U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-254/83-02(DRMS); 50-265/83-02(DRMS)

Docket Nos. 50-254; 50-265 Licenses No. DPR-29; DPR-30

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

Facility Name: Quad-Cities Nuclear Power Station, Units 1 and 2

Inspection At: Quad-Cities Site, Cordova, IL

Inspection Conducted: February 1-4, 1983

Inspectors: D. E. Miller — 2/22/83

C. C. Peck — 2/22/83

Approved By: L. R. Greger, Chief — 2/22/83
Facilities Radiation
Protection Section

Inspection Summary

Inspection on February 1-4, 1983 (Reports No. 50-254/83-02(DRMS); 50-265/83-02(DRMS))

Areas Inspected: Routine, unannounced inspection of radioactive waste management, including: effluent releases; records and reports of effluents; effluent control instrumentation; procedures for controlling releases; reactor coolant water quality; solid radioactive waste; and transportation. Two written allegations were also reviewed. The inspection involved 60 inspector-hours onsite by two NRC inspectors.

Results: No items of noncompliance or deviations were identified.

DETAILS

1. Persons Contacted

P. Behrens, Chemist
W. Bielasco, Health Physicist
*R. Carson, Lead Health Physicist
J. Dierickx, Chemist
J. Forrest, Radwaste Planner
*D. Gibson, QA Supervisor
*N. Kalivianakis, Plant Superintendent
*T. Kovach, Rad/Chem Supervisor
J. Neal, Training Supervisor
D. O'Conner, Personnel Administrator
J. Petri, Radwaste Supervisor
J. Piercy, ALARA Coordinator
J. Sirovy, Lead Chemist
*G. Tietz, Technical Staff Supervisor

*N. Chrissotimos, NRC Senior Resident Inspector

The inspectors also contacted several other licensee employees, including rad/chem foremen, rad/chem engineering assistants and technicians, and members of the technical and engineering staffs.

*Denotes those present at the exit meeting.

2. General

This inspection, which began at 8:00 a.m. on February 1, 1983, was conducted to examine the operational radwaste and radioactive material transportation programs, and to review written allegations made by a previously employed contractor employee and a currently employed contractor employee. Operation of the cement and Dow waste solidification systems were observed as well as the packaging and handling of waste in preparation for transport. Review of air-cleaning system requirements was made during a previous inspection.

3. Rad/Chem Department Staffing

Since previously reported in Inspection Reports No. 50-254/82-21; 50-265/82-23, several organizational changes have been made, including:

a. J. Sirovy, former Chemist at Dresden Station, has been promoted to the position of Lead Chemist replacing G. Gary who has terminated employment with CECo.

b. D. Gerlach, Health Physicist, has terminated employment with CECo. The licensee is seeking a replacement.

c. A. Schabilion, former Radiation Protection Foreman, has been promoted to Health Physics Staff Assistant (HPSA), a newly created position. The HPSA reports to the Lead Health Physicist.

d. J. Dishman and A. O'Horo, former Rad/Chem Technicians, have been promoted to Radiation Protection Foreman positions. There are currently five radiation protection foremen and a chemistry foreman.

Qualifications of newly assigned supervisors will be reviewed during a future inspection.

No items of noncompliance or deviations were identified.

4. Gaseous Radwaste

Gaseous radioactive effluents are released via the joint reactor building vent and via the 300-foot chimney. Both discharge pathways are continuously monitored for noble gas release and continuously sampled for iodines and particulates. Recently installed Eberline SPING monitors on the vent and chimney pathways are not yet considered operational. The NMC CAM on the vent and the General Electric monitor on the chimney are calibrated quarterly using fresh off-gas samples. Grab samples of the two pathways are collected and analyzed each month to verify calibrations and establish baseline count-rates. The chart recorders are checked at least three times per week (by rad/chem personnel) to verify operability; recorder printouts are reviewed monthly to quantify releases that are above the previously established baseline count-rates.

The inspector reviewed the methods of calibrations, functional testing, and quantification. No significant problems were identified.

5. Liquid Radwaste

The inspector selectively reviewed records of liquids released from the River Discharge Tank during 1983. Before discharge, the tank is isolated and the contents recirculated to promote mixing. During recirculation, two grab samples are collected in 500 milliliter marinelli breakers. The two grab samples are GeLi counted and the analysis results compared. If the gamma isotopic results differ by greater than ten percent, the tank is resampled. Gross Beta counting is also performed. No problems were noted with the methods of establishing permissible release rates or quantification of released activity. Releases were within regulatory limits.

The inspector reviewed the licensee's method of calibration and set point establishment of the liquid release discharge monitor. The inspector noted that the background on the monitor averages about 3000 counts per minute and the set point, corresponding to MPC, for individual releases averages about 300 counts per minute greater than background. According to the licensee, the background has continued to rise over the years and decontamination of the monitor has become less effective. The licensee recognizes that further background rise

could render the monitor incapable of performing its function. The licensee stated that installation of a new discharge monitor is planned during 1983. No other problems were noted during the inspector's review.

No items of noncompliance or deviations were identified.

6. Management of Solid Radioactive Waste

a. Organization

The organization responsible for solid and liquid radwaste consists of the Radwaste Planner, Radwaste Supervisor, a normal compliment of five foremen, and an operator. Another operator, the shift roving extra, is usually assigned to the radwaste group on off shifts, weekends, and some day shifts because waste solidification and packaging is continuous except on day shifts. The radwaste unit reports to an Assistant Station Superintendent.

b. Operations

Solid wastes generated are of two principle types. Sludges and resins are solidified in cement in new specification 17-H 55-gallon drums. Dry active wastes (DAW) are compacted into large 1000 pound bails which are loaded into metal bins for shipment.

The inspector observed the operation of the cement solidification process. The additions of waste, cement, and water to the drum and the mixing cycles are pre-set and controlled as the drum is moved on a remotely operated conveyor through successive phases of the process. A capping station at the end of the line, where drum lids were formerly secured, is no longer used for that purpose. Instead, the contents of each drum is observed visually outside the facility to ensure absence of free liquid before the drums are capped. The licensee stated that there have been no recent major operating problems involving the cement process and attributed this to daily cleanup of the system, particularly the removal of cement from mixing blades. The capacity of the system is estimated at 7-14 drums per shift.

Preparation of a shipment of drums, the packaging most frequently used for solidified waste, containing cement-solidified waste was observed. Drums were moved from their shielded storage area onto pallets, then into a 14-drum shielded cask. The panel board operator and crane operator were protected by shielding during the operation. The operator who placed and secured drum lids was protected by a shield positioned between him and the drum. The cask loading was accomplished using check sheet procedures. Following loading, the vehicle and load were inspected in accordance with procedure. Signatures of radwaste supervision and a quality assurance inspector were required for release of the vehicle. No problems were noted.

The licensee continues development of the Dow process as a possible alternative to cement solidification. Several small batches of liquid have been solidified, and the inspector observed part of the solidification of the sixth large batch. The waste and several liquid additives are pumped into a lined cask on its trailer. Additions are in a prescribed sequence and are accompanied by a predetermined amount of mixing. Gellation occurs a few minutes after additions have been completed, accompanied by the evolution of heat. Verification that a solid mass has been obtained is by visual observation. The licensee acknowledged that the method has some advantages over the cement process. Less labor and less exposure to radioactivity are involved. The licensee estimated roughly that total exposure for a shipment prepared by the DOW process is about 10 mrem vs. about 120 mrem for a cement shipment. Also, there is some reduction in waste volume. However, a laboratory scale solidification is considered necessary whenever the waste composition changes. The gellation time, amount of heat evolved, and quality of the solid mass vary with the volume and nature of the waste and the volumes of additives. No failures have been identified to date.

A Muncher compactor compresses DAW wastes into approximately 1000-pound steel banded bails. The compactor appears adequately ventilated. As a precaution, wastes whose radiation levels exceed 100 mR/hr are not compacted but are placed in 55-gallon drums. The licensee does not compact the contents of drums.

The compacted bails are loaded into steel bins, called Muncher bins, having a capacity of 8000 pounds. The bins have not been subjected to DOT Specification 7A test requirements because they are used only for packaging of low specific activity wastes. Acceptance of the bins is, however, subject to a quality control procedure.

The licensee stated that significant progress had been made in recent years in disposing of the large waste backlog and in reducing the attendent housekeeping and radiation control problems. These problems were described in Inspection Reports No. 50-254/80-20; 50-265/80-22 and 50-254/79-26; 50-265/79-23. These improvements were obvious during the inspection. Storage in the radwaste area was orderly, and control of radiation and high radiation areas was in accordance with regulations. A storage building constructed in 1979, to accomodate the large backlog, was empty.

c. Procedures

A number of operating, radiation protection, administrative, and quality assurance procedures pertaining to radioactive waste management and the transportation of radioactive materials were examined.

The basic quality assurance procedure for transportation is QP 13-52, Preparation and Shipment of Radioactive Material. Checklists required in the preparation of all types of radioactive material shipments are appended to the procedure. Their use for shipments prepared during the inspection was observed.

The procedures appear to address regulatory requirements pertaining to radioactive material packagings and transportation. The procedures reflect an adequate response to specific NRC requests contained in IE Bulletin No. 79-19 pertaining to shipments of radioactive waste. The procedures indicate that NRC-certified casks are designated as "the package" when the contents of any inner container exceeds three curies. Inner containers are "the package" when none of them contains more than three curies. This practice is consistent with IE Information Notice No. 80-32, Revision 1, which permits the designation of inner containers as "the package."

Procedures examined included:

QOP 2090-1	Moving Drums to Filling Station
QOP 2090-2	Drum Filling
QOP 2090-3	Mixing Drum Contents with Cement
QOP 2090-4	Mixer Manual Cleaning
QOP 2090-6	Drum Storage
QOP 2090-8	Removing Drums from Storage
QOP 2090-9	Manual Cement Feed to Drum
QOP 2090-10	Loading Drums into Top Loading Cask
QOP 2090-11	Loading Overpack Drums into Top Loading Cask
QOP 2090-12	Loading DAW Containers onto Unshielded Vehicles
QOP 2090-13	Loading Radwaste Drums into Rear Loading Casks
QOP 2090-14	Packaging Absorbed Liquids for DAW Shipments
QOP 2099-1	Sludge Solidification Using Dow System
QOP 2099-8	Decanting Dow Mixing Tank
QOP 2099-10	Binder Tank Recirculation and Aeration
QOP 2099-S1	Dow Solidification Data Sheet
QOP 2070-1	Bailing and Packaging of Contaminated Waste
QRP 1520-1	Calculation of Curie Content of Radioactive Shipments (Washington)
QRP 1520-2	Surveying Radioactive Shipments
QRP 1520-3	Offsite Shipment and Inspection of Radioactive Waste Shipments
QRP 1520-4	Calculation of Curie Content of Radioactive Shipments (South Carolina)
QRP 1520-S1	Checksheet for Smearing of Casks and Vehicles
QRP 1520-S2	Checksheet for Smearing of Drums, Bins, Overpacks, etc.
QRP 1520-S3	Calculation of Curie Content of 55-gallon Drums
QRP 1520-T1	Millicuries vs. Radiation Level for Contact Exposure Measurements
QRP 1520-T2	Millicuries vs. Radiation Level for 55-gallon Drums
QRP 1530-0	Receipt of Radioactive Materials
QRP 1530-1	Receipt, Inventory, and Leak Test of Radioactive Sources

The inspector also verified that the licensee has copies of burial site licenses, Certificates of Compliance and other required documents for NRC-licensed packagings, and verification that they are registered users of the packagings.

d. Training

The licensee's Training Department presents an annual training program in radioactive waste management and transportation to employees involved with these subjects. Four hours of training are required for the radwaste supervisor and foremen, radiation-chemistry supervisors and technicians, and quality assurance and quality control people involved with radwaste and transportation functions. Training subjects include: operations, administrative, and radiation-chemistry procedures; DOT regulations; and burial site criteria. The program is responsive to IE Bulletin No. 79-19 on Waste Packaging and Transportation.

The inspector did not examine records of past training, although the licensee said they were available. Training in 1983 is scheduled in May.

e. Quality Assurance

Inspection of the vehicle and load by a quality assurance inspector, and his signed concurrence, are required before a radioactive waste shipment is released. In addition, QA makes an annual station-wide inspection of procedures. A determination as to whether applicable radwaste and radiation-chemistry procedures are available and up-to-date is included.

7. Reactor Coolant Quality

Compliance with Technical Specification 4.6.C, Coolant Chemistry, was examined. The specification requires an isotopic analysis of the coolant at least monthly and an analysis for iodine-131 through iodine-135 at least every 96 hours during operation. The radioiodine concentration must not exceed 5 µCi of iodine-131 dose equivalent per gram of water.

Examination of records for about six months for both units disclosed that daily coolant samples are collected and analyzed [illegible]cally during operation and occasionally during shutdown. Equivalent iodine-131 concentrations were less than 5 µCi/g, usually ranging from 1E-2 to 1E-3 µCi/g. No problems were identified.

8. Status of NUREG-0737 Task Items

a. Extended Range Noble Gas Effluent Monitors (Task II.F.1.1)

As discussed in Inspection Reports No. 50-254/82-21; 50-265/82-23, this item remains open pending completion of calibration of the

high range detectors. In a letter to NRR dated January 14, 1983, the licensee requested a completion date extension until July 1, 1983.

b. Containment High Range Radiation Monitors (Task II.F.1.3)

As discussed in Inspection Reports No. 50-254/82-21; 50-265/82-23, this item remained open pending radioactive source calibration. These monitors were calibrated during December 1982 using a newly acquired Shephard calibrator. Each detector was calibrated at ten exposure levels ranging from 2 to 2000 rems per hour gamma. Response correction graphs were generated and are posted in the control room. The inspectors have no further questions concerning this task item at this time.

9. Allegations

A list of concerns regarding possible radiological and security problems at Quad-Cities Station was received at Region III on January 3, 1983. The concerns were contained in a letter, dated December 20, 1982, which was sent to Region III by a contractor employee who had worked at the Station during portions of 1981 and 1982. The inspectors met with the individual on January 31, 1983, to discuss his concerns.

When the inspectors arrived at the Station on February 1, 1983, the NRC Resident Inspector advised the inspectors that a letter containing radiological concerns had been received by him on January 31, 1983. This letter, dated January 25, 1983, was from a currently employed contractor employee. The inspectors met with the worker on February 2, 1983, to discuss his concerns, which were similar to a concern contained in the December 20, 1982 letter from the other contractor employee.

During the review of allegations, the inspectors contacted licensee managers in the site construction, administration, and rad/chem departments. The inspectors also contacted rad/chem foremen, technicians, and engineering assistants, and the ALARA Coordinator. The inspectors reviewed administrative and radiation protection procedures, dosimetry records, radiation work permits, survey records, and results of personal bioassay. The inspectors noted that portions of the licensee's radiation protection and training programs could be improved; however, no items of noncompliance related to the allegations reviewed were identified. Program improvements were discussed with licensee personnel.

The allegations listed below are from the letter dated December 20, 1982, the last allegation listed includes concerns contained in the letter dated January 25, 1983. The additional concerns contained in the letter dated January 25, 1983, are no longer valid, according to the alleger. He stated that he had discussed these matters with licensee rad/chem department representatives and he was satisfied with the explanations given. He had no further questions concerning these matters, and he did not desire review by the inspectors.

The allegations are presented in the allegers' words. In order to maintain the allegers' anonymity, specific dates or names have not been included in discussions of the allegations. The allegations concerning security problems were not reviewed during this inspection. They will be reviewed and documented in a future inspection.

a. Allegations: The monitoring devices don't work correctly.

Discussion: During the January 31, 1983 interview, the alleger stated that he was referring to an Eberline portal monitor located at the trackway 2 exit from the reactor building. This monitor, which had been located about 30 feet from the tool decontamination area, has subsequently been replaced. During periods when tools were being decontaminated, or stored awaiting decontamination, the original (G-M tube) portal monitor would occasionally alarm because of increased background radiation levels from the tool decontamination area. The licensee replaced the G-M tube portal monitor with a liquid-scintillation portal monitor late in 1982. The new monitor is more sensitive than the previous monitor and has a background subtract feature which reduces background fluctuation alarms. The alarms on the previously used G-M tube portal monitor may have caused inconvenience when attempting to pass through the monitor to check for personal contamination, but was still usable. The worker's concern appears to have resulted from an incomplete understanding of the functioning of the portal monitor.

b. Allegation: The dose allowed per day was jacked to 600 without being asked if we would accept that amount.

Discussion: The 600 (mrems) referred to is an administrative dose limit established at the Station to ensure that NRC limits are not exceeded. The administrative limits are designed to trigger a review of workers' previous radiation doses. The administrative limits are not required by NRC regulation, nor do the licensee's procedures require notification of the individual when a dose extension is requested. The applicable NRC limit is 1250 mrems per quarter or 3000 mrems per quarter depending upon previous dose information.

c. Allegation: My film badge was dropped in a high radiation area. The health physicist disposed of it giving me the dose recorded on the digital counter which was 692 for the period times 1.5. The safety factor was to be erased on the next film reading, but wasn't. I may have been able to stay longer if it had been erased.

Discussion: During work in radiologically controlled areas, a worker wears a film badge and a pocket or digital dosimeter. The film badge, the official measurement device, is sent for processing at two week intervals. The licensee utilizes the pocket or digital dosimeter readings to estimate dose received since the last film badge reading. When the film is read, the dosimeter readings for the period are replaced by the film reading. The licensee routinely applies a safety factor to dosimeter readings to ensure that no regulatory limit is exceeded when the film badge is read. The film

badge, dropped by the alleger, had become contaminated with radioactive materials and could not be processed. The licensee used the digital dosimeter reading and safety factor as the official reading until an evaluation could be made. The license later deleted the safety factor and used the digital reading as the official dose received. The inspectors identified no problems with the licensee's method of handling the alleger's accumulated dose information.

d. Allegation: One person was given a body count as a health measure because he had used a contaminated mask.

Discussion: Before a respiratory protective device is issued by the licensee, it is cleaned, sanitized, checked for contamination, and placed in a plastic bag to keep it clean. When issued, the licensee records the device's serial number and wearer's name. When returned, the inside of the mask is checked for contamination. Only a small percentage are found contaminated when returned. If a significant quantity of contamination is found, the wearer is given a whole body count to determine if radioactive materials were taken into the body. Having obtained from the alleger the name of the individual referred to, the inspectors found that no activity was detected in the whole body count of the individual. No problems with the licensees handling of this matter was found.

e. Allegation: In the torris the pocket dosimeters were never zeroed in properly.

Discussion: When pocket dosimeters are charged and zeroed in a charger, a small portion of the charge may be lost by shorting when the dosimeter is withdrawn from the charger. Therefore, the dosimeter may read slightly upscale after charging. After being worn in the radiologically controlled area, the dosimeter reading will be conservative because of the slight initial upscale reading. The dosimeter results are handled as described in allegation "c," above. As indicated, the pocket dosimeter results are replaced by film badge results. Therefore, the slight conservative error resulting from dosimeter charging "leakoff" does not affect the worker's permanent dose records.

f. Allegation: I also had it explained to me last year that the radiation doesn't register on the digital and pens when it has to pass through the body first. This was after I had spent two days leaning against a pipe to grind which was giving off two rems/hr.

Discussion: The alleger was unable to provide specific dates or location to aid in the inspector's review. After extensive records review and discussions with licensee personnel, the inspectors could not reconstruct the event. An event which was similar but which did not involve the alleger had been identified by the licensee, and resulted in a recent policy change which should reduce the possibility of recurrence. The inspectors discussed the occurrence with the alleger, described how the film badge would

respond in such an event, reviewed the allegers' film badge results for the approximate time period of the event, and concluded that no exposure in excess of regulatory limits could have occurred.

g. Allegation: This year we were used as lead shielders without being asked.

Discussion: This allegation refers to work practices which are not of NRC concern.

h. Allegation: We removed tools from the Drywell and tryed cleaning them at trackway two, then transported them to trackway one, to have them checked for radiation. One large combination in particular couldn't be cleaned up and had been lying there giving off radiation where everyone was passing by.

Discussion: When interviewed, the alleger said that the tool had been cleaned at the tool decontamination area near trackway two. He said that a rad/chem technician at trackway two told him to take the tool to trackway one to be checked. During review of this allegation, the inspectors learned that although the background radiation level near the tool decontamination area was less than one millirem per hour, this level is too great to permit final checking of contamination levels on tools and equipment to be released for unrestricted use or release. Therefore, they had to be final checked at a lower background area (trackway one), with sensitive detection instruments. Apparently, the tool discussed in the allegation needed further decontamination, or had fixed contamination and could not be released. Due to the low direct radiation level, involved no significant radiation hazard existed.

i. Allegation (December 20, 1982 Letter): Employees are required to sit where there is low level radiation for the duration of the day.

Allegation (January 25, 1983 Letter): The rules put on us are grossly unfair. Substation Construction says we are to be in the building at all times. This to me is rediculous. There is tons of paperwork or other many reasons why a job may be put on "hold." Presently during the hold time, we are to stand around in the building collecting radiation. This additional radiation is not needed or wanted. I got at least 10 millirem a day by being in the building when I am not needed. These 10 millirem really add up fast. 50 millirems a week or 200 a month adds up to 600 millirems a quarter. When a worker gets laid off before he gets 3000 millirems a quarter and he receives 600 unneeded millirems a quarter means over one fifth of that radiation was uncalled for. This to me is assinine.

Discussion: The building referred to is the reactor building. The areas where workers wait to be assigned a job, return to a specific job, or are directed by the foreman to wait for other reasons, generally have radiation levels of from one to four millirems per hour. The contractor workers mostly have been performing seismic

hanger installation and alteration work in the torus and drywells. According to licensee management, the workers are kept near the entrances to the areas where work is being performed to avoid the delays involved in locating a worker and getting him prepared to perform an assignment. Although having the workers wait in areas where the radiation levels are between one and four millirems per hour is not a regulatory problem, it is a good ALARA practice to eliminate unnecessary doses. The inspectors discussed with licensee management the need to review the practice of keeping the worker in the low dose areas between work assignments and to determine if there are alternate methods of providing availability while reducing their radiation doses. The licensee stated that such a review would be made and consideration given to possible alternate waiting areas and methods.

10. Exit Meeting

The inspectors met with licensee representatives (denoted in Section 1) at the conclusion of the inspection on February 4, 1983. The inspectors summarized the scope and findings of the inspection and discussed the two allegations. In response to an item discussed by the inspectors, the licensee stated that the practice of having contractor employees remain in the reactor building between work assignments would be reviewed and that Region III would be informed of the results of the review and any proposed changes from the current practice. (Section 9.i)