

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-454/87044(DRSS); 50-455/87042(DRSS)

Docket Nos. 50-454; 50-455

Licenses No. NPF-37; NPF-66

Licensee: Commonwealth Edison Company  
Post Office Box 767  
Chicago, IL 60690

Facility Name: Byron Station, Units 1 and 2

Inspection At: Byron Station, Byron, Illinois

Inspection Conducted: December 8-11, 1987

Inspector: *W.B. Grant*  
W. B. Grant

*1/8/88*  
Date

Accompanying Inspector: *W.W. Ogg*  
W. W. Ogg

Approved By: L. R. Greger, Chief  
Facilities Radiation  
Protection Section

*1-8-88*  
Date

Inspection Summary

Inspection on December 8-11, 1987 (Reports No. 50-454/87044(DRSS);  
No. 50-455/87042(DRSS))

Areas Inspected: Routine, unannounced inspection of operational radiation protection activities during a surveillance outage including: organization and management control; training and qualifications, internal and external exposure control; control of radioactive materials; ALARA activities; and licensee action on a previous inspection item. In addition, the inspectors performed independent direct radiation and contamination surveys and accompanied an auxiliary operator on his rounds.

Results: No violations or deviations were identified.

## DETAILS

### 1. Persons Contacted

- P. Andrews, Health Physicist
- \*S. Barrett, R/C Supervisor
- \*A. Britton, QA Inspector
- B. Bielasco, Station Health Physicist
- W. Burkamper, Quality Assurance Superintendent
- \*L. Bushman, ALARA Coordinator
- D. Cork, Assistant Equipment Operator
- \*R. Flahive, Technical Staff Supervisor
- \*R. Hansen, ALARA Technologist
- W. McNeill, Lead Health Physics Foreman
- \*F. Pollak, Dosimetry E.A.
- \*J. Schrage, Health Physicist, Corporate
- \*S. Sober, Operational Group Leader, H.P.
- J. Stout, H.P. Foreman
- \*R. Ward, Services Superintendent
- J. Weitzel, Engineering Assistant
- \*E. Zittle, Regulatory Assurance
  
- \*P. Brochman, NRC, Senior Resident Inspector
- \*N. Gilles, NRC, Resident Inspector

The inspectors also contacted and interviewed other licensee and contractor personnel during the course of the inspection.

\*Denotes those present during the exit meeting on December 11, 1987

### 2. General

This inspection, which began at 2:30 p.m. on December 8, 1987, was conducted to examine the licensee's operational radiation protection activities during a surveillance outage. The inspection included numerous plant tours, including Unit 2 containment; reviews of previous inspection findings, posting and labeling, radiation occurrence reports, and personnel contamination reports; examination of internal and external dosimetry; independent radiation measurements by the inspectors; and discussions with licensee personnel.

### 3. Licensee Action on Previous Inspection Findings

(Closed) Open Item (455/87011-01) completion of startup tests at 90-100% power and resolution of neutron streaming problem. A corporate engineering study (AIR 6-86-20) was conducted to review reactor neutron shielding and proposed design changes, if any, to reduce the neutron dose at the containment air lock and near the reactor head. The study determined that the person-rem saving of 1.5 to 6 person-rem per year did not justify the cost of reactor shielding changes; no shielding or design changes will be implemented. This item is considered closed.

#### 4. Organization and Management Controls (IP 83722)

The inspectors reviewed the licensee's organization and management controls for the radiation protection and radwaste programs including changes in the organizational structure and staffing, effectiveness of procedures and other management techniques used to implement these programs, experience concerning self-identification and correction of program implementation weaknesses, and effectiveness of audits of these programs. Audits are discussed in Section 5. Recent Rad/Chem personnel changes include:

- The Rad/Chem Supervisor was reassigned to Technical Staff Supervisor.
- A former Station Chemist transferred from license training to Rad/Chem Supervisor.
- Two new Health Physicists (HP) were hired, one from the outside and one from the training center.
- Two Radiation Protection (RP) Foremen transferred to chemistry.
- Three RCTs were promoted to RP Foremen.

The persons newly occupying the above positions are qualified in accordance with ANSI N18.1-1971 for their respective positions.

The Health Physics staff is gaining needed experience. This is due to the presence of experienced contract HPs and fairly stable staff. The contractor HPs have been extended through October 1988.

The inspectors reviewed Radiation Occurrence Reports (RORs) which were written in 1987. There have been 12 RORs written to date; one since the last inspection in October 1987. The licensee continues to provide sufficient management attention to followup and investigation of RORs.

No violations or deviations were identified.

#### 5. Audits

The inspectors reviewed audits of the radiation protection program conducted to date since the last inspection. Extent of the audits, qualifications of the auditors, and adequacy of corrective actions were reviewed.

Two quality assurance (QA) audits were conducted during this period. One onsite audit, conducted by the onsite QA organization, reviewed: receipt of radioactive materials; whole body counts; source control; ALARA; radiation surveys; and radioactive shipments. There were no adverse findings or observations. The second audit was an audit by the corporate QA organization of several station activities including radiation protection. The two radiation protection observations from the second audit appeared to have timely and adequate corrective actions. The extent of the audits and the qualifications of the auditors appeared adequate.

Onsite quality assurance surveillance reports for radiation protection activities, solid radwaste shipments, and ALARA were selectively reviewed. These surveillances included observation of compliance with DOT shipping regulations regarding solid radwaste shipments. No significant problems were identified by the auditors.

No violations or deviations were identified.

6. Training and Qualifications (IP 83723)

The inspectors reviewed the training and qualifications aspects of the licensee's radiation protection, radwaste, and transportation programs, including: changes in responsibilities, policies, goals, programs, and methods; qualifications of newly hired or promoted radiation protection personnel; and provision of appropriate radiation protection, radwaste, and transportation training for station personnel. Also reviewed were management techniques used to implement these programs and experience concerning self-identification and correction of program implementation weaknesses.

An inspector attended the licensee's N-GET Site Specific training course. The course appeared to be well presented by the instructor augmented by a video tape. The subject matters appeared to be comprehensive and understandable.

7. External Exposure Control and Personal Dosimetry (IP 83724)

The inspectors reviewed the licensee's external exposure control and personal dosimetry programs, including: changes in facilities, equipment, personnel, and procedures; adequacy of the dosimetry program to meet routine and emergency needs; planning and preparation for maintenance and surveillance tasks including ALARA considerations; required records, reports, and notifications; effectiveness of management techniques used to implement these programs and experience concerning self-identification and correction of program implementation weaknesses.

The technical problems that have delayed implementation of the licensee's own TLD program have apparently been solved. A consultant at the University of Michigan has completed an evaluation of the vendor-supplied TLD reader and a sample of badges and apparently resolved the problems. Implementation of the licensee's self-administered whole body TLD program should begin after final testing of the equipment.

Exposure records of plant and contractor personnel were reviewed for 1987 to date. No exposures greater than 10 CFR 20.101 or licensee administrative limits were noted. Licensee administrative limits are 50 mrem/day for Type One RWPs and 100 mrem/day for Type Two RWPs. Approvals for doses in excess of 100 mrem per day or 300 mrem per week require the signature of the Rad/Chem Supervisor.

The inspectors verified that the licensee is using the NRC guidance specifying that whole body dose should be determined using an absorber

thickness which is determined by the eye protection provided. Eye protection is not routinely required for access into radiologically controlled areas. Therefore, according to the licensee's film badge vendor, when dosimetry data indicates that reporting the dose at 1 cm (1000 mg/cm<sup>2</sup>) depth would not reflect the appropriate dose at 0.3 cm (300 mg/cm<sup>2</sup>) depth the deep dose (whole body) reported will be the dose at 0.3 cm rather than at 1.0 cm depth.

8. Internal Exposure Control (IP 83725)

The inspectors reviewed the licensee's internal exposure control and assessment programs, including: changes to procedures affecting internal exposure control and personal exposure assessment; determination whether engineering controls, respiratory equipment, and assessment of individual intakes meet regulatory requirements; and required records, reports, and notifications.

The licensee's program for controlling internal exposures includes the use of protective clothing, respirators, engineering controls, and control of surface and airborne radioactivity. A selected review of smear survey results for 1987 to date was made; no problems were noted.

The frequency and location of routine air sampling using portable air samplers appeared sufficient. The inspectors observed the placement, operation and apparently timely calibration of several constant air monitors. Constant air monitor/samplers are on each of the five floors of the auxiliary building. Each day of the week (Mon-Fri), and on each floor in succession, a 24-hour air sample is taken and analyzed.

In reviewing routine daily air sampling and analyses, the inspectors noted that even though the radioactivity of the laundry air samples appeared to be always low-level, of the order of  $1 \times 10^{-12}$   $\mu\text{Ci/cc}$ , the laundry workers wear respirators when sorting PCs which have been worn in areas of potentially high-level contamination.

The inspectors reviewed tritium and non-radiological gas sampling and analyses. No problems were noted.

A good practice of daily remote containment air sampling is implemented by the licensee's procedure BAP 1450-1. The containment air sampling results are tabulated on the DAILY AND SPECIAL AIR SAMPLE STATUS BOARD located in the HPAC office. Thus, immediate entry into containment after a SCRAM could be allowed if direct radiation levels are safe.

The licensee began to experience noble gas air activity in Unit 2 north compressor room in August 1987, from a leak in the check-valve from the RHR to the pressurizer spray. No workers were in this field since containment is not entered when the unit is operating. The licensee stated that no significant iodine or other halogen activity was detectable ( $<0.0001$  MPC). The inspectors confirmed this statement by reviewing records of analyses. The records indicated that noble gas activity in that part of the containment varied to as high as 200 MPC.



The gas contained gamma radiation energy of 81 kev and beta energy of 110 kev. The licensee stated that at a level of 100 MPC this activity would produce a dose rate of 20 mrem per hour if the betas are considered to be shielded by protective clothing and the gamma calculation considers the small room (not semi-infinite cloud). The licensee's method of calculation appeared reasonable. The leak was repaired during this present surveillance outage. The licensee representative stated that upon startup careful observance is to be made to assure the repair is holding pressure.

No problems were noted in the licensee's internal dosimetry control.

9. Radiation Work Permit (RWP) Program/ALARA Program (83724, 83726, 83728)

To establish radiological controls for routine radiological control area entries and work, the licensee utilizes Type 1 and Type 2 RWPs. Type 1 (General) RWP is required for all routine work in the radiologically controlled area where personnel are not expected to exceed a whole body dose of 50 mrem per day and is valid for a maximum of one (1) year from January 1. Type 2 (Specific) RWP is required for all work in radiologically controlled areas where personnel are expected to exceed a whole body dose of 50 mrem per day and is valid for the duration of the job.

The licensee has recently revised his RWP procedure and has added forms which the inspectors reviewed and discussed with staff members. The HP ALARA section stated that these new forms have enhanced ALARA. The licensee's ALARA section, described in the previous inspection, indicated that they use RWP information to a great extent. The ALARA section appears to be a viable and alert influence for reducing unnecessary exposure. The new forms and other apparently good practices associated with the licensee's RWP program include the following:

- The licensee attaches the latest survey-record sheet to all Type 2 RWPs;
- All active Type 2 RWPs are deactivated prior to the beginning of dayshift each day. To reactivate any Type 2 RWP requires the job foreman, operating supervision, and Health Physics foreman to review the RWP and initial his/her approval.
- Workers must sign-in on the RWP daily (licensee ALARA states that this helps relate dose to specific jobs);
- The one-page form RWP ALARA RECOMMENDATION CHECKLIST appears to be able to produce information that will effect ALARA by its comprehensive list of questions and evaluation items;
- The form DAILY JOB PROTECTIVE EQUIPMENT REQUIREMENTS FOR LONG TERM RWPs allows easy revision of RWP requirements;
- ATTACHMENT B to the RWP approved in October 1987, gives and complete description/guidelines for equipment/clothing for body protection.

To prepare for the outage, the ALARA section reviewed the maintenance/repair plans and picked out the ones which would need an RWP, then requested that the RWPs be submitted to the ALARA office by November 20, 1987. The ALARA section had an understanding with the job supervisor that he would notify ALARA within 24 hours if any change was made in the job plan. Using plant history job and dose records they arrived at an estimate of 10-12 person-rem. To date they have accumulated 9.5 person-rem.

There are three members of the HP ALARA section; one coordinator and two technologists. For the current outage, one of the two ALARA technologists was put on the 3-11 shift. The licensee representative stated that one of their key programs is to document as history the collective dose (person-rem) of unit maintenance/repair jobs and that an ALARA promotional activity of daily dose card accuracy has been part of this work. He stated that a sister plant has found Byron's histories useful in ALARA planning.

The licensee representative stated that members of the ALARA section meet with repair crew supervision and discuss the next days work, suggesting ways of reducing dose. He showed the inspectors printouts entitled BYRON STATION - INDIVIDUAL RWP REPORTS which show person-rem savings. For example, a job estimated at 100 hours which took 223 hours was estimated at 3.5 person-rem but resulted in only 1.53 person-rem (RWP No. 72047). Similarly, RWP No. 72051 estimated 48 hours, took 72 hours, and the person-rem was estimated at 9.6, but was actually done with an expenditure of only 1.15 person-rem. Examples of ALARA section recommendations which netted reduced exposure under these RWPs are:

- defining the plane of the Reactor Head Door as being the onstart of high dose rates,
- providing tool and vacuum cleaner wand extensions at the Reactor Head Door.

No violations or deviations were identified.

10. Control of Radioactive Materials and Contamination, Surveys and Monitoring (83726, 83729, and 83724)

The inspectors reviewed the licensee's program for control of radioactive materials and contamination, surveys, and monitoring, including: changes in instrumentation, equipment, and procedures; effectiveness of survey methods, practices, equipment, and procedures; adequacy of review and dissemination of survey data; effectiveness of methods of control of radioactive and contaminated materials; management techniques used to implement the program; and experience concerning self-identification and correction of program implementation weaknesses.

The inspectors conducted numerous and frequent plant tours in the auxiliary and radwaste building and in containment for the purpose of examining the licensee's performance of radiation protection and

contamination control practices, observing work activities performed under the requirements of more than a dozen RWPs, and interviewing workers who performed tasks authorized by other RWPs. The inspectors conducted radiation and contamination surveys of selected plant areas using NRC and licensee survey instruments. Housekeeping appeared good. Relevant observations are discussed below.

- Poor Practice: Incomplete Labeling

The inspectors observed storage and on-going work in the licensee's decontamination areas. They saw more than one case of apparently incomplete labeling of yellow plastic bags, e.g., no dose rate or no dose rate units. In the exit interview the licensee committed to enforce complete labeling including units.

- Conformance with RWP Requirements

The inspectors inspected more than a dozen work sites/SOP exits for radiation worker conformance with the RWP clothing/equipment required. Not one item of nonconformance was noted.

- Smear Survey of the Auxiliary Building Floor

The inspector took 45 smears of the Auxiliary Building floor, including samples from SOPs, from outside Unit 2 containment to Access Control. There was no detectable activity on any smear.

- Welding Work on Seal Bonnet Valve 2RC8045A

Good practice: a backup air sample was run even though the worker was in a respirator. Poor practice: gloves in use were partially dissolved by the cleaning solvent while the welder was cleaning the weld site. The welder's hand became slightly contaminated. The plant Industrial Hygienist later made proper glove recommendation for the next such job.

- Vacuum Cleaners for Issue

The licensee has purchased additional 20-gallon tank sized vacuum cleaners which contain inner final HEPA filters. The licensee's vacuum cleaners are controlled by the plant stationmen.

There were no violations noted on these tours.

The inspectors interviewed the foreman in charge of routine radiological surveys and reviewed a representative sampling of records of surveys for the year 1987 to date. The licensee has implemented two new forms, ROUTINE WEEKLY SURVEY CHECKLIST and ROUTINE BI-MONTHLY/MONTHLY/QUARTERLY SURVEY CHECKLIST, during this calendar year. The survey records indicated that the licensee had performed the surveys on the checklists timely, and no violations or deficiencies were noted. Two good practices were noteworthy:



- Although the licensee's official smearable contamination limit is 5000 dpm per 100 cm<sup>2</sup>, the licensee cleans anything greater than 2000 dpm per 100 cm<sup>2</sup> in order to reduce the number of alarms on his HPAC control auto-frisker.
- The licensee HPAC auto-frisker is apparently highly sensitive and can detect <1000 dpm/100cm<sup>2</sup> on clothing; thereby, easily meeting the guidance in IE Circular No. 81-07.

There were no violations noted in the licensee's control of radioactive materials and contamination, surveys, or monitoring.

#### 11. Control of Hot Particle Contamination

When touring the licensee's Personnel Decontamination Room, the inspectors observed signs in the room stating: "SAVE HOT PARTICLES FOUND DURING DECONTAMINATION." The licensee representative stated that his technicians are aware of the requirement to look for hot particles, and have done so. He stated that they do not typically find repeats in the same locations. For the 1987 Refueling Outage, the licensee generated a Hot Particle Surveillance Plan for the reconstitution work performed at that time. The licensee stated that numerous other nuclear power station programs were reviewed.

The licensee is presently in the process of responding to his corporate directive entitled "RADIOACTIVE PARTICLE RESPONSE INITIATIVE" and expects his own program to be completed in 1988. The inspector reviewed the corporate office's directive and found it to be a good guideline for actions as called for by NRC Information Notice No. 87-39.

In summary, the inspectors find the licensee's response to Information Notice No. 87-39 to be partial, but on-going, with no significant problems at this time. The matter will be reviewed further in a future inspection.

#### 12. Plant Tours/Accompanying An Equipment Operator (EO) On His Shift Rounds

The inspector and the EO attended the 7:00 a.m. briefing in the Control Room before making rounds. The EO was observed to strictly follow health physics procedures; he moved swiftly but carefully and therefore received very little radiation exposure. He donned PCs four times in the six hours it took to complete his rounds; considering his duties, the number of PC changes did not seem excessive. No significant radiological concerns were noted by the inspector. Relevant items noted during the shift rounds included:

- Good housekeeping indicated by the licensee's use of non-contaminated waste receptacles.
- Firewatchers on duty for doors needing to stay open or unlocked.
- The plant has more non-support walls than typical. They serve as barriers for radiation/radioactivity, containment/shielding, and fire.

- The electric penetration areas are walled off with locked doors; this is good practice.
- Components and pipes are labeled with their names/numbers in bold face; this is good practice.
- While in a high-rad area, the EO took another operator's readings as well as his own; this is a good ALARA practice.

There were no problems noted on the EO rounds.

13. Spent Fuel Pool Leakage (IP 92705)

Sight glasses to detect leakage from the spent fuel pool (SFP) liner are located in drain lines on the west wall of the auxiliary building (364' elevation) where it abuts the fuel handling building. No leakage from the SFP lines has been observed. The three SFP lines containing the sight glasses drain to the auxiliary building floor drain tank. No problems were noted.

No violations or deviations were identified.

14. Exit Meeting (IP 30703)

The inspectors met with licensee representatives (denoted in Section 1) on December 11, 1987. The inspectors discussed the likely informational content of the inspection report with regard to documents or processes reviewed during the inspection. The licensee identified no such documents/processes as proprietary.