U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-155/88004(DRSS)

Docket No. 50-155 License No. DPR-6

Licensee: Consumers Power Company
212 West Michigan Avenue
Jackson, MI 49201

Facility Name: Big Rock Point Nuclear Plant

Inspection At: Big Rock Point Site, Charlevoix, Michigan

Inspection Conducted: February 1-5, 1988

Inspector: W. J. Slawinski 3-1-88
Date

Accompanying
Inspector: M. A. Kunowski

Approved By: L. Robert Greger, Chief 3-1-88
Facilities Radiation Protection Section Date

Inspection Summary

Inspection on February 1-5, 1988 (Report No. 50-155/88004(DRSS))
Areas Inspected: Routine, unannounced inspection of the radiation protection program including maintenance outage activities. Areas inspected included: organization and management controls (IP 83722); training and qualifications (IP 83723, 83729); outage planning and preparation (IP 83729); external and internal exposure controls and personal dosimetry (IP 83724, 83725); facilities and equipment (IP 83727, 83729); contamination control (IP 83726, 83729); the ALARA program (IP 83728, 83729); radiation work permit program (IP 83724); transportation activities (IP 86721) and audits and appraisals (IP 83722, 83729). Also reviewed were past open items (IP 92701), an allegation concerning the radiation protection program, and spent fuel pool liner leakage issues (IP 92705).
Results: The licensee's radiation protection program continues to be effective in protecting the health and safety of occupational workers. No violations or deviations were identified. One unresolved item was identified pertaining to the absorber thickness used with personal dosimetry (Section 7).

DETAILS

1. Persons Contacted

C. Abel, Production and Performance Superintendent
M. Acker, Senior Engineer/ISI Coordinator
*R. Alexander, Technical Engineer
**J. Beer, Chemistry/Health Physics Superintendent
*R. Burdette, Senior Health Physicist
*T. Elward, Plant Manager
*R. Garrett, Chemistry/Health Physics Supervisor
*T. Hancock, Chemistry/Health Physics Engineer
D. Johnson, Health Physics Specialist
*L. Monshor, Quality Assurance Superintendent
*J. Werner, ALARA Coordinator and Chemistry/Health Physics Supervisor
F. Wilcenski, Quality Control Inspector

S. Guthrie, NRC Senior Resident Inspector

The inspectors also contacted other licensee personnel in the Operations and Chemistry/Health Physics (C/HP) Departments.

*Denotes those present at the exit meeting on February 5, 1988.

**Denotes those contacted by telephone between February 12 and March 1, 1988.

2. General

This inspection was conducted to review the operational radiation protection program during a limited maintenance outage, including organization and management controls, training and qualifications, planning and preparation for outages, external and internal exposure controls, contamination control, the ALARA program, transportation of radioactive materials, and audits and appraisals. Also reviewed were open items, an allegation related to the radiation protection program, and spent fuel pool liner integrity. The inspectors conducted independent, direct radiation and contamination surveys of selected plant turbine building and sphere areas using an NRC survey instrument; survey (smear and direct) results were in general agreement with posted licensee data. Observations made during tours of plant areas, including the desirability to improve housekeeping, are discussed in Section 17.

3. Licensee Action on Previous Inspection Findings (IP 92701)

(Closed) Open Item (155/86009-01): Radiological Incident Report corrective action documentation not comprehensive. Documentation of corrective actions for radiological incident reports has improved (Section 13).

(Open) Open Item (155/86009-02): Review revised Radiation Work Permit (RWP) program. The RWP program has been substantially changed and is undergoing early stages of implementation. This matter will remain open pending review of program implementation and effectiveness during a major outage (Section 12).

(Closed) Open Item (155/87012-01): Review documentation of C/HP technicians successful completion of on-the-job (OJT) training practical factor tasks including methodology for transferring previously completed tasks onto a revised list. The licensee has developed and implemented a systematic method for transferring previously completed tasks onto a revised (more specific) list. This matter is considered closed.

(Closed) Open Item (155/87012-02): Review availability of friskers in the sphere, type of friskers employed, and worker adherence to frisking policies. The licensee has reinstalled a hand-held frisker at the 585-level of the sphere to allow detection of gross contamination and has purchased two state-of-the-art whole-body friskers for use at access control areas. The new friskers are expected to be fully operational by March 1988 (Section 9).

(Closed) Open Item (155/87012-03): Review radiological aspects of February 13, 1987 outdoor waste hold tank overflow incident. Approximately 25 gallons of liquid overflowed down the side of the tank to the asphalt tank pad and froze. About one gallon ran off the pad and onto the ground. The frozen liquid was melted and absorbed in Oildri and the contaminated soil was excavated. The absorbent material and excavated dirt were disposed as radioactive waste at a licensed burial site. The radiological aspects of the event were reviewed; no problems were noted.

(Closed) Open Item (155/87012-04): Improve administrative controls over high radiation area keys. Administrative Procedure No. 5.8 has been revised to transfer high radiation area key custody and control from the shift supervisor to the C/HP supervisor or designee. During outages and for instances where high radiation areas are kept open for several shifts or days, key responsibility may be transferred to other authorized individuals after approval of the C/HP supervisor and log book entry. The operations department has been permanently issued three high radiation area keys for the performance of their routine duties. The policy changes and operations department responsibility are specified in a draft revision to Administrative Procedure 2.1.4. In addition, all high radiation area door key cores were recently changed. This matter is considered closed.

(Closed) Open Item (155/87012-05): Review the need to improve methods for soliciting ALARA recommendations. The licensee has recently established on ALARA committee and continues to solicit ALARA suggestions via an "ALARA Problem Report" (Section 11).

4. Organization and Management Controls (IP 83722)

The inspectors reviewed the licensee's organization and management controls for the radiation protection and ALARA programs including changes in the organizational structure and staffing, management techniques used to implement the program, and experience concerning self-identification and correction of program implementation weaknesses.

The overall C/HP Department organizational structure remains essentially as previously described (Inspection Report No. 50-155/87012). The responsibility for the external dosimetry program has been transferred from the ALARA Coordinator to the C/HP Engineer. A Health Physics Specialist providing administrative support for the dosimetry program now reports to the Engineer. A new ALARA Coordinator has been appointed; this change is detailed in Section 11.

The station's C/HP technician staff has been reduced from its full complement of twelve persons to ten. One technician was involved in an auto accident in July 1987 and is not expected to return, another has recently transferred to one of the licensee's fossil plants. These individuals averaged about 2.5 years relevant technician experience each. The licensee does not plan to fill the vacancies in the near future and will operate the routine program with ten technicians. The permanent technician staff now consists of six Senior Technicians, two Technicians II's, and two Technician I's. The station has conducted the routine radiation protection program with 12 technicians for several years. According to the licensee, an experienced contract technician may be hired to supplement the current staff if necessary, and during major maintenance/refueling outages, the staff will continue to be augmented with contract technicians (Section 6). Limited outages, including the current one-week outage to replace recirculation pump seals, are covered by the permanent technician staff. The staff reduction does not degrade the average experience level of the C/HP technicians; however, it could strain technician availability for job coverage during peak work periods and reduce the overall effectiveness of the radiation protection program. These matters were discussed at the exit meeting and will be reviewed during future inspections (Open Item No. 155/88004-01).

The licensee continues to implement the Health Physics Department Functional Surveillance Program previously described in Inspection Report No. 50-155/87012. Since then, four surveillances have been completed and a few others have been initiated. The completed surveillances included reviews of sealed source inventory and control, computer software and procedures for the operation of the gamma spectroscopy system, and radwaste shipments. No significant problems were identified in the surveillance reports; however, recommendations to improve administrative and documentation deficiencies were noted. These recommendations appear to be adequately implemented but continue to be poorly documented. The desirability of improving this documentation was discussed with the licensee.

No violations or deviations were identified.

5. Training and Qualifications (IP 83723, 83729)

The inspectors reviewed portions of the training and qualification aspects of the licensee's radiation protection program, including changes in the program and methods, qualifications of newly promoted radiation protection personnel, and provisions for appropriate radiation protection training of station and contractor personnel.

In October 1987, an on-site INPO audit was conducted to review the C/HP technician training program. Two problems were identified and have supposedly been corrected by the licensee. One problem concerned the inadequate identification of certain knowledge standards for the OJT task qualification program. To address this finding, the licensee revised 60 of 80 OJT task standards to provide specific and measurable criteria to evaluate trainees. INPO accreditation of the C/HP technician training program is expected in 1988.

All permanent C/HP technicians are considered "qualified in radiation protection procedures" and also meet ANSI N18.1-1971 experience requirements for technicians in responsible positions. Two technicians were recently upgraded from Technician I to Technician II.

The inspectors reviewed aspects of the orientation program provided to Field Maintenance Services (FMS) and contract maintenance workers. In addition to general employee and radiation worker training, these workers complete a one-day orientation program which includes maintenance and administration, material control/stockroom, outage orientation, health physics and ALARA. The orientation program familiarizes the worker with plant-specific, primarily administrative information relative to maintenance activities.

The inspectors also reviewed the training program tentatively planned for contract C/HP technicians prior to the 1988 maintenance/refueling outage. After the selected technicians arrive on-site, they are required to complete general employee and advanced radiation worker training, asbestos and confined space training, general and specific plant C/HP procedure reviews, and OJT task training and practical factors evaluations. The licensee plans to formalize the OJT task qualification portion of the training and document successful task completions similar to methods employed for permanent (house) technicians. This has not been done for previous outages.

Selection of contracted C/HP technicians includes a review of technician resumes and usually an interview with the radiation protection organization of the plant where the technician previously worked. The licensee anticipates hiring only contract technicians which meet ANSI N18.1-1971 experience requirements. Also, approximately 70% of the contract technicians anticipated to be hired for the 1988 outage have worked at the station during previous outages. The anticipated experience level and high rate of returning technicians appears indicative of a reliable contract staff.

No violations or deviations were identified.

6. Planning and Preparation (IP 83729)

The inspectors reviewed the planning and preparation performed or planned by the licensee for the 1988 refueling outage, including: additional staffing, training, and increased equipment and supplies.

The station plans to augment its C/HP Department with ten contract senior (greater than two years applicable experience) technicians. The licensee also plans to hire their former ALARA Coordinator to assist with RWP and ALARA planning. Additional, large-sized protective clothing has been purchased to prevent clothing shortages which may have existed during previous outages (Inspection Report No. 50-155/87012).

No violations or deviations were identified.

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

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

The inspectors reviewed the licensee's dosimetry program to verify compliance with NRC requirements on Form NRC-5, which specifies that whole-body doses be determined using a maximum absorber thickness of 1000 mg/cm^2 when eye protection of at least 700 mg/cm^2 is worn. If no eye protection is provided, whole-body doses must be determined using a maximum absorber thickness of 300 mg/cm^2 or less. The licensee's primary dosimetry system is the Teledyne Radi-Guard PB-3 thermoluminescent (TL) dosimeter. According to the licensee, the TL material is divided into four zones over which there are one or more of five types of absorber material. Zone 1 is covered with 7 mg/cm^2 of mylar, Zone 2 is covered with 830 mg/cm^2 of plastic and teflon, and Zones 3 and 4 with 1000 mg/cm^2 of plastic, aluminum, and slotted copper. Licensee representatives stated that whole-body dose is determined using the zones covered by the 1000 mg/cm^2 absorber. Safety glasses are provided to persons in radiologically controlled areas; however, licensee representatives estimated that the glasses have an absorber thickness of approximately 250-300 mg/cm^2. Pending NRC evaluation of information provided by the licensee's corporate office for a similar issue at the Palisades Nuclear Generating Plant (Inspection Report No. 50-255/87005), this matter is considered unresolved (Unresolved Item 50-155/88004-02).

Exposure records for plant and corporate personnel for 1987 and 1988 to date were selectively reviewed. No problems were identified. Licensee representatives stated that no administrative dose limits have been exceeded in 1987 and 1988 to date. The licensee estimates that the total dose for 1987 is 200 person-rems, essentially matching their projected

total. For 1988, which will include a refueling outage, the licensee projects a 190 person-rem total. Currently, approximately 200 persons are badged, with an additional 50-60 persons to be badged for the upcoming refueling outage.

The inspectors also reviewed the licensee's revised dose tracking program instituted in late 1987. The program allows access to dose information using worker social security numbers, dates, and various parameters in the revised RWP numbering system including RWP number, work group, job function, and plant location. Dose values from TLD processing and daily and weekly pocket dosimeter RWP logs are entered into the program data-base by the dosimetry clerk. The capability of the program was demonstrated to one of the inspectors, and aside from a slow data sorting speed, the program is a positive addition to the station's radiation protection program.

No violations or deviations were identified.

8. Internal Exposure Control and Assessment (IP 83725)

The inspector reviewed the licensee's internal exposure control and assessment programs, including: changes in facilities, equipment, personnel, and procedures affecting internal exposure control and personal assessment; determination whether assessment of individual intakes meet regulatory requirements; required records, reports, and notifications; effectiveness of management techniques used to implement these programs; and experience concerning self-identification and correction of program implementation weaknesses.

The licensee's whole-body counting program is similar to that of Palisades Nuclear Generating Plant (Inspection Report No. 50-255/87030), except that Big Rock uses only one whole-body counter. The inspectors reviewed records of whole-body counts performed in 1987 and in 1988 to date; no problems were identified. No results exceeding the 40 MPC-hour control measure were noted. In addition, the licensee reported that there have been no uptakes exceeding 1% Maximum Permissible Body Burden.

No violations or deviations were identified.

9. Facilities and Equipment (IP 83727, 83729)

The inspectors toured radiation protection facilities, observed equipment in use, and discussed plans for improving facilities including plans to expand radiologically controlled area (RCA) egress points.

The licensee recently purchased two Eberline Model PCM-1B whole-body contamination monitors to replace the hand-held friskers currently used at access control. One of the new monitors was made operational on a trial basis for a few days in early 1988 and was disconnected after apparently experiencing false positive alarms. The monitors' manufacturer is scheduled for a site visit in mid-February 1988 to assist the licensee

in resolving the operational problems. The licensee has not attempted to set-up the second unit but plans to do so for comparison studies. Conventional hand-held friskers will continue to be used until whole-body frisker operational problems are resolved. This is expected prior to the 1988 refueling outage scheduled to commence in April.

As previously described (Inspection Report No. 50-155/87012), all RCA egress is currently through access control only, unless specifically authorized by the C/HP Department. According to the licensee, one whole-body frisker will be maintained at the existing (primary) access control point and the other is planned to be installed at a new (second) control point, which will be setup in an area currently used as a stockroom for non-radioactive material. The licensee plans to modify and extend the RCA into the former stockroom area to accommodate the frisker. The primary access control point is adjacent to and clearly visible from the usually manned C/HP technician office. The proposed second access control point will probably not be manned; however, the licensee is considering modifying the frisker's alarm to also sound remotely in the C/HP technician office. The facility modifications are anticipated to commence in early 1988 and be completed later that year. The inspectors alerted the licensee to the potential radiological control problems associated with unmanned RCA egress points.

Protective clothing is laundered (wet-washed) and surveyed for contamination by a janitorial staff member. Hand-held pancake friskers are used for the survey. The janitor is reportedly trained in the proper use of survey instruments and monitoring techniques. PC release criteria are defined in Section VI of the licensee's Corporate Radiation Safety Plan which specifies that the permissible radiation level for laundered cloth items (e.g., coveralls and hoods) is less than 3 mR/hr in a folded storage geometry. In addition, Big Rock has instructed their workers not to release PCs for further use if surveys indicate greater than 10,000 cpm on the surface of unfolded clothing. When geometry considerations and survey techniques are factored in, this method of monitoring may not detect hot particles of sufficient activity to produce substantial skin doses. The licensee has no immediate plans to alter the current methods or equipment employed for PC laundering and monitoring. Although the laundry program appears to be adequate, improvements are desirable. This aspect of the radiation protection program is subject to further review.

10. Control of Radioactive Materials and Contamination (IP 83726, 83729)

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

Inspector observations at sphere egress and RCA control points indicate that workers are properly frisking. No problems were noted.

a. Personal Frisking

As discussed in Section 9 above, the licensee has received two state-of-the-art whole-body contamination monitors which are planned for use at RCA access control points. A shielded frisking station, employing a conventional hand-held frisker, is located in the sphere at the 585-level to allow detection of gross contamination after exiting contaminated areas in the vicinity. A similar frisking station is located immediately outside the sphere's personnel hatch. The primary and currently sole RCA access control point is located adjacent to the C/HP technician office after exiting the Turbine Building. Individuals who worked in or visited a posted contamination area are required to perform a whole-body frisk; others who entered the RCA but not a posted contamination area are required to frisk, at least, the hands and feet.

The licensee anticipates one of the new whole-body frisker units to be fully operational prior to their 1988 refueling outage. According to the licensee, the unit's contamination alarm will be set at a threshold of 5,000 dpm (2.25 nCi) relative to Co-60. This detection capability is achieved using an extended 30-second count time. The licensee has nearly completed draft procedures for operation and calibration of the unit. These procedures were reviewed by the inspectors and discussed with the C/HP Superintendent; no problems were noted. The licensee plans to train all C/HP technicians and other health physics personnel on specific use and calibration of the monitor and issue a memorandum to other plant staff regarding monitor installation and general use. Training, alarm setpoints, and relevant use, quality control, and calibration procedures for the monitor will be reviewed during a future inspection (Open Item 155/88004-03). This matter was discussed at the exit meeting.

b. Personnel Contamination/Hot Particle Incidents

The inspectors selectively reviewed Personnel Contamination Reports (PCRs) for 1987. The licensee reports all skin contaminations exceeding 100 cpm above background and tracks the data for ALARA purposes. There were ten personnel skin contamination incidents reported for the last eight months of 1987. Sixty-nine PCRs were recorded for January to April 1987, coincident with the 1987 refueling outage (Inspection Report 50-155/87012). In addition, the licensee has begun recording and tracking clothing contaminations using the 100 cpm threshold. Since October 1987, ten clothing contamination incidents have been recorded, mainly involving shoe contamination. To date, the licensee's procedure on personnel contamination has not been modified to include clothing contamination; however a working form is being used to record information and will be incorporated into the procedure at a later date.

The licensee's policy on skin dose determination and hot particles is defined in Section VI of the corporate Radiation Safety Plan. The plan requires a skin dose determination if skin contamination

levels greater than approximately 10,000 cpm are observed regardless of area over which the contamination is spread or the uniformity of contamination. To calculate skin dose, the licensee uses measured values from Eberline Model RO2/RO2A dose rate meters or count rate meters employing Model HP210/260 probes and averages the dose over 10 cm^2 instead of the more conservative value of 1 cm^2 advocated in NRC IE Information Notices No. 86-23 and No. 87-39. For purposes of showing compliance with 10 CFR 20.101(a), calculating a skin dose averaged over 1.0 cm^2 at a depth of 7 mg/cm^2 is appropriate. To date, the licensee has reportedly not needed to calculate skin dose from excessive uniform contamination or from hot particles; however, according to a licensee representative, several hot particles have been found on the reactor deck. Operation of the new state-of-the-art contamination monitors should increase contamination detection capabilities. The licensee's corporate office is reevaluating their skin dose calculation methodology. This matter will be reviewed further during a future inspection. (Open Item No. 155/88004-04). In September 1987, all C/HP staff received training on NRC Information Notice No. 87-39 and the related INPO Significant Event Report 18-87. In February 1988, operators, who are advanced rad workers will receive training on hot particles during the mandatory 2-year advanced radiation worker refresher training and the corporate health physics staff plans to provide additional related training to the C/HP staff. The inspectors discussed the desirability of providing instructions and general information concerning hot particles to other members of the plant staff.

c. Resurfacing of Reactor Deck

The licensee initiated a reactor deck resurfacing project in an effort to reduce the number of personnel contamination events that occur during refueling activities. To date, the deck's old enamel surface coating has been stripped, concrete has been patched, and expansion joints filled. The deck, which reportedly has not been totally resurfaced since the 1960's, will be recoated with an epoxy. The project is expected to be completed prior to the 1988 refueling outage.

No violations or deviations were identified.

11. Maintaining Occupational Exposures ALARA (IP 83728, 83729)

The inspectors reviewed the licensee's program for maintaining occupational exposures ALARA, including: changes in ALARA policy and procedures; ALARA considerations for maintenance and refueling outages; worker awareness and involvement in the ALARA program; establishment of goals and objectives, and effectiveness in meeting them. Also reviewed was management techniques use to implement the program and experience concerning self-identification and correction of implementation weaknesses.

In late 1987, the ALARA Coordinator, who had been in this position for several years, retired and a new coordinator was appointed. The new ALARA Coordinator has about 13 years plant health physics experience including the last five years as a station C/HP Supervisor. The individual appears to have the knowledge, experience, and dedication to conduct an effective ALARA program. However, the formal ALARA program is staffed only by the ALARA Coordinator, no other personnel are assigned direct responsibilities under this program. Also, approximately 20-30% of the individual's time is allotted to C/HP Supervisor duties and about 10-15% to job coordination. To address concerns regarding the apparent need for increased ALARA staffing during outages (Inspection Report No. 50-155/87012), the licensee plans to contract their former ALARA Coordinator to assist in the 1988 refueling outage. It also appears desirable to permanently devote additional manpower to the ALARA program.

In January 1988, the station formed an ALARA Committee with members from maintenance, I&C, health physics, operations and engineering staffs. The committee plans to meet monthly to discuss methods of dose reduction and act as spokespersons for their respective departments. The initial committee meeting is scheduled for February 1988.

The licensee's Midland Training Center together with the Palisades Station has developed a formal "ALARA Engineering" training program for health physics, engineering, maintenance, and other interested supervisory staff members. The course is scheduled to take three days and will be initially offered in February 1988. The station plans to have 30-40 plant personnel attend the course in 1988.

The inspectors reviewed the ALARA aspects of the recirculation pump seal replacement job performed during this inspection and interviewed maintenance workers and radiation protection staff members participating in the job. No problems were noted. The job was projected to expend 3.4 person-rems to the six maintenance workers involved; actual exposure was 2.6 person-rems (another 2.1 person-rems was received by supervisory, technical, and C/HP persons assigned to the job). A similar pump seal replacement job performed in 1985 by four maintenance persons resulted in 5.2 rem total dose; however, portions of that job were repeated because of maintenance-related problems. In 1980, a similar pump seal job performed by two experienced repairmen resulted in 2.0 rem. The 1988 seal replacement job was performed by plant maintenance workers assisted by a corporate pump specialist. Previous jobs were performed primarily by pump vendor specialists. Exposure reduction measures included surface wetting to reduce potential airborne problems and partial flooding of the pump housing to reduce external radiation levels. Continuous radiation protection coverage was provided by two C/HP technicians. Both pre-job ALARA and maintenance briefings were conducted. The inspectors attended one of the maintenance briefings where seal replacement procedures and aspects of pump design were discussed. ALARA considerations appeared to be adequately addressed for this job.

As previously described (Inspection Report No. 50-155/87012), overall ALARA program weaknesses stem from inadequacies in the RWP program and apparent lack of sufficient ALARA staffing. During the inspector's

review of the ALARA program and discussions with licensee personnel, the inspector found that ALARA job history files have not been extensive, thorough, and comprehensive enough to be an effective tool for planning future jobs. ALARA documentation did not adequately reflect the effort expended in pre-and post-job reviews and discussions, job specific planning, and problems encountered. In the past, RWP exposure data for completed jobs was not easily assembled and significantly delayed ALARA planning for upcoming similar jobs. The time spent in accumulating and manipulating data reduced the overall effectiveness of the ALARA program. To address this problem, the licensee has made several changes/improvements to their existing computer dose tracking program (Section 7). This coupled with continued expansion of the ALARA photo library, initially assembled in 1987, and creation of the aforementioned training program and ALARA Committee, is expected to improve the overall program effectiveness.

No violations or deviations were identified.

12. Radiation Work Permit (RWP) Program (IP 83724)

As previously described (Inspection Report No. 50-155/87012), the licensee identified a general weakness in the implementation of the RWP program and formed a task force to improve the system. In October 1987, an overhauled RWP system was implemented. Two basic RWP types or classifications exist; the General RWP and the Standard RWP. The General RWP is used for the performance of routine duties such as operator rounds, observations and inspection, laundry operations, valve lineups and work assignment evaluation for a maximum period of six months. A Weekly Entry Log is included in the RWP package and exposure data is entered by the worker at least once per day. The Standard RWP is used for the performance of a specific job in a specific location or area for a maximum period of 30 days and will be modified on the basis of significant changes in radiological conditions. A Daily Entry Log is included in the RWP package and normally is used unless the job extends into several days or a week.

Initial RWP approval is provided by the C/HP Supervisor and if necessary, forwarded to the ALARA Coordinator for review. The back of the RWP exposure entry logs specify the dosimetry and radiation protection requirements for the job and any related additional comments. These requirements are normally specified by the C/HP technicians and can be changed by them without specific C/HP Supervisor approval, as radiological conditions dictate. Under the old RWP system, such changes required approval. Workers initial the entry log form indicating they understand the radiological conditions of the RWP and will comply with the requirements. In most cases, the radiological conditions and radiation protection requirements for the job are explained to each worker by a C/HP technician. This differs from the previous RWP program which required workers to independently read the RWP and initial the entry log; no job specific explanations were provided unless requested by the worker. The revised program should prevent worker misunderstandings concerning the radiation protection requirements for a job; this was identified by the licensee as a previous weakness.

The inspectors selectively reviewed RWPs generated from October 1987 to date. No significant problems were noted. The effectiveness and workability of the revised RWP program will be better determined during the station's 1988 refueling outage. This matter will continue to be reviewed.

No violations or deviations were identified.

13. Radiological Incident Reports (RIRs) (IP 83722)

The inspectors reviewed the licensee's program for recording and investigating radiological incidents, this included a review of the two RIRs generated since the previous NRC inspection (Report No. 50-155/87012). During a 1986 inspection (Report No. 50-155/86009), the inspector noted that corrective action documentation for radiological incident reports (RIRs) was not always comprehensive. These documentation weaknesses have improved and the licensee appears to be adequately documenting RIR corrective actions.

No violations or deviations were identified.

14. Transportation of Radioactive Materials (IP 86721)

The inspectors reviewed two recent problems with casks used for shipping irradiated-contaminated reactor components. These problems are discussed below:

a. Cask Model 1-13G

On January 26, 1987, while assisting in the decontamination of a Chem-Nuclear Systems, Inc., Model CNS 1-13G shipping cask, a licensee maintenance person observed liquid leaking from a circumferential crack in the bottom of the cask. The cask had been stored in the spent fuel pool and loaded with a liner containing irradiated hardware. The licensee was decontaminating the cask after removing it from the pool in preparation for transfer of the cask to a burial site. After discovery of the leak, the cask was removed from service by the licensee pending further evaluation. On January 27, 1987, non-destructive testing of the cask by a licensee contractor indicated five cracks in the base of the cask. The licensee then returned the cask to spent fuel pool, using a vendor-provided support for the base of the cask, where the liner was removed from the cask. The cask was then removed from the pool, and drained, decontaminated, and shipped (on February 2, 1987) to the vendor for evaluation. As required by 10 CFR 71.95(a), the licensee reported the incident to the NRC. In April 1987, Chem-Nuclear Systems (CNS) submitted information from their evaluation to the NRC. Based on the evaluation, CNS suggests that the cracks in the cask resulted from a combination of "ice-plug" expansion and weld failure. The ice-plug expansion apparently occurred because water had accumulated in the annulus between the outer stainless steel sheet and the inner lead shield and froze while the cask was enroute to or was stored at the

Big Rock Point plant. Spectrometric analysis of samples of the stainless steel weld filler-material indicated excessive lead in the failed weld. CNS believes that the lead contamination in the weld material was sufficient to reduce the strength of weld, and in concert with the expansion pressure of the ice, resulted in the failure of the weld. The weld on the defective cask was repaired by CNS and examination of five other casks of the same design indicated no similar problem.

On October 23, 1987, NRC issued Certificate of Compliance No. 9216 to CNS that redesignated the model number of the cask, concurred with the results of the CNS evaluation, and approved the modifications to the cask and the revisions to maintenance procedures performed by CNS. Formerly, cask Model CNS 1-13G had been designated as General Electric Model 1600.

No problems were identified with the actions taken by the licensee.

b. Cask Model 1-13C

On June 8, 1987, a representative of the Barnwell, S.C., low level radioactive waste disposal facility notified the licensee that external contamination in excess of DOT limits was found on a cask shipped from the Big Rock Point plant on June 3, 1987. The cask was Chem-Nuclear Systems, Inc., Model 1-13C and contained irradiated hardware. The contamination levels ranged from about 800 to 110,000 dpm/100 cm^2 and coincided with visible residue on the cask that apparently emanated from the lower bolt holes of a lifting lug mounting bracket. In addition, an inspector from the South Carolina Department of Health and Environmental Control (DHEC) and licensee representatives who arrived at the burial facility on June 9 found a small amount of green liquid in the bolt holes that was believed to be the source of the stain.

In a letter dated June 15, 1987, the South Carolina DHEC cited the licensee for violation of DHEC regulations which limit the amount of removable package contamination to that specified in DOT 49 CFR 173.443(b) (22,000 dpm/100 cm^2). The Big Rock Point plant was assessed a civil penalty of $5000 and prohibited from transporting or shipping radioactive waste to South Carolina until appropriate corrective measures were implemented an approved by DHEC.

The licensee's subsequent investigation of the incident determined that vendor and licensee procedures for use and shipment of the cask had been followed and that contamination levels on the outside of the cask when it left BRP were less than 400 dpm/100 cm^2. This value is below the limit of 2200 dpm/100 cm^2 allowed by 49 CFR 173.443(a) for contamination on a package offered for shipment. The licensee's conclusion that the cask was properly prepared for shipment agrees with the findings of the NRC Senior Resident Inspector who observed the preparation activities (Inspection Report No. 50-155/87011(DRP)). The increased contamination levels were attributed to decontamination liquid

used by the vendor which was apparently trapped within the annulus between the stainless steel outer shell of the cask and the inner lead shield. In-transit temperature and pressure changes apparently caused the trapped liquid to expand in the annulus and pass out through the bolt holes. In a letter to the NRC dated June 12, 1987, the vendor described the problem with the cask, stated that the contamination found on the cask originated from CNSI activities, and withdrew the cask from use pending resolution of the problem. The vendor's subsequent evaluation resulted in modification of the bolt holes to prevent entry of liquid into the annulus. This modification was reviewed and approved by the NRC. On October 13, 1987, the NRC issued a revision to the cask's Certificate of Compliance (No. 9081) to document the modification and authorize use of the modified cask. The vendor also modified the bolt holes on the similar CNSI Model 1-13G casks.

In accordance with the NRC enforcement policy, 10 CFR 2, Appendix C, which states that licensees are not ordinarily cited for violations resulting from matters not within their control, the licensee will not be issued a Notice of Violation for the excessive contamination found on the the cask.

No inspector identified violations or deviations were identified.

15. Audits and Appraisals (IP 83722, 83729)

The inspectors reviewed reports of audits and appraisals of the radiation protection and radwaste management programs performed during 1987 to date. Extent of audits and adequacy of corrective actions were reviewed. Also reviewed were management techniques used to implement the audit program and experience concerning identification and correction of programmatic weaknesses.

The station's Quality Assurance (QA) staff is headed by a QA Superintendent and subdivided into QA and QC groups. The QA group audits broad programmatic issues and is composed of four QA consultants reporting directly to the QA Superintendent. The QC group performs job specific (unplanned) activity inspections, surveillances, and audits and is composed of four QC inspectors reporting to a QC Supervisor who reports to the QA Superintendent. The QA Superintendent reports to the Corporate Executive Director of Nuclear Assurance.

The inspectors selectively reviewed reports of audits, surveillances, and activity inspections of the radiation protection and radwaste programs conducted in 1987 to date and discussed findings with members of the QA and C/HP Departments. In February 1987, a five-day audit of the health physics program and packaging and shipping of radioactive material was conducted by plant QA. The audit was performed during the station's 1987 refueling outage and focused on job activities and performance. The audit identified three findings and one observation. The findings involved calibration of self-reading dosimeters, qualifications of

contract C/HP technicians, and examples of workers failing to follow RWP requirements/good health physics practices. Adequate corrective actions were taken for the identified findings. The observation involved an error in the computerized exposure tracking system and was also adequately corrected. A similar audit is planned for 1988.

The station's QC group routinely performs scheduled surveillances of several activities. In 1986, a total of thirteen plant surveillances were performed including four involving the radiation protection program. Several radiation protection program weaknesses were identified in the RWP and ALARA programs. In 1987, fifteen total surveillances were conducted; however, only one was directed at the radiation protection program. According to the QA Superintendent, surveillances of the radiation protection program were reduced in 1987 to allow previously identified weaknesses to be corrected and improvements adequately implemented. Inasmuch as several unplanned radiation protection related activity inspections were conducted in 1987, it appears that the extent of the audit and appraisal program is adequate to assess the radiation protection program.

The inspectors reviewed the 1988 surveillance schedule and discussed the radiation protection program surveillance currently underway to followup problems/concerns previously identified during station surveillances, INPO audits, and NRC inspections. No problems were noted.

No violations or deviations were identified.

16. Spent Fuel Pool Cleanup System and Liner Leakage (IP 92705)

a. Pool and Liner Leak Detection System Description

The fuel pool is a 1.2E5 gallon concrete structure lined with stainless steel and located in the sphere at approximately the 632-level. The area between the stainless steel liner and concrete is segmented into eight sections each with a drain that terminates at a trough in the Fuel Pit Pump Room. These drains are used to detect liner leakage; the pool has no bottom penetrations or other drain valves. A 4,750 gallon capacity surge tank accepts pool overflow and at 2,630 gallons, directs it to the enclosure clean sump and to the liquid radwaste system. An outlet pipe leaves the bottom of the surge tank and goes to the fuel pool filter tank or directly to it's pump suction via a filter bypass. This system therefore, collects and controls all liner leakage and fuel pool overflow.

Fuel pool liner leakage is checked shiftly by visual observation of Fuel Pit Pump Room trough levels. Control room log sheets are used to document the observations. The inspectors selectively reviewed the log sheets for 1987 and to date in 1988; no problems were noted. The licensee has never identified any significant fuel pool liner leakage.

b. Filtering System

A fuel pit filtering system contains disposable socks, normally changed monthly or when pump suction pressure reaches a predetermined value. The water inlet to the filter is provided by the surge tank outlet and the driving force is provided by elevation differences. As previously discussed (Inspection Report 155/87012), the licensee installed a supplemental portable underwater filtering and vacuuming unit in the fuel pool during the 1987 refueling outage. This filter unit contains two filter cartridges operated in parallel and can accommodate various sizes of filter cartridges. The unit is equipped with a discharge and two intake hoses which can be used to vacuum the bottom of the fuel pool. The supplemental system has reportedly operated satisfactorily and has proved beneficial; however, further use of the system has been discontinued pending licensee engineering review of system design support documentation. If this supplemental filtering system continues to be effective, the licensee will consider decontamination of the fuel pool cooling system piping and heat exchangers.

No violations or deviations were identified.

17. Tours of Plant Radiologically Controlled Areas

The inspectors conducted several plant tours in the Turbine Building and Sphere to observe radiation protection and contamination control practices, observe work activities performed under RWPs, and interview workers who performed tasks authorized by two RWPs including recirculation pump seal replacement and reactor depressurization system valve packing jobs. No nonconformance with RWP requirements was noted. Workers also appeared to be removing protective clothing in the proper manner and adequately frisking at access control.

Housekeeping in radiologically controlled areas appears to have declined since previously reported (Inspection Report No. 50-155/87012). Many posted contamination areas throughout the plant were cluttered with used protective clothing (gloves, rubbers, hoods, etc.) Several plastic (yellow) bags used for disposal of such material were taped to walls and piping and filled to capacity while other areas did not appear to have any containers to dispose of the material. These observations exclude the Turbine Building trackway area, currently used as a temporary staging/storage area pending relocation of equipment to a newly constructed warehouse outside the building. This matter was discussed at the exit interview.

18 Allegation Followup

Discussed below is an allegation concerning the radiation protection program at Big Rock Point which was evaluated during this inspection. The evaluation consisted of record and procedure review and interviews with licensee personnel.

The Palisades Resident Inspector's office received an allegation that certain In-Service Inspection (ISI) activities performed at the Big Rock plant during the 1987 refueling outage were conducted with insufficient preplanning and therefore, resulted in unnecessary personnel radiation exposure. By letter dated August 7, 1987, the licensee was requested to investigate the allegation and submit a response to NRC Region III. The licensee's response, dated September 10, 1987, denied certain of the alleger's claims and stated that they were unable to substantiate others. The alleger's concerns were further clarified in a telephone conversation between the individual and NRC Region III on November 25, 1987. The allegation and inspectors' findings are discussed below (Allegation No. RIII-87-A-0078 (Closed)).

Allegation: Improper grinding wheels were initially utilized for ISI weld preparation work in the steam drum on January 15 or 16, 1987, because there was no pre-job discussion, job safety analysis, or other preplanning which specified the type piping to be ground (and therefore the type grinding wheel needed). As a result, the worker allegedly received 350-450 mrem unnecessary dose before the correct grinding wheel was procured and used. A second similar incident occurred for ISI preparation work in the recirculation pump room on January 23, 1987, when a worker was informed that new grinding wheels were unavailable and used grinding wheels would have to be utilized. Use of the used grinding wheels allegedly caused the working time for the job to increase from five minutes to twenty minutes with a resultant unnecessary worker dose of 150 mrem.

Discussion: The subject of the alleger's concern involved ISI weld preparation work consisting of cleaning, brushing, grinding, and flapping, performed during Big Rock Point's 1987 refueling outage. This work was performed during the back-shift by Field Maintenance Service (FMS) crews (i.e., the licensee's traveling maintenance service group). The FMS crew worked under the direct supervision of an FMS job (shift) supervisor, who reported to an FMS Site Supervisor. Overall ISI work activities were under the direction of Big Rock's ISI Coordinator.

In general, job preplanning, discussions, and training were conducted for ISI weld preparation work performed in the steam drum and recirculation pump room during the station's 1987 outage. This included the preparation of maintenance work orders, issuance of necessary RWPs and ALARA reviews for various aspects of the ISI activities. An "Access Book" containing a listing of the welds to be examined giving details of each weld requiring preparation, including the type piping to be ground, was made available to the FMS job supervisor and reportedly discussed with the work crew and supervisor prior to initiating the job. The alleger recalled that a co-worker later informed him that pre-job discussions were conducted; however, the alleger was not involved in the job at its outset and possibly was not present during the discussions. FMS crew members completed formal classroom weld preparation training at the licensee's Skill Center Training in Muskegon, Michigan. Although not specifically documented in course syllabi or other training materials, the training reportedly included discussions regarding selection and use of grinding wheels. After arriving at Big Rock Point, FMS and contractor personnel

undergo site orientation and instruction including topics devoted to material control and the stockroom system and health physics/ALARA program descriptions (Section 5). The alleger attended both of the aforementioned training sessions.

Metabo No. 16.730 grinding wheels were used exclusively for similar ISI weld preparation work performed at the Big Rock Point plant during previous outages and were the primary wheel used during the 1987 outage. This wheel was used for grinding both carbon and stainless steel piping with the only restriction that a wheel used on carbon steel could not subsequently be used on stainless steel. This restriction was necessary to prevent introduction of carbon chips or fines into the stainless. The grinding wheel manufacturer's brochure color codes wheel No. 16.730 for application on "steel and stainless steel".

ISI weld preparation activities were performed primarily during the last three weeks of January 1987. The licensee did recall an instance, about midway into the activity, when weld grinding was apparently not progressing quickly and a worker asked if grinding wheels other than No. 16.730 were available. A different number (type) grinding wheel (Metabo No. 16.747) was obtained from the stockroom and tried. The licensee could not recall if this wheel completed the job faster. The manufacturer's brochure also color codes wheel No. 16.747 for application on "steel and stainless steel." The inspector checked both wheels and could not distinguish a significant difference in their physical characteristics; both wheels looked and felt similar. According to the licensee, information concerning wheel 16.747 was subsequently relayed to the FMS job supervisor and work crew. The inspector was unable to confirm this. Grinding wheel selection issues are not documented in training materials; however, according to the licensee, the topic is discussed during both formal Skill Center Training and repeated during site orientation. The licensee contends that either type of grinding wheel is suitable for either carbon or stainless steel. According to the licensee, the 16.730 wheels have a larger grit size and are softer than the 16.747 wheel. The 16.730 wheel with larger grit would be faster at metal removal but being softer would wear down faster requiring more frequent replacement. The licensee indicated there is little, if any, difference in the time it would take to prepare a carbon or stainless steel pipe weld using either type grinding wheel. Standard practice is to leave selection of which grinding wheel to use to the individual workman's preference, as is the case with most general tools he uses.

It appears this logic is partially correct and choice of wheels also appears dependent on the surface area to be ground; regardless, a trade-off exists between time, and therefore dose, expended during grinding and that expended during replacement of worn down wheels. For the activities in question, general work area dose rates were about 400 mrem/hr and workers would be exposed to these levels during wheel replacement. It is not known whether a worker was told that new grinding wheels were unavailable; the FMS site supervisor was not aware any such statements were made. According to the licensee, adequate supplies of both types of grinding wheel were available and stocked throughout the outage. Runners were used to retrieve necessary tools and equipment for workers involved in RWP work.

The licensee's TLD analyses show that none of the FMS workers involved in weld preparations during their temporary assignment at the Big Rock Point plant in January and February 1987, including the alleger, received a whole body exposure exceeding licensee quarterly administrative limits; however, several of these workers approached the limits and were transferred to other non-nuclear locations.

To improve future similar tasks, the licensee plans to provide plant ISI coordination on the back-shift to monitor work activities in progress. This was not the case during the 1987 outage. The licensee acknowledged that worker/job supervisor communications needed improvement and plans to advise job supervisors to relay worker concerns and problems to appropriate licensee management for resolution. Also, the licensee plans to expand Skill Center Training and allow trainees to practice grinding with all the various type wheels available. These matters were discussed at the exit meeting and will be reviewed during a future inspection (Open Item 155/88004-05).

Finding: While the inspectors could not substantiate whether or not unnecessary radiation dose was received by workers due to improper grinding wheel availability, it was apparent that improvements in supervisory oversight, supervisor-worker communications, and training would be beneficial, and the licensee has committed to improvements in these areas. The alleger's claims that the lack of preplanning or pre-job discussions led to improper grinding wheel use and that new grinding wheels were not always available were not substantiated in general, but could have been valid in isolated situations. While the licensee's planning, ALARA practices, and job communications perhaps could have been better, they did not violate regulatory requirements. Nor did the licensee's failure to distribute the radiation dose for the ISI preparation work over a larger number of workers violate NRC regulations. Future NRC inspections will review implementation of the licensee's planned improvements for future ISI preparation work.

No violations or deviations were identified.

19. Exit Meeting (IP 30703)

The inspectors met with licensee representatives (denoted in Section 1) at the conclusion of the onsite inspection on February 5, 1988. Further discussions were conducted by telephone through March 1, 1988. The inspectors summarized the scope and results of the inspection and discussed the likely informational content of the inspection report with regard to documents or processes reviewed during the inspection. The licensee did not identify any such documents/processes as proprietary. In response to certain matters discussed by the inspectors, the licensee:

a. Acknowledged the inspectors' comments concerning C/HP technician staff reductions (Section 4).

b. Acknowledged the inspectors' comments concerning NRC Form-5 criteria for determining whole-body exposure and that this item was unresolved pending evaluation of information provided to Region III by the licensee's corporate office for a similar issue at the Palisades Station (Section 7).

c. Acknowledged the inspectors' comments regarding training, establishment of alarm setpoints, and relevant procedures governing the new whole-body contamination monitors (Section 10(a)).

d. Acknowledged the inspectors' comments regarding skin dose assessment from hot particles and indicated the matter is under corporate review (Section 10(b)).

e. Acknowledged the need to improve ISI Coordination and communications between work crews and Job Supervisors and the importance of relaying worker concerns to licensee management for resolution (Section 18).