

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 50-334/93-17 and 50-412/93-18
Docket Nos. 50-334 and 50-412
License Nos. DPR-66 and NPF-73
Licensee: Duquesne Light Company
P.O. Bcx 4
Shippingport, Pennsylvania
Facility Name: Beaver Valley Power Station, Units 1 and 2
Inspection At: Shippingport, Pennsylvania
Inspection Conducted: August 9-13, 1993

Inspector: Jason C. Jang 8-17-93
Jason C. Jang, Sr. Radiation Specialist
Effluents Radiation Protection Section (ERPS) Date

Approved by: Robert J. Beres 8-19-93
Robert J. Beres, Chief, ERPS, Facilities
Radiological Safety and Safeguards Branch,
Division of Radiation Safety and Safeguards Date

Areas Inspected: Announced safety inspection of the radioactive liquid and gaseous effluent control programs including: management controls, audits, calibration of effluent and process radiation monitoring systems, air cleaning systems, and implementation of the above programs and the Offsite Dose Calculation Manual (ODCM) for the calculation of projected dose to the public.

Results: Within the areas inspected, excellent implementation of the above programs, including projected dose calculation capability by the Health Physics Department, was observed. The management support to the effluent control programs was evident. No safety concerns or violations of NRC requirements were identified.

DETAILS

1.0 Individuals Contacted

1.1 Licensee Employees

- * M. Banko, HP Specialist, Health Physics
- A. Crella, HP Specialist, Health Physics
- * K. Grada, Unit Manager, Quality Services
- * S. LaVie, Sr. HP Specialist, Health Physics
- * D. Orndorf, Director, Chemistry Operations
- * F. Lipchick, Sr. Licensing Supervisor, Licensing
- * A. Lonnett, Sr. HP Specialist, Health Physics
- W. McIntire, Director, Safety and Environmental Services
- * J. Sieber, Sr. Vice President
- * D. Spoerry, Division Vice President, Nuclear Operations
- * D. Szuls, Sr. Engineer, Licensing
- * G. Thomas, Division Vice President, Nuclear Services
- * N. Tonet, Manager, Nuclear Safety
- * R. Vento, Manager, Health Physics
- * S. Vivinie, Sr. QA Specialist, Quality Services
- K. Winter, Sr. HP Specialist, Health Physics

1.2 NRC

- * L. Rossbach, Sr. Resident Inspector
- * S. Greenlee, Resident Inspector

* Denotes those present at the exit meeting on August 13, 1993.
Other licensee employees were contacted and interviewed during this inspection.

2.0 Purpose

The purpose of this inspection was to review the licensee's capability to implement the following areas:

- (1) Control and quantification of effluent radioactive liquids, gases, and particulates during both normal and emergency operations.
- (2) Calculation of projected doses to the public from radioactive liquid and gaseous effluent releases during normal operation.

3.0 Audits

The inspector reviewed the QA audit (Audit No. BV-C-92-09) of the Radioactive Effluent Control Program (RECP) with respect to Technical Specification

requirements. Audit members identified one finding and one observation. The finding concerned the frequency for sampling the sludge from the site Sewage Treatment Facilities. The responsible department resolved this finding during the QA Audit. The finding and observation were not safety significant issues.

The inspector also noted that the audit was performed by qualified auditors, and the audit was deemed to have thoroughly assessed the radioactive liquid and gaseous effluent control programs. The inspector had no further questions in this area.

4.0 Liquid and Gaseous Effluent Control Programs

4.1 Program Changes

There were no significant changes in the licensee's radioactive liquid and gaseous effluent control programs since the previous inspection conducted on April 13-17, 1992.

During the previous inspection conducted in April 1992, the inspector noted that the licensee employed a "specialist concept" for these programs. Each specialist was assigned to a program and had the responsibility for that program. During this inspection, the inspector noted that the "specialists" performed their responsibility in a very professional manner and demonstrated their ownership of the assigned area. The inspector also noted that the management had continued to support this concept.

Based on the above reviews, the inspector determined that the "specialists" enhanced the effluent control programs.

4.2 Review of Semiannual Radioactive Effluent Reports

The inspector reviewed the Semiannual Radioactive Effluent Reports for 1992. The semiannual effluent reports provided the total released radioactivity in liquid and gaseous effluents. The semiannual effluent report for the second half of 1992 not only provided the total released radioactivity but also provided the calculated projected radiation dose to the public, as required. The projected radiation doses to the total body and organs of members of the public were well below regulatory limits specified in the licensee's Technical Specifications. The inspector also reviewed available 1993 effluent release records and determined that these records did not contain obvious anomalous measurements or omissions. The inspector had no further questions in this area.

4.3 Liquid and Gaseous Radioactive Effluent Controls

The inspector reviewed the licensee's effluent control procedures and radioactive liquid and gaseous discharge permits to determine the adequacy of implementation of the Technical Specifications and of the Offsite Dose Calculation Manual (ODCM) for both units.

Through reviews of selected liquid and gaseous discharge permits and the associated procedures, and discussions with the licensee regarding discharges, the inspector determined that the licensee continued to implement effective control over radioactive liquid and gaseous releases from the site.

On March 31, 1993, the licensee noted higher than normal levels of radioactivity in the waste gas storage tanks (later determined to be due to pinhole leaks in the reactor fuel). The responsible individual (specialist) effectively coordinated all gaseous effluent sampling and discharges to ensure compliance with Technical Specifications and ODCM requirements. This specialist established a good communication channel with the Operations Department to minimize projected doses to the public by use of effective handling and discharge strategies.

On June 29, 1993, the Operations Department requested a discharge of about 33,000 gallons of radioactive liquid stored in a tank (LW-TK-7B). The analytical results of the liquid sample indicated that the tank contained the highest radioactivity content for 1993. The specialist calculated projected doses to the public for various release parameters to determine optimum discharge conditions for public dose minimization. The specialist suggested the following to the Operations Department to minimize the projected doses to the public.

- (1) Raise the cooling tower blowdown flow rate from 10,000 gallons per minute (gpm) to more than 20,000 gpm.
- (2) Lower the discharge rate from the tank from 35 gpm to less than 30 gpm.

The Operations Department adopted these suggestions for the liquid discharge. Based on the above reviews, the inspector determined that the licensee continued to implement excellent radioactive liquid and gaseous effluent control programs.

5.0 Radiation Monitoring Systems (RMS)

5.1 Calibration of Radioactive Effluent/Process Monitors

The inspector reviewed the recent calibration results for the following radioactive effluent and process monitors to determine the implementation of the Technical Specification requirements.

Unit 1:

- o Liquid Waste Effluent Monitor
- o Process Vent Monitors
- o Containment Ventilation Monitor
- o Ventilation Vent Monitor
- o Elevated Release Gas Monitor

Unit 2:

- o Liquid Waste Effluent Monitor
- o Process Vent Monitor
- o Ventilation Vent Monitor
- o Waste Gas Storage Vault Effluent Monitor
- o Condensate Polishing Building Effluent Monitor

The I&C and Health Physics Departments had the responsibility to perform electronic and radiological calibrations for the above RMS. All reviewed calibration results were within the licensee's acceptance criteria.

During a previous inspection, the inspector discussed with the licensee data reduction techniques for the RMS calibration results. During this inspection, the inspector noted that the responsible individuals (RMS Specialists) in the Health Physics Department had implemented a statistical analytical technique (using the linear regression) to determine the linearity and obtain the monitor conversion factors (cpm/ μ Ci). The licensee also used the linearity and conversion factors to trend the reliability of the RMS.

Based on the above review, the inspector determined that the licensee had excellent calibration techniques.

5.2 Operability of Effluent/Process RMS

Although the calibration results were within the licensee's acceptance criteria, the licensee tracked the operability for all effluent RMS using a daily surveillance log and history of each effluent/process RMS. The inspector also reviewed the RMS Specialist's study results from May 1991 to December 1992, "BVPS Technical Specification Radiation Monitor Availability Summary". The inspector found that the specialist tracked not only the mechanical failures and/or modes (such as failure of the pump/flow switch and maintenance testing) but also total hours of

inoperable status for all RMS required by the Technical Specifications. One of the conclusions of this study was that the results could be used as a future guideline to establish RMS upgrade priority. The inspector stated that the responsible individuals' efforts were excellent and that the program met or exceeded regulatory requirements.

The inspector noted that the licensee continued the comparison between actual effluent monitor reading results and expected monitor readings determined from the laboratory sample measurements to ensure that the effluent monitors responded acceptably. The inspector reviewed these comparison results for liquid and gaseous effluent monitors during this inspection. The results indicated that the comparisons were in reasonably good agreement.

Based on the above reviews, the inspector determined that the licensee continued to perform excellent tracking techniques for the operability of effluent/process RMS.

6.0 Verification of the Projected Dose Calculation Program

During this inspection, the inspector performed an independent verification of the licensee's capability for calculating projected doses to the public resulting from discharges of radioactive liquids and gases to the environment. The licensee calculated the projected doses to the public, prior to discharge of radioactive liquids and/or gases, based on the analytical data incorporated into the radioactive liquid and gaseous discharge permits. The inspector used the same parameters contained in the discharge permits (e.g., dilution factor, total amount of radioactivity released, meteorological data, etc.) to calculate the projected dose commitments to the maximally exposed member of the public for intercomparison with the licensee's assessments. The licensee representatives used their computer code and the NRC used the "PCDOSE code".

The PCDOSE code was developed by Idaho National Engineering Laboratory for the U.S. Nuclear Regulatory Commission. The code was designed to calculate the maximum projected radiation dose to an individual and the average dose to the population due to radionuclides in radioactive liquid and airborne effluent releases from a nuclear power plant. The code was designed for normal operation rather than for emergency situations. The code was developed from the methodology found in both NUREG-0133 and Regulatory Guide 1.109 (Revision 1). The PCDOSE code serves as a basis of comparison with calculational programs used by individual utilities which operate nuclear power plants.

During this inspection, the inspector reviewed the Offsite Dose Calculation Manual (ODCM) for site specific parameters and current methodology for the noble gas, liquid, and particulates release pathways. The ODCM corresponds to the licensee's computer code, using NRC Regulatory Guide 1.109 and NUREG-0133 for all parameters.

The inspector evaluated the licensee's computer code by assuming site specific parameters and certain release information. The intercomparison results for the liquid, noble gas, and particulates (iodine-131 and H-3) release pathways are listed in Tables 1, 2, 3, and 4.

The comparison results of the radioactive liquid release pathway were based on an actual release permit issued at the Beaver Valley site (Liquid Release Permit Number: RWDA-L-03909 and Release Date: July 31, 1993). The intercomparison results were excellent, as shown in Table 1.

The comparison results of noble gas release pathway were based on an actual release permit issued at the Beaver Valley site (Noble Gas Release Permit Number: RWDA-G-01201 and Release Date: July 4, 1993). The intercomparison results were also excellent, as illustrated in Table 2.

The comparison results of the particulates (using I-131 and H-3) release pathways were based on an actual release permit issued at the Beaver Valley site (Release Permit Number: RWDA-G-01179 and Release Date: March 29, 1993). The intercomparison results were also excellent, as shown in Tables 3 and 4, respectively.

The inspector calculated dose factors for the several pathways independently, using site specific parameters. Hand calculation results of the pathway dose factors calculated by the inspector agreed with the ODCM results. The inspector noted that the responsible individual had accurately calculated pathway dose factors and compared them against the ODCM pathway dose factors.

Based on the above comparisons and reviews, the inspector determined that the licensee conducted an excellent projected dose calculation program.

The inspector noted that the responsible individual had excellent knowledge of the dose calculation methodology described in the ODCM.

7.0 Air Cleaning Systems

The inspector reviewed the licensee's most recent surveillance test results to determine the status of implementation of the following Technical Specification (TS) requirements for both units.

- o TS 3/4.7.7, "Control Room Emergency Habitability Systems"
- o TS 3/4.7.8, "Supplemental Leak Collection and Release Systems (SLCRS)"

The following surveillance results were reviewed and all reviewed test results were found to be within the licensee's Technical Specification acceptance criteria.

- o Visual Inspection
- o In-Place HEPA Leak Tests
- o In-Place Charcoal Leak Tests
- o System Flow Rate Tests
- o Pressure Drop Tests
- o Laboratory Tests for the Iodine Collection Efficiencies
- o Heater Tests

The inspector also reviewed test results for the Fuel Building Ventilation for Unit 1. On high-high radiation signal in the Fuel Building (RM-VS-103A or RM-VS-103B), exhaust flow is automatically directed through the main filter banks (SLCRS) and the pressure difference in the spent fuel storage area must be less than or equal to -1/8 inch of water gauge. The inspector noted that the test results were within the licensee's acceptance criteria specified in Section 4.9.13.b of the Technical Specifications.

Based on the above review, the inspector determined that the licensee was implementing the requirements for the air cleaning systems effectively.

8.0 Exit Interview

The inspector met with licensee representatives (denoted in Sections 1.1 and 1.2 of this inspection report) at the conclusion of the inspection on August 13, 1993. The inspector summarized the purpose, scope, and findings of the inspection. The licensee acknowledged the inspection findings.

Table 1. Projected Dose* Comparisons for Liquid Release
 Liquid Release Permit Number: RWDA-L-03909
 Release Date: July 31, 1993

Adult	NRC (mrem)	LICENSEE (mrem)
Bone	6.25E-3	6.25E-3
Liver	1.14E-2	1.14E-2
Total Body	8.54E-3	8.55E-3
Thyroid	4.45E-4	4.48E-4
Kidney	3.83E-3	3.83E-3
Lung	1.39E-3	1.40E-3
GI-LLI	6.18E-4	6.19E-4

Table 2. Projected Dose* Comparisons for Noble Gas Release
 Gas Release Permit Number: RWDA-G-01201
 Release Date: July 4, 1993

ELEVATED RELEASE (145m)	NRC	LICENSEE
Beta Air Dose	4.05E-8 mrad	4.05E-8 mrad
Gamma Air Dose	7.14E-8 mrad	7.14E-8 mrad
GROUND RELEASE	NRC	LICENSEE
Beta Air Dose	6.73E-2 mrad	6.73E-2 mrad
Gamma Air Dose	1.16E-2 mrad	1.16E-2 mrad

* Calculated projected dose commitments to the maximally exposed member of the public.

Table 3. Projected Dose* Comparisons for Particulates (I-131)
 Gas Release Permit Number: RWDA-G-01179
 Release Date: March 29, 1993

CHILD DOSE	NRC (mrem)	LICENSEE (mrem)
Bone	7.19E-6	7.19E-6
Liver	7.22E-6	7.22E-6
Total Body	4.65E-6	4.65E-6
Thyroid	2.41E-3	2.40E-3
Kidney	1.18E-5	1.18E-5
GI-LLI	5.63E-7	5.63E-7

Table 4. Projected Dose* Comparisons for Particulates (H-3)
 Gas Release Permit Number: RWDA-G-01179
 Release Date: March 29, 1993

CHILD DOSE	NRC (mrem)	LICENSEE (mrem)
ALL ORGAN DOSES (Liver, Total Body, Kidney, Thyroid, GI-LLI)	3.30E-4	3.32E-4

- * Calculated projected dose commitments to the maximally exposed member of the public.