

**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION III**

**Docket Nos:** 50-454; 50-455  
**License Nos:** NPF-37; NPF-66

**Report No:** 50-454/2000004(DRS); 50-455/2000004(DRS)

**Licensee:** Commonwealth Edison Company (ComEd)

**Facility:** Byron Generating Station, Units 1 & 2

**Location:** 4450 North German Church Road  
Byron, IL 61010

**Dates:** January 10-14, 2000

**Inspector:** K. Lambert, Radiation Specialist

**Approved by:** Steven K. Orth, Acting Chief, Plant Support Branch  
Division of Reactor Safety

## **EXECUTIVE SUMMARY**

**Byron Generating Station, Units 1 & 2  
NRC Inspection Report 50-454/2000004(DRS); 50-455/2000004(DRS)**

**This was an announced routine radiation protection inspection to review the solid radioactive waste processing and control program, the radioactive materials shipping program, and the spent fuel assembly top nozzle repair activities. The inspection included a review of waste processing, 10 Code of Federal Regulations (CFR) Part 61 sampling analysis, shipping activities, hazardous material worker training, quality assurance audits, radiological planning for spent fuel assembly repairs, and observations of shipping and fuel assembly repair activities. This inspection covered a 4-day period concluding on December 16, 1999, and was performed by a radiation specialist. No violations of regulatory requirements were identified.**

- The solid radwaste processing program was effective, well implemented and was as described in the Final Safety Analysis Report and the Process Control Program. The program was technically sound and implemented in accordance with station procedures and regulatory requirements. The radioactive waste staff was knowledgeable regarding regulations, station procedures and industry standards (Section R1.1).**
- The radioactive material transportation program was technically sound and implemented in accordance with regulatory requirements. Required shipping documentation was complete, accessible, and maintained in accordance with regulatory requirements (Section R1.2).**
- Radiological postings and container labeling were well maintained and appropriately informed workers of radiological conditions. Housekeeping and material condition of radiation protection equipment was good (Section R2.1).**
- Station personnel demonstrated a thorough knowledge of station procedures, and regulatory requirements in that radioactive material packages were effectively prepared for shipment. Radiation protection technicians effectively performed radiological surveys of radioactive material shipments. Good communication was evident between personnel involved in radioactive material shipping activities (Section R4.1).**
- The radiation protection staff provided effective planning, oversight and control of the spent fuel assembly top nozzle repair activities. Good communication and radiation worker practices were evident between the work group and radiation protection technicians (Section R4.2).**
- The training program provided effective hazardous material worker training to those individuals involved with the transportation of radioactive materials (Section R5.1).**
- The licensee conducted thorough audits of the radioactive waste and transportation programs that were technically sound and of sufficient scope and depth to identify deficiencies (Section R7.1).**

## Report Details

### IV. Plant Support

#### **R1 Radiological Protection and Chemistry Controls**

##### **R1.1 Solid Radioactive Waste Management**

###### **a. Inspection Scope (86750)**

The inspector reviewed the station's solid radioactive waste (radwaste) processing program as described in the Final Safety Analysis Report and the Process Control Program. The inspector's review included the generation, processing and storage of solid radwaste, 10 CFR Part 61 waste classification, discussions with cognizant individuals, and walk downs of solid radwaste storage and processing areas.

###### **b. Observations and Findings**

Solid radwaste generated at the station included waste from operations and dry active waste (DAW). Operations waste included demineralizer filter elements and resins, while DAW included metal, irradiated equipment, and waste materials removed from the radiologically protected area (RPA).

DAW minimization was implemented through corporate procedure RP-AA-630, "Reducing the Generation of Dry Active Waste." This procedure included reducing the materials brought into the RPA; reducing the amount of disposable clothing used by personnel; replacing consumable items with items that can be incinerated; reducing the number of contaminated areas; and carrying materials out to the RPA access point where they could be surveyed for unrestricted release. In addition, the corporate-wide Process Control Program, implemented in 1999, allowed the shipment of radwaste to an intermediary processor for volume reduction of resins, filter media and DAW.

Resins and filters were processed for volume reduction by incineration. This reduced the waste disposed, as incineration results in about a 90 percent volume reduction for resins and filters. Resins and filters accounted for 58 percent of the waste disposed in 1998. The station had developed a goal of generating less than 60,000 pounds of DAW in 1999. The station generated 43,455 pounds of DAW in 1999, which was shipped for processing and volume reduction or disposal. This was the first year the station was recording DAW generated in pounds versus cubic feet. DAW was processed at an off site contractor to reduce the volume buried by decontaminating, surveying for unrestricted release, and compacting and incinerating the waste. The processing of these wastes resulted in the burial of 1,074 cubic feet of radwaste in 1999, approximately 50 percent of the amount buried in 1996.

Waste stream sampling and analysis to determine scaling factors were conducted in accordance with 10 CFR Part 61, the Process Control Program, and station procedures. Samples from waste streams were composited and analyzed annually for primary side resins and filters, and every two years for secondary side resins and DAW. The

inspector's review concluded that the scaling factors were determined consistent with the guidance contained in the NRC Branch Technical Positions on Waste Classification and Waste Form, station procedures, and the Process Control Program. Procedures reviewed were clear, concise and technically sound, and radioactive waste staffs were very knowledgeable of regulations, station procedures and industry standards. The scaling factors used in 1999 were consistent with past results.

The inspector toured and inspected the radioactive waste processing and storage areas of the radwaste building. The storage and processing areas were posted and controlled, and containers were labeled in accordance with NRC requirements and station procedures. Material condition and integrity of drums and containers was good. Housekeeping was also good in processing and storage areas.

Radiation exposures for radwaste activities were low and varied depending on the time spent processing waste each year. The major processing activity was the sorting of DAW. The exposure per hour worked was consistent with past years' exposures from similar processing activities. Specifically, the exposure totals were:

	<u>1997</u>	<u>1998</u>	<u>1999</u>
DAW Daily Sorting Activities:	559 mrem	303 mrem	275 mrem

c. Conclusions

The solid radwaste processing program was effective, well implemented and was as described in the Final Safety Analysis Report and the Process Control Program. The program was technically sound and implemented in accordance with station procedures and regulatory requirements. The radioactive waste staff was knowledgeable regarding regulations, station procedures and industry standards. Radiation exposures for radwaste activities were low.

R1.2 Radioactive Material Transportation Program

a. Inspection Scope (86750)

The inspector reviewed the radioactive material transportation program for compliance with NRC and Department of Transportation (DOT) requirements. The review included applicable procedures, shipment records, discussions with personnel, and observations of shipping activities.

b. Observations and Findings

The inspector verified that plant procedures correctly referenced DOT and NRC transportation regulations. It was noted that the procedures were generally well written and provided an appropriate amount of detail, thus providing individuals adequate guidance to perform assigned tasks.

Radioactive material shipped offsite included DAW, resins, filters, equipment, and oil samples. The station made the following radioactive material shipments in 1997, 1998 and 1999:

	<u>Number of Shipments</u>		
	<u>1997</u>	<u>1998</u>	<u>1999</u>
Radwaste Shipments	14	36	20
Radioactive Material Shipments	101	119	105

The inspector reviewed selected shipping documents for shipments made in 1999 and 2000. Shipping documents were complete and contained the proper information regarding waste classification, physical and chemical form, volume, weight, total activity, proper shipping name, transportation index, and also indicated if a reportable quantity of radioactive material was contained in the shipment.

The inspector also reviewed the shipping documents being prepared for two radioactive material shipments. The shipping documents were appropriately completed and included all required information. The licensee used a vendor computer program (i.e., RADMAN) to classify waste, determine if any reportable quantity limits were present, and to generate shipping papers. Shipping procedures required that information pertinent to the hazards of materials being shipped be brought to the control room, where it would be immediately available in the event an emergency involving the material occurred. The control room telephone was manned 24 hours in accordance with DOT regulations for an emergency response telephone number.

The licensee maintained current files for certificates of compliance for shipping and high integrity containers, and burial site requirements. The licensee also maintained a file with current licenses for facilities that received radioactive material from the station.

c. Conclusions

The radioactive material transportation program was technically sound and implemented in accordance with regulatory requirements. Required shipping documentation was complete, accessible, and maintained in accordance with regulatory requirements.

**R2 Status of Radiological Protection and Chemistry Facilities and Equipment**

**R2.1 Radiological Posting, Labeling, and Housekeeping**

a. Inspection Scope (83750)

The inspector reviewed radiological postings and labeling of containers during several walk downs of the auxiliary and radwaste buildings. In addition, housekeeping and material condition of radiation protection equipment was reviewed.

b. Observations and Findings

The inspector observed that radiological postings and boundaries in the auxiliary and radwaste buildings were well maintained. The inspector determined, through independent measurements, that radiation and high radiation areas were appropriately posted and controlled in accordance with station procedures and regulatory requirements. Containers were observed to be labeled in accordance with station procedures and regulatory requirements.

Overall, housekeeping and material condition of radiation protection equipment in use was good. However, during a walk down of the radwaste building, the inspector observed that the exhaust from an air sampler was directed toward the air sampler sampling head (intake). The inspector noted that this condition could result in under reporting the actual concentration of activity in the air. Radiation protection management personnel agreed with the inspector's conclusion and implemented corrective actions that included initiating a problem identification form, checking additional air samplers in the plant for similar conditions, and directing the sampler exhaust away from the sample head. The licensee identified one additional sampler with a similar condition, which was corrected.

c. Conclusions

Radiological postings and container labeling were well maintained and appropriately informed workers of radiological conditions. Housekeeping and material condition of radiation protection equipment was good. A problem with air sampler configuration was promptly corrected.

**R4 Staff Knowledge and Performance in Radiological Protection and Chemistry**

**R4.1 Radioactive Waste Preparation and Transportation Activities**

a. Inspection Scope (86750)

The inspector reviewed preparation activities for two radioactive material shipments. This included a review of shipping papers; observations of radiological surveys, placarding and labeling; and discussions with cognizant personnel.

b. Observations and Findings

The inspector observed that the packages were appropriately loaded and secured onto the transport vehicles. Radiation protection technicians (RPTs) performed dose rate measurements along the entire surface of the packages and transport vehicles and at one meter from the vehicle, and wipes were taken on the packages to check for removable contamination. Because these were exclusive use shipments, measurements were also obtained at two meters from the vehicle and in the cab of the truck. The RPTs documented the areas of highest measurement for each section of the packages as described in the procedure. The inspector observed that the packages were appropriately labeled and marked, and that the transport vehicle was placarded in

accordance with regulatory requirements. Effective communication was evident between the shipper and personnel involved in shipment preparation and surveys of the radioactive material. The inspector also reviewed the shipping papers and concluded that they were appropriately completed and included all required information.

c. Conclusions

Station personnel demonstrated a thorough knowledge of station procedures, and DOT and NRC requirements in that radioactive material packages were effectively prepared for shipment. Radiation protection technicians effectively performed radiological surveys of radioactive material shipments. Good communication was evident between personnel involved in radioactive material shipping activities.

R4.2 Spent Fuel Assembly Top Nozzle Repair Activities

a. Inspection Scope (83750)

The inspector reviewed the radiological planning for spent fuel bundle top nozzle repair activities. The evaluation included the as-low-as-is-reasonably-achievable (ALARA) action review, the radiation work permit (RWP) and observations of work activities.

b. Observations and Findings

The inspector reviewed the ALARA action review and RWP Number 000212, "Spent Fuel Assembly Top Nozzle Repair: Including Equipment Repair, Set-up, Tear Down and Robotics Support". The inspector determined that the plan and RWP were detailed, appropriate for the work to be performed, and included appropriate dose reduction techniques. For example, radiological survey information was recorded in microentgens per hour, low dose waiting areas were identified, equipment was staged in lower dose areas, and maximum spent fuel pool water cleanup was maintained. The licensee estimated a total dose for the repair activities of 142 millirem, based on similar activities at other nuclear power plants. The actual dose accumulated for the repair activities was 136 millirem.

During repair activities, the inspector observed good oversight and control of work activities by the RPTs. The inspector also noted good radiation worker practices and good communication between RPTs and work group members.

c. Conclusions

The radiation protection staff provided effective planning, oversight and control of spent fuel assembly top nozzle repair activities. Good communication and radiation worker practices were evident between the work group and radiation protection technicians.

**R5 Staff Training and Qualification In Radiological Protection and Chemistry**

**R5.1 Department of Transportation Hazardous Worker Training**

**a. Inspection Scope (86750)**

The inspector reviewed the hazardous material worker training provided to those RPTs and shippers involved with transportation activities. This included a review of the training outline, selected individual training records, and discussions with training personnel.

**b. Observations and Findings**

The training department designed a lesson plan for the RPTs that contained general awareness, job specific training, and an overview of the requirements for shipping radioactive materials. The inspector reviewed the lesson plan and noted that it was comprehensive in content and effectively addressed DOT requirements. The station scheduled hazardous worker training every two years (required every three years by DOT) as part of the RPTs' continuing education. The training was last conducted in May/June 1999. Successful completion of training was accomplished through written examinations. The RPTs interviewed by the inspector had an acceptable understanding of the requirements.

The technical health physicist responsible for the transportation of radioactive materials maintained a data base of those individuals designated as shippers (i.e., those individuals authorized to prepare and review shipping paperwork). These individuals were provided more detailed training; this was generally conducted by a subject matter expert. The inspector reviewed the training records for these individuals and noted that all individuals listed had received the training within the required timeframe.

**c. Conclusions**

The training program provided effective hazardous material worker training to those individuals involved with the transportation of radioactive materials.

**R7 Quality Assurance In Radiological Protection and Chemistry Activities**

**R7.1 Solid Radioactive Waste and Transportation Audits**

**a. Inspection Scope (86750)**

The inspector reviewed the results of several assessments performed in 1998 and 1999 of the radwaste and transportation programs. The assessments included a corporate audit, a nuclear oversight audit, and a task-specific observation of transportation activities.



b. Findings and Observations

The corporate audit, performed in 1998, reviewed all Commonwealth Edison nuclear plants to determine if placarding and labeling were correct, if approved procedure checklists were use, and if shipping papers were appropriately completed. The audit concluded that the Byron transportation and process control programs were effectively implemented. No deficiencies were identified.

Nuclear oversight performed an audit of the radwaste program in December 1999 to determine if the program was effectively controlling radwaste activities. The audit assessed organizational structure and effectiveness, corrective actions, work practices, document and procedure control, personnel qualifications, effluent monitoring and the control of radioactive waste. The audit concluded that the implementation and execution of the radwaste program were acceptable and no findings or deficiencies were identified.

Radiation protection management observed transportation activities in August 1999 to determine if the radiation protection staff was effectively preparing shipments, performing radiological surveys of packages and transport vehicles, and completing shipping papers. The management observation did not identify any deficiencies.

c. Conclusions

The licensee conducted thorough audits of the radwaste and transportation programs that were technically sound and of sufficient scope and depth to identify deficiencies.

V. Management Meetings

**X1 Exit Meeting Summary**

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on January 14, 2000.

The licensee did not identify any items discussed as proprietary.

## **PARTIAL LIST OF PERSONS CONTACTED**

### Licensee

B. Adams, Regulatory Assurance Manager  
R. Colglazier, NRC Coordinator  
D. Herrmann, Chemistry/Radwaste Specialist  
J. Kuczynski, Lead Technical Health Physicist  
S. Kuczynski, Nuclear Oversight Manager  
W. Levis, Site Vice President  
R. Lopriore, Station Manager  
W. McNeill, Radiation Protection Manager  
T. Schuster, Chemistry Manager  
D. Sperry, Training Manager  
D. Thompson, Technical Health Physicist

## **INSPECTION PROCEDURES USED**

IP 83750: Occupational Radiation Exposure  
IP 86750: Solid Radioactive Waste Management and Transportation of Radioactive Materials

## **LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

### Opened

None

### Closed

None

### Discussed

None

## LIST OF ACRONYMS USED

<b>ALARA</b>	<b>As-Low-As-Is-Reasonably-Achievable</b>
<b>CFR</b>	<b>Code of Federal Regulations</b>
<b>DAW</b>	<b>Dry Active Waste</b>
<b>DOT</b>	<b>Department of Transportation</b>
<b>DRS</b>	<b>Division of Reactor Safety</b>
<b>NRC</b>	<b>Nuclear Regulatory Commission</b>
<b>PDR</b>	<b>Public Document Room</b>
<b>RPA</b>	<b>Radiological Protected Area</b>
<b>RPTs</b>	<b>Radiation Protection Technicians</b>
<b>RWP</b>	<b>Radiation Work Permit</b>

## LIST OF DOCUMENTS REVIEWED

### Procedures

BOP DAW-3	Revision 10	Loading of Radioactive Waste Shipments
BRP 5600-3	Revision 9	Classification of Radioactive Waste
BRP 5600-4	Revision 16	Completion of Radioactive Material Shipping Record
BRP 5600-5	Revision 2	Radioactive Material/Waste shipment Vehicle Inspections
BRP 5600-7	Revision 14	Shipment of Radioactive Materials
BRP 5600-13	Revision 3	Trending for Shifts in Scaling Factors and Waste Stream Sampling
BRP 5610-6	Revision 13	Surveying Radioactive Material Shipments
BRP 5610-12	Revision 8	Guidelines for Preparing and Loading Equipment Into Sea Vans for Offsite Shipment
CEPI NSP TQ 1-15	Revision 1	Radiation Protection Technician Training
OP-AA-101-502	Revision 0	Accidents Involving the Transportation of Rad Materials
RP-AA-600	Revision 0	Administrative Process for Radioactive Material/Waste Shipments
RP-AA-602	Revision 0	Packaging of Radioactive Material/Waste Shipments
RWP-AA-630	Revision 0	Reducing the Generation of Dry Active Waste
RW-AA-10,	Revision 1	Process Control Program for Radioactive Wastes

CNSI Non-proprietary Topical Report, RDS-255506-01-NP, Revision 1, "RDS-1000 Radioactive Waste Dewatering System"

### Audits

Nuclear Generating Group, Health Physics, ALARA, Radioactive Material Shipping, Process Control Program Audit Report, ComEd-98-02  
Nuclear Oversight Assessment NOA-06-99-PS05  
Task-Specific Observation Checklists - Shipping (Revision 0)

### Radioactive Material Shipments

RMS 99-034, RMS 99-054, RMS 99-061, RMS 99-080, RMS 99-125, RWS 99-001,  
RMS 00-001, RMS 00-002, RMS 00-003

### Miscellaneous

ALARA Action Review, AAR 06-00A013  
RWP 000212, Revision 0  
DAW generation Chart, 1999  
Radwaste goal reports, 1997, 1998, and 1999.