The licensee classified the workers using the monitoring criteria in the proposed 10 CFR 20 (new Part 20), since the new Part 20 requirements are more limiting. Individuals who are restricted from entering contaminated areas, airborne radioactivity areas, and high radiation areas are no longer required to wear a TLD and are not required to receive annual whole body counts or physical examinations. Visitors are included in this category. An individual may enter a radiologically controlled area (RCA) without a TLD; however, they are required to wear direct reading dosimetry and their exposure is administratively limited to 25 mrem/quarter. The licensee addressed some potential problem areas and provided solutions to them. These problems included issues such as: dose accountability for an individual who changes monitoring categories within a quarter, or visually distinguishing between individuals required to wear a TLD from individuals not required to wear a TLD. All declared pregnant females are issued a TLD regardless of the monitoring category. Individuals who enter the protected area for the first time after July 1, 1992 will not receive a termination letter when they leave the site. Individuals who were monitored previously, but under the revised categorization are no longer monitored, received a letter providing them with a record of their occupational dose for the entire period during which they were monitored. No violations were identified relative to the licensee's external exposure monitoring program.

9.0 Exit Meeting

The inspector met with licensee representatives at the conclusion of the inspection on November 6, 1992. The inspector reviewed the purpose and scope of the inspection and discussed the findings.