U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	50-461
License No:	NPF-6
Report No:	50-461/98002(DRS)
Licensee:	Illinois Power Company
Facility:	Clinton Nuclear Power Station
Location:	Route 54 West Clinton, IL 61727
Dates:	January 5-9, 1998
Inspectors:	S. Orth, Senior Radiation Specialist W. West, Radiation Specialist
Approved by:	G. L. Shear, Chief, Plant Support Branch 2 Division of Reactor Safety

EXECUTIVE SUMMARY

Clinton Nuclear Power Station, Unit 1
NRC Inspection Report 50-461/98002

This announced inspection included aspects of the licensee's plant support performance and, specifically, an evaluation of the effectiveness of the radiation protection (RP) program. The report covers a one-week inspection concluding on January 9, 1998, performed by two radiation specialists. One non-cited violation of NRC requirements was identified (Section R1.1).

Plant Support

- The licensee maintained effective oversight of the respiratory protection program and implemented numerous program improvements. Required surveillances and maintenance were completed as required, and the equipment was in good working order. Personnel using the equipment were properly trained, medically qualified, clean-shaven, and properly fit-tested. However, one non-cited violation was identified concerning the failure of plant security force members and supervisors to maintain their required respiratory protection qualifications (Section R1.1).

- Respiratory protection evaluations were sound and were consistent with NRC guidance. The RP staff properly evaluated radiological conditions to determine whether the use of respiratory protection would maintain the total effective dose equivalent as-low-as-is-reasonably-achievable (ALARA) (Section R1.2).

- The RP staff properly determined the activity of radioactive waste shipments via scaling factors. The inspectors noted good evaluation of radionuclide data but identified one error in the interpretation of the vendor's radioanalytical results (Section R1.3).

- The licensee properly packaged and classified radioactive material and waste shipments in accordance with regulatory requirements. However, the inspectors identified that procedures lacked guidance in determining the level of fixed contamination on material packaged and shipped under the surface contaminated object classification. The shipping documentation and low level waste manifests contained the information required by 49 CFR Part 172 and Appendix F of 10 CFR Part 20 (Section R1.4).

- The licensee had difficulty maintaining operability of the area and process radiation monitoring (AR/PR) equipment. Although the staff recognized the problem in October of 1997, late and/or missed surveillances had resulted in equipment operability problems with these monitors during 1997. With respect to the AR/PR remote monitoring console the inspectors concluded that (1) there was a lack of clear, reliable indication of AR/PR readings in the main control room; (2) frequent nuisance alarms were distracting operators from their assigned duties and the monitoring of plant conditions; and (3) previous modification plans were unsuccessful because of various technical and licensing problems and uncertainties. Although plant management had recently placed a high priority on the AR/PR system, the licensee's final plans to resolve these problems remained uncertain (Section R2.1).

- Radioactive material and waste shipping procedures were consistent with regulatory requirements. However, the inspectors identified some problems and inconsistencies within and between procedures indicating the need for additional review of procedures (Section R3.1).

- The licensee had identified problems concerning the control of work hours and overtime for RP personnel, which will be reviewed as part of the NRC 0350 Panel (Section R4.1).

- Audits of the radioactive waste management and shipping programs were of good depth. The audit team maintained a balance of performance-based and compliance-based observations and identified issues, which were being resolved by the RP staff (Section R7.1).

Report Details

IV. Plant Support

R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 Respiratory Protection Program

a. Inspection Scope (IP 83750)

The inspectors reviewed the licensee's respiratory protection program. This review included examination of equipment storage, maintenance, inspection, and cleaning. The inspectors also reviewed audits of the respiratory protection program and reviewed the respirator training and qualification program, including fit-testing, medical evaluation, and classroom training.

b. Observations and Findings

The inspectors noted that all required respirator testing and maintenance records were readily available, well-organized, and complete. Plant service air was tested quarterly as required and complied with American National Standards Institute (ANSI) Grade D specifications. The inspectors found that self contained breathing apparatus (SCBA) tanks were hydrostatically tested at the required frequencies and that the required monthly inspections of SCBA equipment were performed as required.

The respiratory protection equipment was in good condition and was properly stored. In particular, facepieces were stored in heat-sealed plastic bags, which provided an indication of facepiece use or removal. The inspectors noted that respirator filter cartridges and canisters were not reused, that respiratory protection equipment was properly cleaned and disinfected, and that SCBAs were in good physical condition. In addition, the respirator storage and issue area was clean and well-organized.

The inspectors reviewed self assessments of the respiratory protection program and found them to be comprehensive, objective, and effective in identifying areas for improvement. At the time of this inspection, the licensee was completing several improvements to the respirator protection program. For example, the staff was revising and restructuring respiratory protection procedures. In the course of this initiative, guidance which had previously been contained in work instructions or which had been provided by personnel experience was incorporated into new procedures. The inspectors observed that these procedures were detailed and were consistent with NRC guidance. The licensee also designated respirator eyeglass kit storage locations to ensure that emergency response personnel were capable of readily obtaining their kits, as needed. Other improvements included the addition of speaking diaphragms for SCBA facepieces and the increase in SCBA tank-filling capacity for use during emergencies.

The licensee had properly maintained the respirator fit-testing program and the training program for respirator qualification. In addition, the licensee met the medical

qualification requirements of 10 CFR Part 20 by requiring annual medical evaluations for all respirator-qualified personnel. The inspectors verified that personnel who maintained and repaired respiratory protection equipment had received the appropriate manufacturer training to remain certified for these activities.

During the implementation of the above initiatives, the licensee identified one deficiency in the area of respirator qualifications. On November 3, 1997, the plant engineering controls specialist (ECS), who maintained the respiratory protection program, noticed that no plant security force members had current respiratory protection qualifications. Although the site Emergency Plan required all plant security force members and supervisors to be respirator-qualified, security force personnel had mistakenly allowed their respirator qualifications to lapse in 1995. Following this discovery, the ECS informed plant security personnel of the deficiency, initiated a condition report (CR), and verified that other plant departments had properly maintained the qualifications for required personnel. The inspectors noted that the licensee planned to obtain respiratory qualification for the security personnel by March 31, 1998, and planned to add respiratory training expiration dates to security qualification cards to better track this requirement.

10 CFR 50.54(q) requires that an Emergency Plan be established and implemented. The Clinton Nuclear Power Plant Emergency Plan requires that Emergency Plan Implementing Procedures be implemented. Emergency Plan Implementing Procedure AP-05 (Revision 7), "Emergency Preparedness Training Program" (Step 4.6.3) states that the emergency response organization positions requiring respiratory protection training are delineated in the Emergency Planning Training Program Description. The Emergency Planning Training Program Description (Revision 29) requires security force members and security shift supervisors to have respiratory protection training. This non-repetitive, licensee-identified and corrected violation is being treated as a non-cited violation, consistent with Section VII.B.1 of the NRC Enforcement Policy (NCV No. 50-461/98002-01).

c. Conclusions

The licensee maintained effective oversight of the respiratory protection program and implemented numerous program improvements. Required surveillances and maintenance were completed as required, and the equipment was in good working order. Personnel using the equipment were properly trained, medically qualified, clean-shaven, and properly fit-tested. However, one non-cited violation was identified concerning the failure of plant security force members and supervisors to maintain their required respiratory protection qualifications.

R1.2 Respiratory Protection Evaluations (IP 83750)

The inspectors reviewed the licensee's process for determining whether respirators or other engineering controls should be provided for work activities and concluded that the process was consistent with the requirements of 10 CFR Part 20 and NRC guidance. Prior to performing a work evolution, the radiation protection (RP) staff evaluated

several variables (e.g., the levels of surface contamination, the degree of surface agitation, area ventilation, and surface consistency) to determine the likely concentration of airborne radioactive material produced during performance of the job. Based on these factors, the RP staff calculated an estimated derived air concentration (DAC) fraction for the work activity. If this DAC fraction was greater than or equal to 0.3, the RP staff was required to evaluate the use of respiratory protection. The staff calculated the prospective external and internal doses for the work, both with and without the use of respirators, to determine which scenario resulted in the lowest total effective dose equivalent to the workers. In this evaluation, the licensee used a 20 percent efficiency reduction factor (i.e., it was estimated that donning a respirator increased work duration by 20 percent). The inspectors verified that the licensee had performed an acceptable technical justification to justify the use of the 20 percent factor.

The inspectors reviewed various examples of these evaluations, including those for a December, 1997, control rod drive replacement and for the 1997 containment paint removal evolution. The inspectors found that the evaluations were properly performed. During the work activities, the RP staff performed confirmatory air sampling. The inspectors noted that the air sample results were consistent with the licensee's projected concentrations.

R1.3 Determinations of the Activity of Radioactive Waste Shipments

a. Inspection Scope (IP 86750)

The inspectors reviewed the licensee's method for determining the activity of radioactive waste shipments. The inspectors reviewed the most recent annual waste stream analyses and the verifications which were performed to ensure the validity of radionuclide scaling factors used to determine the activity of hard to detect radionuclides. The inspectors also reviewed the implementation of procedures CPS No. 1888.00 (Revision 9), "Process Control Program," and CPS No. 7013.40 (Revision 5), "10 CFR 61 Compliance Program."

b. Observations and Findings

In accordance with 10 CFR 61.55(a)(8), the RP staff used scaling factors as an indirect method to determine radionuclide activity in radioactive waste shipments. This is done by inferring a concentration of hard to detect radionuclides by applying scaling factors to a known concentration of an easier to detect radionuclide, provided that there is a reasonable assurance that the indirect method can be correlated with actual measurements. As required by procedure CPS No. 7013.40, the licensee obtained samples from six of its seven waste streams (i.e., concentrate waste, fuel pool sludge, other waste, phase separator sludge, and spent resin), sent the samples to a vendor laboratory for isotopic analyses, and calculated a scaling factor for each hard to determine radionuclide in each sample. In accordance with NRC guidance, procedure CPS No. 7013.40 recommended that each waste stream determined to produce Class B and C wastes be sampled every year and that each waste stream determined to produce Class A wastes be sampled every two years. The RP staff determined the total

activity of each shipment by multiplying the radionuclide concentrations (determined by direct gamma spectroscopy measurements and scaling factors) and the mass of the material.

In the case of the dry active waste (DAW) stream, the RP staff determined that the radionuclide distribution (and the corresponding scaling factors) for the waste sludge waste stream adequately represented the distribution found in DAW. To ensure that the distributions remained consistent, the staff obtained biennial surface contamination samples from areas within the radiologically posted area (RPA) and compared the distribution of the gamma emitting radionuclides in the samples to the scaling factors determined for the waste sludge stream. If the comparison resulted in an unacceptable variance (as defined in procedure CPS No. 7013.40), the licensee was required to evaluate and resolve the discrepancy. The RP staff determined the total activity of each shipment of DAW through a dose-to-curie calculation, applying the radiation levels measured at 1 meter and the radionuclide scaling factors.

The inspectors reviewed the most recent scaling factor evaluations (i.e., samples, analyses, and comparisons) of the waste streams, which had been performed during April through July of 1997. In accordance with procedure CPS No. 7013.40, the RP staff performed comparisons of the following data:

- the gamma isotopic results obtained by the vendor laboratory and by the licensee's chemistry staff;
- the fractional abundances of cobalt-60, cesium-137, and cerium-144 determined in 1997 and in the previous analysis; and
- the scaling factors determined in 1997 and in the previous analysis.

During the review of the 1997 vendor laboratory data, the inspectors found the licensee's practices to be in accordance with plant procedures. The RP staff properly compared the vendor data to plant results, and the proper comparisons were made between the 1997 results and the previous results. The inspectors also noted that any abnormal variances were investigated and resolved. However, the inspectors identified an error in the phase separator sludge waste stream scaling factor database. In the case of niobium-94 (Nb-94), the RP staff had misinterpreted the laboratory data and had incorrectly determined that the concentration of Nb-94 was less than the minimal detectable concentration (MDC) of 8.4×10^{-4} microcuries per gram (uCi/g) instead of the detected activity of 9.9×10^{-4} uCi/g. Based on this error, the RP staff had not initially included Nb-94 into the database. Following the inspectors' identification of the error, the RP staff: (1) added Nb-94 to the database for the phase separator sludge waste stream, (2) initiated a condition report (CR No. 1-98-01-087) to document the error, (3) determined that the error did not have a significant effect on any shipments from the site, and (4) counseled the individuals involved in maintaining and verifying the scaling factor database.

c. Conclusions

The RP staff properly determined the activity of radioactive waste shipments via scaling factors. The inspectors noted good evaluation of radionuclide data but identified one error in the interpretation of the vendor's radioanalytical results.

R1.4 Conduct of Radioactive Material and Waste Shipments

a. Inspection Scope (IP 86750)

The inspectors reviewed the shipping documents for the following radioactive shipments, including the package classifications and labeling and shipping papers:

97-011 Outage Equipment (2/26/97);
97-017 Traversing Incore Probes (3/18/97);
97-025 De-watered Ion Exchange Resins (5/15/97);
97-027 De-watered Ion Exchange Resins (5/28/97);
97-038 Contaminated Laundry (6/27/97); and
97-064 De-watered Ion Exchange Resins (12/16/97).

The inspectors reviewed the shipping documents to determine their compliance with 10 CFR Part 71 and 49 CFR Parts 172 and 173.

b. Observations and Findings

The inspectors observed that the RP staff prepared shipments in accordance with procedures CPS No. 7013.12 (Revision 3), "Shipment of Radioactive Material," and CPS No. 7013.13 (Revision 2), "Shipment of Radioactive Waste." As allowed by these procedures, the RP staff used a vendor-supplied computer program to classify the shipment and prepare the required shipping documents. Prior to each shipment, the RP staff sampled and analyzed the materials and compared the gamma spectroscopy results to the specific waste stream's scaling factor database. The inspector reviewed the classification of materials/wastes shipped as Low Specific Activity-II (LSA-II) and Limited Quantity packages and noted that shipping documents were properly prepared. The RP staff maintained photographs of the packages and carriers' vehicles to record the outgoing conditions of the shipments and to record the placarding of the vehicles, as applicable.

The inspectors noted that the licensee had packaged and classified one shipment (shipment no. 97-011) of tools using the surface contaminated object (SCO) classification. Based on the consistency of the shipment, the material met the basic definition of SCO found in 49 CFR 173.403: "a solid object which is not itself radioactive but which has Class 7 (radioactive) material distributed on any of its surfaces." However, the inspectors were unable to correlate the RP staff's radiological survey results with the fixed contamination levels used to ensure the package met the specific SCO-II requirements for fixed contamination contained in 49 CFR 173.403. For example, the licensee measured and recorded surface radiation levels of 100 millirad/hr

(> 500,000 disintegrations per minute (dpm) per 100 cm^2) but classified the package based on a fixed contamination for gamma and beta emitting radionuclides of 2,500,000 dpm per 100 cm^2. In addition, the RP staff measured removable contamination from alpha emitting radionuclides of 176 dpm per 100 cm^2 but did not record any measured, fixed contamination from alpha emitting radionuclides. During the review, the inspectors also noted that the licensee's procedures did not provide guidance in determining the fixed contamination from beta and gamma emitting and from alpha emitting radionuclides. Following the onsite portion of the inspection, the RP staff located a technical evaluation which had been used to correlate the survey results to the levels used for the purposes of package classification. The inspectors reviewed this information and determined that it provided adequate technical basis for the values used by the licensee. However, the RP staff acknowledged the lack of procedural guidance in evaluating the survey results and determining the contamination levels. RP management planned to review other procedures for similar deficiencies.

The inspectors observed that the shipping documents and waste manifests contained the information required by 49 CFR Part 172 and Appendix F of 10 CFR Part 20, respectively. The RP staff recorded the activity of shipments using the International System of Units (SI). The shipping documentation also included required emergency response information.

c. Conclusions

The RP staff properly packaged and classified radioactive material and waste shipments in accordance with regulatory requirements. However, the inspectors identified that procedures lacked guidance in determining the level of fixed contamination on materials packaged and shipped under the SCO classification. The shipping documentation and low level waste manifests contained the information required by 49 CFR Part 172 and Appendix F of 10 CFR Part 20.

R2 Status of RP&C Facilities and Equipment

R2.1 Area and Process Radiation Monitoring (AR/PR) System

a. Inspection Scope (IP 84750)

The inspectors reviewed the operability and maintenance of the plant's AR/PR system. This review included inspection of the radiation monitors, as well as the associated display and control console in the main control room. The inspectors also reviewed surveillance and preventive maintenance records for the monitors and interviewed cognizant plant staff regarding the performance, reliability, and current status of the system.

b. Observations and Findings

AR/PR System Surveillances:

The inspectors found that the licensee experienced difficulties completing the area radiation monitor (ARM) and continuous air monitor (CAM) surveillances, which were required by Technical Specifications (TS), the Operational Requirements Manual (ORM), and the Offsite Dose Calculation Manual (ODCM), at the required frequencies. These surveillances, which included calibrations, functional checks, source checks, and battery checks, ensured the operability of the plant radiation monitors. The system engineer for the AR/PR system documented the surveillance/preventive maintenance (PM) backlog problem in a CR dated October 27, 1997 (CR No. 1-97-10-474, "Degradation of the AR/PR System") and attributed the condition to problems in scheduling and resources. Through interviews with plant personnel and review of CR's and maintenance work requests on the monitors, the inspectors found that the assessment documented in this condition report, including the causal factors, was accurate. Specifically, the staff indicated that there were few personnel qualified to service these monitors and that these personnel had often been assigned to lower-priority activities. In addition, the plant scheduling process did not adequately reflect plant priorities. For example, in December of 1997, the staff scheduled and performed work on the new fuel storage vault ARM, which was not required in the current plant condition and would not have been required for 12 months. However, the system engineer acknowledged that those resources would have been better spent performing surveillances on radiation monitors which were both needed and approaching their past due dates.

The licensee scheduled surveillances and PM's according to an established frequency; changes to that schedule or higher-priority additions by the system engineer were not necessarily made. The inspectors observed that the system engineer had limited authority to ensure that the most important or late surveillances were performed before other, lower-priority tasks. Recently, plant management had recognized this problem and placed additional priority on these surveillances. The system engineer was given the authority to assign controls and instrumentation department resources, to develop a backlog reduction schedule, and to ensure that adequate resources were available for that task. The planning staff also agreed to implement the system engineer's schedule. Although these corrective actions addressed the immediate backlog problem, the licensee had not identified a solution to prevent future backlogs. Under the current scheduling system, the system engineering staff had very limited influence over the scheduling of surveillances and maintenance, which contributed to this problem.

At the time of this inspection, the inspectors could not determine the specific monitors which had not been calibrated or tested at the required frequency. A more exhaustive review of operability records, maintenance records, and CR's related to these monitors will be required to determine if any violations of TS or plant procedures had occurred. This review and the review of the licensee's long-term corrective actions will be evaluated in future inspections (Unresolved Item (URI) No. 50-461/9800[illegible]-02).

Radiation Monitor Material Condition:

The inspectors walked down the following monitors to assess their material condition:

Containment Building Fuel Transfer Vent (A, B, C, D)
Main Control Room Air Intake (A, B)
Continuous Containment Purge (A, B, C, D)
Fuel Building Vent Exhaust (A, B, C, D)
Containment Building Exhaust (A, B, C, D)
Spent Fuel Storage Area ARM
Control Building CAM
Component Cooling Water CAM
Standby Gas Treatment System (SGTS) Exhaust High Range CAM
SGTS Exhaust CAM
Stack Heating, Ventilation, and Air Conditioning (HVAC) Exhaust High Range CAM
Stack HVAC Exhaust CAM
Stack Flowmeter
Shutdown Service Water Effluent Process Radiation Monitor (PRM) (A, B)

The inspectors observed that the monitors were generally clean and in good physical condition. However, the licensee had previously identified a black residue emanating from the sample pumps on the shutdown service water effluent PRMs. In several cases, this condition had affected the operability of these pumps, and the licensee was investigating the source of the material, as well as possible solutions to their condition. Also, the SGTS exhaust high range monitor was inoperable due to flow problems, and the HVAC exhaust high range monitor was inoperable due to power supply problems and to the lack of a current calibration. These monitor problems were symptoms of the maintenance backlog discussed above. The inspectors verified the alarm setpoints on several monitors, which were found to be correctly set.

The AR/PR Console:

The licensee maintained a remote monitoring console installed in the main control room. Monitor data was displayed on a small liquid crystal display screen on the top of the console and printed out on a small paper strip on the front of the console. Radiation alarms resulted in both an audible alarm and the activation of a red light on the console. Monitor errors or detector failures also resulted in an audible alarm and in the illumination of an indicator light. Previously, a similar console had been operated at the RP desk by RP personnel. During 1997, the plant transferred indication to the control room to conform with previous commitments for control room indication and safety parameter display system (SPDS) input of alarms. However, personnel indicated that there was currently no indication of AR/PR system values or status on the SPDS system.

The inspectors observed operation of the main control room AR/PR console, which was being continuously staffed by RP technicians trained on the operation of the unit. The presence of these technicians was necessitated by the fact that control room operators

had not been trained on the use of the system, as well as that the system required constant attention and a great deal of operator intervention. The RP technicians were frequently required to respond to and silence alarms which resulted from maintenance of the monitors, communications system problems, or other equipment problems in the field or at the console. For example, during a 15-minute time period, the inspector noted three audible alarms were activated on the console. Inspectors also interviewed a shift supervisor and a licensed reactor operator about the reliability and operability of the AR/PR console. Both individuals commented that the information provided by the system would be valuable to operators during accident situations as well as some routine activities, such as discharges or plant transients. However, they were also very dissatisfied with the current AR/PR console for the following reasons:

(1) The frequent audible alarms were distracting to operators, especially during transients when other alarms may or may not be activated;

(2) The system was complicated to operate and provided data in a very limited format; and

(3) The alarms from the console required frequent entries into ORM or ODCM action statements, which resulted in additional actions for operators and distracted the operator from monitoring plant conditions.

Plant management recognized the console deficiencies and indicated that the staff had been preparing a modification for the AR/PR system console for approximately 5 years, during which time the station had made various commitments to the NRC. On several occasions, vendor representatives attempted to resolve the problems, but the console in the control room continued to experience frequent failures. During these failures, the operators were required to obtain local instrument readings (every 6 hours) of the plant area radiation monitors (ARMs), PRMs, and CAMs. Based on maintenance records and discussions with the system engineering staff, the inspectors concluded that equipment problems had been prevalent throughout 1997. In addition, the system engineer indicated that the main control room console would require extensive software modification or replacement to be capable of functioning with the year change of 1999 to 2000.

On January 8, 1998, senior plant managers conducted a meeting to discuss the AR/PR console problem and potential resolutions. During this meeting, the attendees summarized the current condition of the system, discussed its problematic history, decided to abandon the current system modifications because of numerous problems (both technical and regulatory), and directed personnel to form a team which was to develop a new modification plan. This team was to be comprised of representatives from the design, operations, RP, system engineering, and licensing departments. During the meeting, the inspectors observed that the regulatory requirements, commitments, etc. related to the AR/PR console were not well understood by the plant staff. In addition, the inspectors did not observe a collective commitment to devote resources to the task of determining the actual requirements for the system so that a modification plan could be formulated. The inspectors also questioned plant

management on the effect of the AR/PR problems on station restart plans. Although the issue had not been considered, management stated that they planned to evaluate this issue.

Due to the complex history, licensing basis, and prior commitments relative to the AR/PR system, the licensee was not fully aware of all the requirements for the system and did not have a specific plan and/or modification to resolve the above operability issues. As such, the operability and licensing basis of the AR/PR system will be reviewed during future inspections (URI No. 50-461/98002-03).

c. Conclusions

The licensee had difficulty maintaining operability of the area and process radiation monitoring equipment. Although the staff recognized the problem in October of 1997, late and/or missed surveillances had resulted in equipment operability problems with these monitors during 1997. With respect to the AR/PR remote monitoring system, the inspectors concluded the following:

(1) there was a lack of clear, reliable indication of AR/PR readings in the main control room;

(2) frequent nuisance alarms were distracting operators from their assigned duties and the monitoring of plant conditions; and

(3) previous modification plans were unsuccessful because of various technical and licensing problems and uncertainties.

Although plant management had recently placed a high priority on the AR/PR system, the resolution of these problems remained uncertain.

R3 RP&C Procedures and Documentation

R3.1 Waste Classification and Shipping Procedures

a. Inspection Scope (IP 86750)

The inspectors reviewed the procedures used by the licensee to prepare radioactive materials and wastes for shipments and to classify radioactive waste for disposal (i.e., burial). The inspectors verified that the following procedures were consistent with the regulatory requirements:

- 1888.00 (Revision 9), "Process Control Program;"
- 7013.12 (Revision 3), "Shipment of Radioactive Material;"
- 7013.13 (Revision 2), "Shipment of Radioactive Waste;"
- 7013.16 (Revision 1), "Packaging of Non-Waste Radioactive Material;" and
- 7013.40 (Revision 5), "10 CFR 61 Compliance Program."

b. Observations and Findings:

The inspectors noted that the licensee's procedures properly reflected regulatory requirements contained in 10 CFR Parts 61 and 71 and in 49 CFR Parts 172 and 173. However, the inspectors noted some problems concerning the contents of several of the above procedures. For example, the RP staff had revised procedure CPS No. 1888.00 in November of 1997 and had deleted one of the appendices. However, steps in the procedure continued to direct the user to the deleted appendix. The licensee acknowledged this error and the lack of adequate procedure review and planned to properly revise the applicable procedure steps. In addition, the inspectors identified that procedure CPS No. 7013.12 lacked specific guidance in determining SCO classifications (Section R1.4).

During a review of the radionuclide scaling factor determinations (Section R1.3), the inspectors noted that procedure CPS No. 7013.40 was not completely consistent with the frequency at which the RP staff was determining the scaling factors. Prior to the licensee's 1997 evaluations, the inspectors identified that the previous scaling factor evaluations for several waste streams, typically classified as Class B or C wastes, had not been performed on an annual frequency. For example, the RP staff obtained the previous samples of phase separator sludge and fuel pool sludge on March 8, 1994, and obtained the previous sample of concentrate waste on October 7, 1993. Although procedure CPS No. 7013.40 recommended that these evaluations be performed on an annual frequency, the RP staff was only evaluating the scaling factors if they were shipping material from that waste stream during the course of the year. Although the licensee's practice was not in violation of the procedure, the RP staff recognized the inconsistency and prepared a procedure change request to more clearly state the required frequency.

The inspectors also noted additional, minor inconsistencies between procedure CPS No. 7013.40 and RP standing order RPSO-024 (Revision 0), "Radioactive Waste Activity Determinations," concerning the determination of radionuclide scaling factors for the DAW waste stream. Although the licensee was properly implementing the requirements of the procedure, the RP staff planned to review both documents to ensure that they were consistent and accurate.

c. Conclusions

The radioactive material and waste shipping procedures were consistent with regulatory requirements. However, the inspectors identified some problems and inconsistencies within and between procedures indicating the need for additional review of procedures.

R4 Staff Knowledge and Performance in RP&C

R4.1 RP&C Staff Work Hours

a. Inspection Scope (IP 83750)

On September 11, 1997, the NRC requested the licensee to review an incident where a RP technician may have exceeded the allowable hours of work. During this inspection, the inspectors reviewed the results of the licensee's evaluation of this issue and the licensee's actions for a similar incident which occurred on May 23, 1997.

b. Observations and Findings

During the licensee's review, the staff identified that an RP technician had exceeded the TS limits for overtime. On December 27, 1996, an RP technician was stationed in the control room to monitor the AR/PR console, a safety-related activity. During this period of time, the individual had worked for 24 hours and 50 minutes in a 48-hour period (between 6:30 pm on December 25, 1996 and 6:30 pm on December 27, 1997). On the date of the occurrence, the licensee identified the issue and initiated a CR (CR No. 1-96-12-242). The individual and the RP shift supervisor were counseled on the event, and the RP department issued a notice to all RP staff of the incident.

On May 23, 1997, the RP staff identified another incident concerning an RP technician who had exceeded the allowable hours of work. This individual had volunteered for overtime to perform a 12-hour shift on May 23, 1997, not realizing that (s)he had already worked 12-hour shifts on the previous 6 days. On May 23, 1997, the RP technician was performing routine RP coverage and support. At about 12:00 pm, the RP technician realized that (s)he had worked more than 72 hours in a 7-day period and reported the condition to the RP shift supervisor. The RP shift supervisor evaluated the individual, determined that (s)he was fit for duty, allowed the individual to return to work, and initiated a condition report (CR no. 1-97-05-280) for the incident. The RP shift supervisor counseled the individual; however, the staff did not take any additional actions to prevent future occurrences. The RP manager planned to review the incidents and to take additional corrective actions, if necessary.

The inspectors discussed the incidents with licensee management and stressed the repetitive nature of the incidents. Plant representatives indicated that control of overtime was not limited to the RP&C organization and that a condition report had been written for an identified trend throughout the site. The control of work hours and overtime will be assessed and reviewed as part of the NRC 0350 Panel oversight of licensee improvement initiatives (URI No. 50-461/98002-04).

c. Conclusions

The licensee had identified problems concerning the control of work hours and overtime for RP&C personnel, which will be reviewed as part of the NRC 0350 Panel.

R6 RP&C Organization and Administration

The licensee had recently appointed a new individual to the position of Director - RP&C and designated the individual as the RP manager. The inspectors reviewed this individual's qualifications with respect to the requirements contained in ANSI standard ANSI/ANS-3.1-1978, "Selection and Training of Nuclear Power Plant Personnel," and the recommendations contained in Regulatory Guide 1.8 (Revision 2), "Qualification and Training of Personnel for Nuclear Power Plants." The individual had Bachelor of Science degrees in RP and human resources. Prior to entering the commercial nuclear industry, the individual had RP experience from the U.S. Navy and had been an RP instructor for 3 years. In the commercial nuclear power industry, the individual had been an RP technician for 3 years and had 3 additional years of professional-level, RP experience as a lead RP supervisor, lead health physicist, and assistant RP manager. Based on this academic background and professional experience, the inspectors concluded that the individual had met the requirements of ANSI/ANS-3.1-1978 and the recommendations contained in Regulatory Guide 1.8 for the position of RP manager.

R7 Quality Assurance in RP&C Activities

R7.1 Self Assessments of Radioactive Waste Management and Transportation

The inspectors reviewed the most recent audit of the radioactive waste management and transportation program (Audit No. Q38-97-13, performed on October 6 - 24, 1997). The inspectors found the audit to be of good depth and to be both compliance and performance based. The audit team found the radioactive waste program to be well implemented: the waste minimization program had improved, shipments of waste were properly conducted, and waste storage areas were in good condition. However, the audit identified weaknesses in the chemical control program and minor problems in the procedure and documentation associated with solid radioactive waste control. Based on discussions with RP&C staff, the staff understood the issues and had plans to resolve the problems in the chemical control program.

R7.2 RP&C Improvement Program Status

The inspectors discussed the status of RP&C improvement initiatives with the RP manager. The RP staff had begun a number of initiatives to improve radiation worker practices amongst plant staff. At the entrance to the RPA, an individual was stationed to ensure that personnel were knowledgeable of plant radiological conditions and understood certain RP policies and rules. In addition, the RP staff was beginning two initiatives to ensure RP responsibilities were understood by the plant work groups. The RP supervisor and members of the other plant groups were performing walkdowns of the RPA, together, to enable the other plant groups to better identify and correct RP problems and radiation worker practice issues. The RP staff also planned to assign an RP technician to each work group to educate and coach the work group in RP practices and to identify areas which could be improved. The RP manager expected these initiatives to improve radiation worker practices at the station and to better enable the other plant groups to understand their RP responsibilities.

R8 Miscellaneous RP&C Issues

R8.1 (Closed) Inspection Follow-up Item (IFI) No. 50-461/96012-05: The licensee investigated higher than expected dose rates in the containment traversing in-core probe (TIP) area and identified that the proximity sensors were not positioned correctly, which resulted in the TIPs being withdrawn past the normal storage location. The licensee planned to correct the positioning problem prior to startup.

On August 4, 1997, the licensee completed maintenance work request No. D7550 to properly relocate the proximity sensors at a distance of 6 inches to the drywell, as recommended in the original vendor diagrams. As part of the maintenance work request, the staff performed procedure CPS No. 8629.01 (Revision 35), "Traversing In-Core Probe (TIP) System Channel Calibration." This calibration ensured that the in-shield detector position light would indicate when the TIP detector was located in the center of the drywell wall. The inspector reviewed the data sheets and verified that the recorded "AS LEFT" condition was within the stated acceptance criteria. This item is closed.

R8.2 (Open) Violation (VIO) No. 50-461/96412-02133: Violation of procedure CPS No. 1024.02, "Radiological Work Control," concerning an unapproved sleeping/smoking area identified inside the RPA on November 22, 1996.

On August 26, 1997, the licensee identified an additional unauthorized sleeping/smoking area within the RPA. Based on this finding, the RP staff conducted an extensive search of general access areas within the RPA for evidence of sleeping/smoking areas. During this search, the staff identified an additional four areas which had some evidence of sleeping and/or smoking. The RP staff verified that radiation levels in these areas were less than 1 millirem per hour (mrem/hr) and that contamination levels were less than 1000 dpm per 100 cm^2. The RP staff performed selective searches in high radiation areas and did not identify any other similar areas.

Based on the additional areas, the licensee recognized that the problem was more widespread than originally believed and implemented the following additional corrective actions:

- the licensee communicated management's expectation concerning this issue to the plant staff via hand-outs, employee news letters, and meetings with plant personnel;
- the RP staff planned to implement a routine annual and biennial surveillance to verify that no new areas have been established;
- the licensee revised (September 10, 1997) the "Clinton Power Station Radiation Worker Training Student Handbook" to describe the issue and the associated radiological risks; and

- the licensee revised the "Nuclear Program - General Work Rules," to clearly prohibit sleeping, eating, drinking, and smoking in the RPA.

Since the licensee could not determine when these areas were established, the inspectors concluded that these areas may have existed at the time of the original violation but had only recently been identified. Based on this, these areas were determined to be additional examples of the original violation, and, consequently, an additional notice of violation will not be issued. However, the effectiveness of the licensee's corrective actions will be reviewed in subsequent inspections.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on January 9, 1998. The licensee acknowledged the findings presented and did not identify any proprietary information.

PARTIAL LIST OF PERSONS CONTACTED

G. Baker, Manager - Quality Assurance
L. Baker, Engineering
J. Barren, Director - Plant Engineering
M. Dodds, Supervisor - Radiological Operations
G. Hall, RP&C
E. Juteau, RP&C
M. Lyon, Assistant Plant Manager - Operations
J. Place, Director - RP&C
J. Ramanuja, Supervisor - Health Physics Group
W. Romberg, Assistant Vice President & Plant Manager
J. Sipek, Director - Licensing
M. Stickney, Supervisor - Regulatory Interface
R. Wyatt, Assistant Manager

INSPECTION PROCEDURES USED

IP 83750	Occupational Radiation Exposure
IP 84750	Radioactive Waste Treatment, and Effluent and Environmental Monitoring
IP 86750	Solid Radioactive Waste Management and Transportation of Radioactive Materials

ITEMS OPENED, CLOSED OR DISCUSSED

Open

50-461/98002-01	NCV	Failure to ensure that security personnel were respirator qualified, as required by the Emergency Plan (Section R1.1).
50-461/98002-02	URI	Review of previous AR/PR monitor calibrations to determine if any required calibrations or functional checks were not performed within required frequency (Section R2.1).
50-461/98002-03	URI	Determine licensing basis and requirements for the AR/PR console (Section R2.1).
50-461/98002-04	URI	Review of licensee's control of personnel hours of work (Section R4.1).

Closed

50-461/96012-05	IFI	Unexpected dose rates in drywell (Section R8.1).
50-461/98002-01	NCV	Failure to ensure that security personnel were respirator qualified, as required by the Emergency Plan (Section R1.1).

Discussed

50-461/96412-02133	VIO	Failure to adhere to RP procedures (Section R8.2).

LIST OF ACRONYMS USED

ALARA	As-Low-As-Is-Reasonably-Achievable
ANSI	American National Standards Institute
AR/PR	Area and Process Radiation Monitoring
ARM	Area Radiation Monitor
CAM	Continuous Air Monitor
DAC	Derived Air Concentration
DAW	Dry Active Waste
DPM	Disintegrations Per Minute
ECS	Engineering Control Specialist
HVAC	Heating Ventilation and Air Conditioning
IFI	Inspection Follow-up Item
LSA	Low Specific Activity
MDC	Minimum Detectable Concentration
NCV	Non-Cited Violation
ODCM	Offsite Dose Calculation Manual
ORM	Operational Requirements Manual
PRM	Process Radiation Monitor
RP	Radiation Protection
RPA	Radiologically Posted Area
SCBA	Self Contained Breathing Apparatus
SGTS	Standby Gas Treatment System
SPDS	Safety Parameter Display System
TIP	Traversing Incore Probe
TS	Technical Specifications
URI	Unresolved Item
VIO	Violation

LIST OF DOCUMENTS REVIEWED

Air Activity Data Sheets [97-721; 97-722; 97-725] and corresponding Radiological Survey Sheets and Radiological Operations Respiratory Protection Evaluation Worksheets.

Breathing Air Sample Data Sheets (dated 12/19/97; 10/28/97; and 6/30/97).

Clinton Emergency Plan.

Condition Reports: CR Nos.

1-97-07-249, "Expired Calibration of Process Radiation Monitors"
1-97-08-157, "Failure to perform sections 8.2.2 and 8.3.2 of CPS 9911.24 prior to declaring monitor operable."
1-97-08-186, "Monitor being treated as OPERABLE with a lapsed Channel Functional Test."
1-97-09-231, "INOPR AR/PR monitor placed in service and violation of CPS7410.75 and safety 'NEAR MISS'"
1-97-10-041, "Failure to complete CPS 9911.24 after placing 0RIXPR002 and 0RIXPR004 in service"
1-97-10-299, "Area Radiation Monitor 1RIX-AR019 Declared Operable With Lapsed Surveillance"
1-97-10-474, "Degradation of the AR/PR System"
1-97-10-475, "Scheduling Deficiencies for PMs PCIPRA011, PCIPRA010, and PCIARM11
1-97-10-477, "Scheduling PM after late date."
1-97-11-032, "A Lapse in Security/ERO Respiratory Protection Qualifications"
1-97-11-451, "Apparent Violation of SPDS Commitment"

December 30, 1997 memorandum from Linden Baker to various plant managers transmitting "AR/PR System Status."

Emergency Plan Implementing Procedure AP-05 (Revision 7), "Emergency Preparedness Training Program."

Emergency Planning Training Program Description (Revision 29).

Form No. CPS No. 1014.06F001 (Revision 0), "Operability Determination," for the Main Control Room AR/PR Central Control Terminal, dated December 30, 1997 (OD No. 1-97-12-381-OD).

Form No. CPS No. 7013.11F001 (Revision 4), "RADMAN, RAMSHP, or TRASHP Operation and Database Maintenance Form," for the following waste streams: spent resin, dated May 13, 1997; waste sludge, dated July 17, 1997; phase separator sludge, dated August 14, 1997; dry active waste, dated October 2, 1997; concentrated waste, dated October 21, 1997; and fuel pool sludge, dated November 14, 1997.

Form No. CPS No. 8629.01D001 (Revision 35), "Traversing In-Core Probe (TIP) System Channel Calibration Data Sheet," for channel D (performed on July 22, 1997), for channel C (performed on July 22, 1997), for channel B (performed on July 22, 1997), and for channel A (performed on July 22, 1997).

Form No. CPS No. 9911.24D001 (Revision 38), "AR/PR Shiftly/Daily Surveillance Data Sheet", completed on January 6, 1998.

Hydrostatic Cylinder Tests (dated 7/8/97; 7/7/97; 7/3/97; 5/15/97; 4/18/97; and 4/17/97).

July 22, 1996 letter from Ken Cowan, MSA, to George Hall, Clinton Nuclear Plant, transmitting various repair and maintenance training credentials.

Maintenance work request package No. D7550, dated August 4, 1997.

Monthly SCBA Inspections (dated 12/97; 11/97; 10/97; and 9/97).

Nuclear Assessment Audit Report #Q38-96-01; dated 1/26/96.

1996 Respiratory Protection Program Evaluation.

Procedures: CPS Nos.:

1001.10 (Revision 6), "Control of Working Hours;"
1005.15 (Revision 0), "Procedure Use and Adherence;"
0024.06 (Revision 2), "Respiratory Protection Program,"
0024.10 (Revision 8), "Conduct of Radiation Protection Personnel;"
1668.00 (Revision 9), "Process Control Program;"
7013.11 (Revision 4), "RADMAN, RAMSHP, And TRASHP Operation and Database Maintenance;"
7013.12 (Revision 3), "Shipment of Radioactive Material;"
7013.13 (Revision 2), "Shipment of Radioactive Waste;"
7013.16 (Revision 1), "Packaging of Non-Waste Radioactive Material;"
7013.40 (Revision 5), "10 CFR 61 Compliance Program;"
7100.03 (Revision 0), "Engineering Controls Evaluation;"
7600.08 (Revision 0), "Routine Use of Service Air for Breathing Air;"
7600.09 (Revision 0), "Operation of the MST Air Filtration Unit;"
7600.10 (Revision 1), "Breathing Air Sampling;"
7600.11 (Revision 0), "Issuance of Respiratory Protection Equipment;" and
8629.01 (Revision 36), "Traversing In-Core Probe (TIP) System Channel Calibration."

Radiation Protection Policy Statement 94-03 (Revision 0), "Types of Ingestion Hazards Recognized at CPS."

Radiation Protection Standing Order (RPSO) - 024 (Revision 0), "Radioactive Waste Activity Determination."

Radiological Engineering Evaluation No. 93-021, "Technical Basis for Worker Utilization Factor Incorporating Inefficiencies Associated with Use of Respiratory Protection."

Radiological Technical Evaluation No. 95-003-IN (Revision 0).