U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos.	50-334/94-08 50-412/94-08
Docket Nos.	50-334 50-412
License Nos.	DPR-66 NPF-73
Licensee:	Duquesne Light Company P.O. Box 4 Shippingport, Pennsylvania 15077
Facility Name:	Beaver Valley Power Station, Units 1 and 2
Inspection At:	Shippingport, Pennsylvania
Inspection Period:	March 28-30, 1994 and May 2-5, 1994

Inspector: _____ 5/31/94
J. Nick, Radiation Specialist — Date

Approved by: _____ 6/1/94
R. Bores, Chief — Date
Facilities Radiation Protection Section

Areas Inspected: Implementation of the radiological controls and external exposure control programs. Program elements reviewed included administrative controls, organization and staffing levels, training and qualifications, external exposure controls, internal exposure controls, corrective action and self-assessment programs, the program to maintain personnel exposures as low as reasonably achievable (ALARA), and required program documentation. Emphasis was placed on the implementation of the requirements in the revision to 10 CFR 20.

Results: The radiological controls program was generally very effective in protecting the safety of workers in radiological areas. The radiological controls group was staffed by qualified individuals with documented training and qualifications. Areas toured in the facility were well maintained and exhibited good housekeeping. The licensee provided good program assessment with continuing improvements to the radiological controls program. Improvements were noted in controls for High Radiation Areas and timeliness of annual bioassays. A minor weakness was noted in the control of radioactive materials. No violations of NRC regulations were identified.

DETAILS

1.0 Persons Contacted

1.1 Licensee Personnel

D. Canaan, Senior Health Physics Specialist, Respiratory Protection
*E. Cohen, Director, Radiological Operations Unit 2
*D. Girdwood, Director, Radiological Operations Unit 1
M. Helms, Senior Health Physics Specialist, ALARA
*J. Lebda, Radiological Engineering and Health
*F. Lipchick, Senior Licensing Supervisor
A. Mizia, Supervisor, Quality Services Unit
*T. Noonan, Plant Manager
R. Pucci, Health Physics Specialist, ALARA
*B. Sepelak, Licensing Engineer
M. Shaw, Nuclear Training Instructor
*R. Vento, Manager, Health Physics

Various other licensee employees were contacted and interviewed during this inspection.

1.2 NRC Personnel

*L. Rossbach, Senior Resident Inspector
P. Sena, Resident Inspector
S. Greenlee, Resident Inspector

*Denotes those present during the exit meeting

2.0 Facility Tours

The inspector toured many of the radiologically controlled areas (RCAs) of the facility including the reactor buildings, the spent fuel pool areas, the auxiliary buildings, and the safeguards area. All areas were generally well posted and exhibited good housekeeping. Some minor discrepancies in postings were identified to the licensee's radiological controls staff. These discrepancies were immediately resolved and were verified by the inspector during subsequent tours. The inspector observed very good marking on potentially contaminated drains and containers used to contain drips or leaks. Areas or equipment with localized radiation levels 5 times higher than the general area dose rate and greater than 100 millirem per hour on contact were marked with "Hot Spot" tags. Although the tags did not indicate the dose rate, they were useful in warning workers of the presence of a higher dose rate in the area.

The licensee provided good controls to prevent the spread of radioactive contamination. Contaminated areas were well posted and marked with tape or rope. Step-off pads were

placed at the entries/exits to these areas to alert workers of the change from a contaminated area to a cleaner area. A large inventory of protective clothing was available for work in contaminated areas. After leaving a contaminated area and removing potentially contaminated protective clothing, radiological frisking instruments were provided to workers for checking their hands and feet for contamination. The receptacles provided for the collection of potentially contaminated protective clothing were periodically emptied and the undressing areas were neatly kept to prevent inadvertent spread of contamination.

The inspector noted that some containers were labelled with radioactive material stickers, but did not provide other information (such as radioactivity levels, dose rates, the radionuclides present, kinds of the material, etc.) to allow workers to maintain their exposure ALARA. The containers were generally tool boxes or metal storage bins. The licensee had labelled the containers with the radioactive material labels even though the material inside the container may not have met the criteria for radioactive material. In some instances, the contents were also labelled and contained in plastic bags with more specific information written on the bags. In all cases, the materials were not highly contaminated or did not produce a very high radiation level. The inspector identified this use of radioactive material posting as a minor weakness in the radiological controls program because it could desensitize workers to the presence of an actual hazard with radioactive materials. The licensee representatives agreed to review the use of the radioactive material stickers in an attempt to improve the control of radioactive materials. The inspector will review the licensee's progress in this area in future inspections.

Automated friskers were used at the main exits from the RCA for personnel and small article contamination monitoring. Other exits were equipped with radiological frisking instruments for manual frisking of workers and articles. The inspector verified that the monitoring equipment was calibrated and source checked by reviewing the licensee's calibration stickers and source check documentation.

The licensee had posted areas of restricted access due to the presence of radioactive materials with signs stating, "Radiologically Restricted Area." These areas included the main protected area surrounded by the security fence, the radiological waste storage building, the storage yard ("South Yard"), and the radioactive source room in the Emergency Response Facility (ERF). The licensee had plans for including the "old Shippingport warehouse" as an area for storage of outage equipment or other rarely used, but potentially radioactive, material. Although this posting was not required by regulation, the inspector noted the licensee's effort to provide information to the public or infrequent visitors to the facility.

The inspector concluded that the licensee provided generally good radiological controls through posting, labelling, and marking of radioactive materials and areas. These controls provided sufficient information to allow workers to maintain their exposure ALARA. The inspector found all High Radiation Areas (HRAs) and Very High

Radiation Areas (VHRAs) were barricaded, locked, and controlled as required by NRC regulations and licensee Technical Specifications.

3.0 Organization and Staffing

The licensee's organization had not changed since the last inspection. The radiological controls organization was adequately staffed to meet the workload and no deficiencies were noted.

The licensee was planning a rotational assignment for the Unit 1 and Unit 2 Radiological Controls Directors. These individuals were planning to switch positions for a period of approximately 30 days. A similar rotation had been implemented with the Radiological Controls Foremen. The licensee management encouraged the rotational assignments to allow the individuals more opportunity for work experience in both units.

4.0 Training and Qualifications

The inspector reviewed the training material presented to employees for the implementation of the revisions to 10 CFR 20. All employees with RCA access were required to attend the General Employee Training (GET) course. The information was currently being revised to add some specific information regarding the revised 10 CFR 20 and improve the training content.

As per the licensee's procedures, all radiological controls technicians were required to attend continuing cyclic training and pass a cyclic examination. The cyclic training included procedure changes, recent industry problems and lessons learned, changes to the 10 CFR 20 regulations, and areas in the facility that could have rapidly changing dose rates. Radiological controls technicians were required to pass the cyclic examination at the end of the training period.

The inspector concluded that the licensee had presented the appropriate information to the technicians and the general workers for the changes to 10 CFR 20. No violations or deficiencies were noted.

5.0 External Exposure Control

The licensee monitored individuals for radiation while performing work in the RCA by the use of self-reading dosimeters (SRDs) and thermoluminescent dosimeters (TLDs). After initial issuance from the ERF, the dosimetry was worn during each workshift within the protected area. At the end of the workshift, the dosimetry was stored at the main security facility with each person's security badge.

The inspector observed workers in the RCA wearing their assigned SRD and the whole body TLD with the correct body placement. The licensee had an on-site laboratory to process whole body TLDs that was currently accredited through the National Voluntary Laboratory Accreditation Program (NVLAP). The inspector verified the current NVLAP accreditation by reviewing the certificate of accreditation.

The licensee maintained an exposure tracking system that recorded the worker's dose from the SRD. The worker's radiation exposure was measured by both SRD and TLD. After each entry into the RCA, the worker was required to record the change in the SRD reading. The SRD continued to accumulate the dose and was not zeroed. The licensee's procedure required zeroing of the SRD only when the TLD was processed and the dose was recorded. This practice allowed a worker to monitor the total accumulated SRD dose unless the TLD was processed. Since SRDs have a tendency to lose charge and potentially alter the dose reading over an extended period of time, the licensee also recorded all workers' total accumulated exposures from the SRDs approximately once every week.

In addition to the requirements mentioned above, the licensee's procedures required the issuance of at least one alarming (automated) dosimeter to a work party when individuals entered a HRA. The inspector did not observe any individuals in a HRA. However, the inspector did note the use of alarming dosimeters for personnel working on the Unit 1 spent fuel pool rerack activities, even though the area was not a HRA.

6.0 Internal Exposure Control

The control of internal exposure was inspected through a review of the licensee's procedures for the issuance of respiratory protection equipment and a review of the internal exposure tracking system. The licensee's internal dose tracking system was maintained on a network computer. The system (HIS-20) allowed the assignment of internal dose from air sample results, bioassay results, or calculations. Although most individuals did not meet the threshold dose for summing of external and internal dose, the licensee was summing the total external dose and the effective internal dose for all monitored individuals in the tracking system. The inspector found that the licensee had an effective tracking system to control internal exposure. The control of internal exposure control was inspected through a review of air sample results, internal dose assignments, the presence of air sampling instruments in the work locations, and the use of respirators or other engineering controls.

The licensee had procedural guidance that a respiratory protection ALARA review shall be performed when individual exposure was greater than 200 millirem or collective exposure was greater than 1 person-rem from external radiation sources; or intakes were expected to exceed 8 Derived Air Concentration (DAC) hours for individuals without the use of respiratory protection. The procedure outlined the method used to determine

whether the workers would receive more total exposure with or without respiratory protection. The radiological controls staff believed that in many circumstances the individuals would receive more whole body exposure when wearing respirators than when performing the same job without wearing respirators, and the historical data on some jobs had shown very little internal dose potential. The licensee stated that respirator usage had decreased from past practice without a significant increase in internal dose assignments.

Estimated internal dose was assigned to workers based on the results of air samples in the work areas. Air sample results were calculated in DACs and multiplied by the time spent by the worker in the area to obtain DAC-hours. After an individual had accumulated greater than 10 DAC-hours in a calendar year, the individual was contacted for a bioassay determination. The dose calculated from the bioassay replaced the estimated dose assigned from the air sample results. The licensee did not have any individuals who received 10 DAC-hours, but whole body bioassays were performed on several individuals for termination of work assignment or other reasons.

The inspector reviewed the results of a positive bioassay to verify the dose assignment. The NRC regulatory limit is 2000 DAC-hours or a total effective dose of 5000 millirem per calendar year. The internal dose assignment to the individual was approximately 6 millirem, and was the highest internal dose assignment for 1994. In addition, the dose assignment was conservative. No individuals were assigned any significant dose from the bioassay determination. The licensee had assigned a total internal dose assignment for 1994 of approximately 11 DAC-hours or 28 millirem to approximately 13 people. Most assignments were less than 1 millirem for each individual.

During tours of the radiological controlled areas, the inspector observed air sampling equipment in the work place when it was appropriate. The inspector also observed air sampling equipment in the workplace with current calibration dates and documented, daily operational checks. Air filtration and air handling units were also placed in many areas to provide better breathing air in potentially contaminated areas. The inspector observed the units in all areas that required ventilation or filtration.

The licensee maintained a bioassay program to verify the effectiveness of the respiratory protection program and determine internal dose assessments. The program included annual whole body counts for personnel with RCA access, whole body counts after personnel radioactive contamination events, and random whole body counts for individuals with RCA access for respiratory protection verification. The inspector had identified a weakness in the bioassay program in an earlier inspection report (Combined NRC Inspection Report Nos. 50-334/93-25 and 50-412/93-26). Most personnel were routinely measured for bioassay determination according to the licensee's procedures; however, there were some individuals who did not receive an annual whole body count on a timely basis. The licensee has taken corrective actions to improve the bioassay program (see Section 10.2 of this report).

Overall, the inspector concluded that the licensee provided adequate control of internal exposure to the workers through engineering or process controls. The licensee effectively tracked and assigned internal dose and performed bioassay assessments when necessary. No deficiencies or violations were noted.

7.0 Corrective Action and Self-Assessment Programs

The inspector reviewed the licensee's corrective action and self-assessment programs through a review of documents and interviews with personnel. The program was of very good quality and included audits and surveillances performed by the quality assurance group, surveillances performed by members of the radiological controls staff, and a radiological occurrence report (or plant report) system. The inspector reviewed the audits, surveillances and reports and noted some areas for improvement in the radiological controls program, but did not note any major programmatic weakness or violations. The licensee had taken timely and effective corrective actions for most findings and recommendations. There were three plant reports written in 1994. The three reports documented a generic problem with the area radiation monitoring system, a worker who reached into a HRA without authorization, and a small fire in the spent fuel pool building.

The licensee's radiological controls staff and quality assurance staff generated hundreds of surveillance reports during the first part of 1994. These reports documented a review of various portions of the program by staff members. The inspector reviewed the surveillance reports and found some minor areas for improvement that were corrected in a timely manner.

The inspector found that the licensee's self-assessment and corrective action program was continuing to document, track, and trend minor areas for improvement in the radiological controls program. Timely and effective corrective actions were implemented. The inspector noted no deficiencies or violations of NRC regulations in this area.

8.0 ALARA Program

The licensee's radiological controls program contained several components to maintain personnel radiation exposure ALARA. The licensee held monthly Radiation Awareness Meetings where Radiological Controls staff members presented ALARA and other radiological information to department representatives. The department representatives took this information back to their respective departments for distribution.

The Radiological Controls staff prepared ALARA reviews of jobs and tasks performed in the RCA. ALARA reviews for major tasks and jobs were assigned to one of the

ALARA group members and a Radiological Controls Foreman. Job supervisors and job planners were also included in ALARA reviews. The ALARA staff had prepared a report of activities for the Unit 2 fourth refueling outage and the maintenance mini-outage for repairs to the Unit 1 recirculation spray heat exchangers in January 1994. The reports summarized the work activities, radiation exposures, and ALARA initiatives during the outage periods.

The licensee distributed periodic exposure tracking reports to keep the licensee's staff aware of personnel exposure to workers on each job and overall personnel exposure totals. The reports also included performance summaries, highest individual radiation doses, numbers of Awareness Reports and Radiological Investigative Reports, numbers of positive whole body counts, numbers of skin and clothing contaminations, total square feet of contaminated and airborne radioactivity areas, and a summary of audit/action items. ALARA goals were compared to actual personnel exposures and displayed in graphs and charts.

The licensee dose reports stated the total personnel exposure for all workers from January 1, 1994 through April 30, 1994, was approximately 16 person-rem. Most of this exposure was attributed to the fuel pool rerack activities in Unit 1 (approximately 3 person-rem) and the maintenance mini-outage for repairs to the Unit 1 recirculation spray heat exchangers in January 1994 (approximately 7 person-rem). The total personnel exposure goal for 1994 was 390 person-rem, including a refueling outage for Unit 1.

The inspector found the reports to be good quality with valuable information to the staff and radiological area workers. The licensee dose reports stated the total personnel exposure for all workers from January 1, 1993 through December 31, 1993, was approximately 620 person-rem. The total personnel exposure goal for 1993 was 700 person-rem. The highest total effective dose for any worker was 2043 millirem during 1993.

The inspector concluded that the program to maintain personnel exposures ALARA was very effective. The licensee used planning, mock-up training, worker education, and departmental accountability to exposure goals. Overall, radiation exposures were very good compared to other pressurized water reactors of the same age. No deficiencies or violations were noted.

9.0 Implementation of Revisions to 10 CFR 20

9.1 Planned Special Exposures

The licensee had developed a procedure for the potential of a planned special exposure (PSE). The PSE is an allowable exposure above the annual regulatory limit, that is to be used when there is no other method available to avoid the planned exposure.

Although the licensee did not have any immediate need to use this procedure, the licensee's staff wanted to prepare the procedure for an unanticipated situation. The inspector reviewed the procedure and found that the licensee had incorporated guidance from 10 CFR 20.1206. The procedure was comprehensive and of very good quality.

9.2 Embryo/Fetus Dose

The licensee had also developed a procedure to limit the radiation exposure to a declared pregnant woman (DPW). The procedure and policy provided very good guidance to the radiological controls personnel to maintain dose to a DPW, and her embryo/fetus, to below the limits specified in 10 CFR 20.1208.

The license's staff was monitoring two declared pregnant women at the time of this inspection. According to the licensee's dose records, the total dose to the workers since declaration was 0 millirem. The inspector concluded that the licensee had effective controls to limit the exposure to the embryo/fetus below the regulatory limit.

9.3 Very High Radiation Areas

The licensee had identified two areas in each unit where a potential VHRA could exist. These areas were the reactor cavity during power operations and the in-core detector storage room. The inspector verified, through photographs taken by the licensee staff, that the areas were posted with the words, "Grave Danger, Very High Radiation Area" and the appropriate controls were in place. The entrances (ladders) to the reactor cavity had been posted and barricaded. Also, the keyways to the in-core detector storage room were also posted and barricaded. The inspector determined that the licensee had taken the appropriate controls to prevent unauthorized entry. No deficiencies or violations of NRC regulations were identified.

10.0 Other Items

10.1 High Radiation Area Controls

The licensee experienced problems with control of other HRAs, as was documented in various NRC inspection reports. The licensee had documented these problems in three different Licensee Event Reports (LERs) in 1992 and 1993 (92-006, 93-006, and 93-009). In response to these events, the licensee issued a letter to all individuals who were qualified to use a radiation dose rate meter to enter an HRA. The letter outlined the requirements for personnel entering an HRA and the individual's responsibilities when entering or exiting an HRA. The letter also outlined the initiatives taken by the licensee's staff to address HRA control problems.

The first action was to add another "zone code" to the licensee's existing codes. The licensee used zone codes to alert workers to changes in radiological conditions from one area to the next. The zone code "6" was used to mark areas with radiation dose rates above 1000 millirem per hour. As per licensee Technical Specifications, these Locked High Radiation Areas (LHRAs) must be locked to prevent unauthorized entries. The licensee's second action was to form a task force to assess the root causes of the loss of controls for HRAs and identify appropriate corrective actions. The third action was a temporary administrative control that required personnel to log all LHRA entries on a small card. This action was intended to increase accountability for maintaining LHRA entrances and to remind personnel to close or lock barriers when entering or leaving the LHRA.

The licensee had established a task force comprised of workers and management to address the problem and make recommendations. The task force had met regularly (i.e. every 2 weeks) to discuss HRA controls. Although the task force had made some preliminary recommendations, the final recommendations were not available for review by the inspector. Some ideas were being tested and examined for permanent use. Among the ideas was a metal gate that automatically closed after a person entered/exited a HRA. The "V" gate (named after a "V" groove that allows the swing arm to return to the desired position) was being used for a trial period in a HRA in Unit 1. The inspector observed the gate and concluded that it would provided adequate controls for a HRA. Another idea involved the use of a plastic curtain composed of wide strips of plastic that would hang at the entrance to a HRA. The use of the plastic curtain, with appropriate posted caution signs, would meet the intent of the licensee's technical specification to have areas with dose rates between 100 millirem/hour and 1000 millirem/hour barricaded and conspicuously posted as a high radiation area. Because the barricade and signs are designed to prevent inadvertent entry into the area, the inspector determined that the plastic curtain would draw an individual's attention to the postings and the individual would take the appropriate action.

The inspector found the licensee's actions appropriate and timely to prevent another occurrence or problem with high radiation areas. Since the implementation of the licensee's initiatives, the licensee had not experienced any further problems with the control of HRAs. The long term corrective actions for these events will be reviewed in future inspections.

10.2 Annual Worker Bioassay Program

The inspector had previously identified a weakness in the radiological control program regarding the timeliness of annual worker whole body counts (Combined NRC Inspection Report Nos. 50-334/93-25 and 50-412/93-26). The licensee maintained a bioassay program to verify the effectiveness of the respiratory protection program. The program included annual whole body counts for personnel with RCA access. Most personnel were routinely measured for bioassay determination according to the licensee's procedures;

however, there were some individuals who did not receive an annual whole body count on a timely basis.

The licensee's radiological controls staff maintained a list of personnel who had RCA access and had not received a whole body count within the one-year period. Several personnel were overdue by more than 30 days. After 30 days, the radiological controls staff sent a notice to the individuals concerning the requirement for an annual whole body count. The inspector observed that this method did not produce effective results because many personnel were overdue by greater than 60 days. One individual was overdue by over three months. The inspector found this to be a weakness in the licensee's bioassay program since the licensee did not restrict the individual's RCA access when the annual whole body count was overdue.

The licensee had taken corrective actions to improve the bioassay program. All personnel that were overdue for a whole body count were counted and the list of overdue personnel was reduced to zero. Subsequently, a letter was sent to every department each month with the names of personnel who were overdue more than 30 days. The letter indicated that the personnel on the overdue list had 30 days to receive a whole body count. The letter further stated that if the personnel did not receive the whole body count within 30 days, the individual's TLD would be pulled and the individual would not have access to the site. The inspector reviewed the most recent letters and verified that the overdue individuals had received whole body counts.

The licensee's efforts in this area should improve the radiological controls program. The inspector did not identify any further deficiencies or violations in this area.

11.0 Exit Meeting

A meeting was held with licensee representatives at the end of the inspection period on May 5, 1994. The purpose and scope of the inspection were reviewed and the findings of the inspection were discussed. The licensee acknowledged the inspector's findings.