U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-456/89025(DRSS); 50-457/89025(DRSS)

Docket Nos. 50-456; 50-457 Licenses No. NPF-72; NPF-77

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

Facility Name: Braidwood Station, Units 1 and 2

Inspection At: Braidwood Site, Braidwood, Illinois

Inspection Conducted: September 19-22, and October 23 through November 29, 1989

Inspectors: W. B. Grant — 12/7/89 Date

M. Schumacher for M. A. Kunowski — 12/7/89 Date

Reviewed By: M. C. Schumacher, Chief, Radiological Controls and Chemistry Section — 12/7/89 Date

Approved By: L. Robert Greger, Chief, Reactor Programs Branch — 12-7-89 Date

Inspection Summary

Inspection on September 19-22, and October 23 through November 29, 1989 (Reports No. 50-456/89025(DRSS); No. 50-457/89025(DRSS))
Areas Inspected: Routine, unannounced inspection (September 19-22 and October 23 through November 3, 1989) of the operational radiation protection program (Inspection Procedure (IP) 83750 and 83729) during the first refueling outage, including: planning and preparation; external and internal exposure control, including ALARA considerations; and control of radioactive materials and contamination, surveys, and monitoring. Also reviewed were previous inspections findings (IP 92701), and radiation protection concerns contained in an allegation. In addition, a special inspection was conducted (from November 3-29, 1989) to continue review of the allegation and to review the circumstances of a 13-rem exposure of a thermoluminescent dosimeter (TLD) worn by a health physics technician (IP 83724).

Results: Overall, the licensee's radiological controls for the outage were good. Outage dose total and number of personnel contamination events are low. Dose intensive emergent work was well planned and executed. A procedural violation (failure to ensure proper operation of portable air filtering equipment--Section 5) was identified by the licensee and corrected during the inspection; consequently no Notice of Violation will be issued. The allegation could not be substantiated; however, a weakness regarding radiation work permits was identified (Section 8). The licensee's investigation of the 13-rem exposure was thorough and the licensee's conclusion that the TLD was exposed to 13 rem, but that the technician was not wearing the TLD at the time of the exposure appears to be accurate (Section 7).

DETAILS

1. Persons Contacted

   # R. E. Aker, Performance Assessment, Corporate
   •*# D. F. Ambler, Health Physics Supervisor
   * T. M. Bandura, Quality Assurance
   * R. L. Byers, Assistant Superintendent, Work Planning
   *# E. W. Carroll, Regulatory Assurance
   * D. E. Cooper, Regulatory Assurance Supervisor
   * G. E. Groth, Production Manager
   # P. Holland, Regulatory Assurance
   B. S. Humphries, Westinghouse Outage Manager, Braidwood
   J. Johnson, TLD Coordinator
   *# K. L. Kofron, Production Superintendent
   *# R. Legner, Assistant Superintendent, Technical Services
   R. C. Lemke, Technical Staff Supervisor
   *# D. J. Miller, Assistant Technical Staff Supervisor
   * W. B. McCue, Operations Engineer
   *# D. E. O'Brien, Technical Superintendent
   •*# R. E. Queric, Station Manager
   * H. D. Pontius, Operations Staff
   * L. W. Raney, Nuclear Safety
   • @E. Roche, Health Physics Group Leader
   # R. A. Thomas, Nuclear Quality Programs Inspector
   * M. C. Schumacher, NRC Section Chief, Radiological Controls and Chemistry Section
   *# T. E. Taylor, NRC Resident Inspector
   *# T. M. Tongue, NRC Senior Resident Inspector

   The inspectors also interviewed other licensee and contractor personnel.

   *Denotes those present at onsite exit meeting on October 27, 1989.
   #Denotes those present at onsite exit meeting on November 9, 1989.
   @Present at telephone exit meeting on November 14, 1989.
   •Present at telephone discussion on November 29, 1989.

2. General

   This inspection was conducted to review radiation protection activities during the station's first refueling outage. The inspection included tours of the onsite facilities, review of records, discussions with onsite personnel, and inplant review of work. Radiation protection concerns of an allegation and the circumstances of a 13-rem exposure of a personal thermoluminescent dosimeter (TLD) were also reviewed.

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

   (Closed) Violation (No. 456/89024-03; No. 457/89024-03): A survey was not performed at 2 meters from the sides of a radioactive waste (radwaste) transport vehicle before it was released from the site; instead, the survey

was performed at 2 meters from the package on the vehicle. The licensee discussed the incident with radiation protection personnel, who survey outgoing shipments of radioactive material, emphasizing the need to follow the procedure, which specifies the correct locations for surveys. The licensee has also instituted use of a 2-meter stick to aid the surveying. In addition, the licensee will formally present information on the incident to the staff via a required-reading package and the annual continuing training program for radiation protection technicians.

(Closed) Violation (No. 456/89024-04; No. 457/89024-04): Oversight groups allowed the release from the site of a vehicle for which a documented survey indicated a dose rate limit had been exceeded. The licensee discussed the incident with oversight personnel in the radiation protection, radwaste, quality control (QC), and quality assurance (QA) departments emphasizing the need for attention to the detail of vehicle survey forms and QA and QC checklists. In addition, the licensee is revising the vehicle survey form and related QC checklists to highlight the acceptance criteria. A similar QA checklist had been revised by the end of the previous NRC radiation protection inspection (Inspection Reports No. 50-456/89024; No. 50-457/89024).

4. Outage Planning and Preparation (IP 83729)

As noted during the previous NRC radiation protection inspection (Inspection Reports No. 456/89024; No. 457/89024), the station was making a notable effort to prepare for major outage activities, including steam generator work, snubber inspection, reactor coolant pump seal repair, and reactor head work. During the current inspection, the inspectors observed that this effort resulted in the preparation and use of a manual that detailed major outage activities, listed radiological protection concerns and requirements, and gave dose total estimates for major jobs. Overall, the licensee effectively used the manual during the outage.

The method of job planning embodied in the manual was also used for major emergent jobs. For example, extensive planning was undertaken for repair of one of the steam generator cold-leg loop stop valves, a 27.5" valve, where dose rates of 2-8 R/hour gamma and 20-35 rad/hour beta, and smearable contamination levels of 2 rad/hour/100 cm^2 were encountered in the valve bowl and on the two discs of the valve. Completion of this emergent valve repair resulted in approximately 19 person-rem to workers.

One area of outage planning and preparation where implementation was less than desired was the staffing level of contractor radiation protection technicians for steam generator work. According to licensee and contractor personnel, the contractor was not able to supply the promised number of radiation protection technicians during the first three weeks of the outage. Licensee and contractor personnel stated that this lack of contractor technicians did not compromise radiation protection for outage jobs; instead, the jobs were delayed or coverage was provided by station technicians (radiation protection concerns of an allegation on the quality

of coverage provided for a steam generator job are discussed in Section 8). Contractor radiation protection technician staffing level was discussed at the exit meeting (Section 10). The staffing level of the licensee's contractor radiation protection technician staff for the March 1990, Unit 2 refueling outage will be reviewed during a future inspection.

No violations of NRC requirements were identified.

5. Internal Exposure Control and Assessment (IP 83729 and 83750)

The inspectors reviewed the licensee's internal exposure control and assessment programs, including: changes in facilities and equipment; planning and preparation for the outage, including ALARA considerations; and experience concerning self-identification and correction of program weaknesses.

Discussions with licensee representatives and a review of selected whole-body count and air sample data indicate that the licensee's internal exposure control program has been effective in limiting exposure. Licensee representatives stated that during the outage no individual had been exposed to airborne radioactivity greater than the 40 MPC-hour regulatory investigation level. The inspectors observed during this inspection that the licensee has an aggressive respirator use policy, good contamination control and decontamination programs, and is making frequent use of its whole-body counter, portable air filtering units, and air samplers. During the inspection, however, several minor problems were identified.

A problem involving the failure to take required air samples during steam generator sludge lancing was identified and is discussed in Section 8. Another problem was identified by a licensee health physicist during a tour with an NRC inspector of the Unit 1 containment. Portable HEPA air filtering units were in use at several job sites within containment, such as the steam generator channel heads, seal table room, and stud deconning and cleaning tents. Braidwood procedure BwRP 1310-13, "Set-Up and Operation of Portable Air Filtration/Ventilation Equipment," requires that these HEPA units be inspected for leaks, proper set-up, and proper operation. After proper set-up is verified and the units have been operating for some time, a differential pressure gauge on the units is checked at a specified frequency, usually daily, to ensure proper operation. According to the procedure, the technician who performs the check should record the gauge reading on a form attached to each unit. In addition, the procedure recommends that dose rate surveys of the filter housing and contamination smears of the exhaust housing of these units are performed at a specified frequency, usually daily. The procedure states that the survey results should also be entered on the form. Contrary to the procedure requirement, on October 24, 1989, a licensee health physicist determined that pressure gauge checks were not performed on October 20 and 23, 1989, for a HEPA unit connected to the "A" and "D" steam generators, for a HEPA unit connected to the "B" and "C" steam generators, and for a HEPA unit connected to the reactor head stud decon tent. After this issue was identified, the gauge checks were performed and all were well within limits. Because the failure to perform the required gauge checks was licensee-identified and isolated,

a Notice of Violation will not be issued (pursuant to Section V. G. of Appendix C to 10 CFR Part 2, the NRC Enforcement Policy). In addition, it was determined that the recommended dose rate and contamination surveys of these three units had not been performed. The surveys were subsequently performed. Survey data were within procedural limits.

No violations of NRC requirements were identified by the NRC inspectors.

6. External Exposure Control and Dosimetry (IP 83729 and 83750)

The inspectors reviewed the licensee's external exposure control and personal dosimetry programs, including changes in facilities, equipment, and procedures; planning and preparation including ALARA considerations; records; and self-identification and correction of program weaknesses and problems.

As of mid-November 1989, with the outage expected to end by late November, the station dose total for 1989 is low, at approximately 260 person-rem. Of this, approximately 200 person-rem is from the current outage. Observations made during this inspection have indicated that, whereas, relatively low radiation fields have contributed to the low dose total, overall good job planning, preparation, and performance have also contributed. During the outage the licensee made good use of ALARA dose reduction techniques, including the items listed below.

a. Use of a nine-camera video system with remote monitors and audio capability to allow monitoring of work in containment from low dose areas. One of these cameras was mounted on a movable cart and used for equipment inspection in confined, highly contaminated areas.

b. Hydrogen peroxide was added to the reactor coolant during shutdown to initiate a crud burst. Dose rates in some areas of containment after the addition and the subsequent cleanup with reactor coolant system demineralizers were approximately 20% lower than pre-addition dose rates.

c. Hot spots in containment were identified and shielded, as needed, after reactor shutdown.

d. A recently acquired optical disk/videomapping system was used extensively for outage job planning.

e. Shield plugs were used in steam generator primary manways during bolt hole cleaning and repair.

f. Automatic positioners were used for sludge lancing and eddy current testing in the steam generators.

g. An eight-camera video system with remote monitors and audio capability was used to supervise workers on steam generator platforms.

h. A "MiniROVER MKI" remotely operated underwater vehicle, equipped with a high resolution camera, was used in the reactor cavity for in-service inspection and finding loose parts/foreign objects.

i. Wireless radio headsets were used on various jobs in containment, which allowed some workers to follow the job from low dose rate and low contamination level areas instead of from the immediate job site. Examples include the removal of a snubber from the letdown heat exchanger pit, lifting of the 27.5"-discs from one of the steam generator cold-leg loop stop valves, and QC inspections and measurements of the stop valve components.

However, not all outage jobs went as planned. For example, on November 14, 1989, a worker may have received unplanned finger exposure while cleaning a piece of refueling equipment. According to the licensee, the worker was wearing extremity dosimetry (ring badges) but the badges were not on the fingers that probably received the highest dose. The two ring badges worn by the worker were processed and indicated an exposure of 40 mrem to the ring finger of one hand and 70 mrem to the ring finger of the other hand. From its investigation of the event, which included video taping a re-enactment by the worker of the job, the licensee estimated that the worker may have received approximately 1 rem to a thumb. This event, which occurred after the onsite portion of the inspection, and the results of the licensee's investigation will be reviewed at a future inspection (Open Item No. 456/89025-01; No. 457/89025-01).

Unnecessary exposure also occurred during preparations for the removal of the reactor head on September 18, 1989. Because of an operator error and a deficient procedure, water from the refueling water storage tank was pumped into the reactor while the head was unbolted but still on the vessel. The water came out of equipment penetrations on the head and wetted electrical and mechanical connections. Approximately 4.5 person-rem was accumulated during the subsequent cleanup and inspection. As corrective action for the event, the operator has been counseled on the error and the procedure has been revised.

Discussions with licensee representatives and a review of selected records indicated that no individuals exceeded the external exposure dose limits specified in 10 CFR 20. The licensee controls exposure through administrative dose limits, typically set at 100 mrem (whole-body dose) per day for containment work. Licensee representatives stated that to date, there has been one exposure above administrative limits. It involved a steam generator eddy current worker who received 139 mrem during a job on a steam generator platform. Licensee investigation of this matter indicated that the exposure in excess of the administrative limits occurred because the worker continued working after the alarm on his electronic dosimeter sounded (at 80 mrem). A contract health physics technician supervising the worker also ignored the alarm. Both individuals were subsequently fired. A review by an NRC inspector of the worker's dose records indicated that the 139 mrem resulted in a total exposure to the worker for the quarter of 341 mrem, well within the regulatory limits of 3 rem.

Previous inspection reports (No. 50-455/89022(DRP) and No. 50-457/89022(DRP)), note that early in the outage a number of the Alnor Model RAD 85 electronic dosimeters used for containment work failed during use. The licensee quickly substituted a different model dosimeter and informed the vendor of the problem. The exposures of the workers who were wearing the dosimeters which failed were adequately monitored with direct-reading dosimeters and TLDs. The licensee has not experienced any unusual problems with the substitute dosimeters.

No violations of NRC requirements were identified by the NRC inspectors.

7. Thirteen-Rem Exposure of a Personal TLD (IP 83724)

On November 3, 1989, the licensee informed the resident inspectors and a regional radiation specialist that a TLD worn by a health physics technician during October and processed on November 2, 1989, indicated an exposure of 13.12 rem. The licensee began an investigation of this exposure immediately thereafter. The results of that investigation were reviewed by Region III and are discussed below.

The exposure was registered on a "neutron" badge worn by the technician for a total of about two hours on three separate days in the calibration facility. During the remainder of October, he wore his regular TLD. By procedure, neutron badges are worn instead of regular TLDs when using a neutron source. By custom the regular TLD is stored inside a lead box in the calibration facility while the neutron badge is worn. The neutron badge and the regular TLD badge are identically constructed and processed except that two different algorithms are applied to the raw data generated during readout. The badge substitution is done to avoid difficulties in badge processing and dose accountability that could result from the two badges covering a common exposure period, i.e., the neutron exposure period.

The technician stated that on October 11 and on October 13, he wore the neutron badge for approximately 30 minutes while setting up equipment and operating a D_2O-moderated Cf-252 neutron source to verify the response of several neutron survey meters. Each time he wore his neutron TLD on his torso adjacent to his SRD and stored his regular whole-body TLD in a lead-lined storage box in the calibration facility. He also monitored his exposure with a portable neutron meter and wore his regularly issued TLD ring badge. Neutron dose rates were about 100 mrem/hr at 18 inches from the source. However, the source was only operated from a console behind a shield wall where the dose rates were 1.5 mrem/hr neutron and 0.1 mrem/hr gamma. The technician stated that the neutron source was exposed for only 10 minutes on each of the two days, with a calculated neutron dose of less than 1 mrem. The technician's SRD (gamma) dose for the two days, including time spent in other areas of the plant, was 0 and 2 mrem, respectively.

The neutron badge was stored in the badge rack at the dosimetry issue desk from October 13 to October 20, 1989.

On the October 20, 1989, the technician again wore the neutron badge for about 60 minutes while working in a remote corner of the facility that was neutron posted because of the presence of a 5-curie americium-beryllium neutron source. Dose rates there were 40 mrem/hour gamma and 5 mrem/hour neutron. The technician's SRD recorded 0 mrem gamma for this work and he calculated 0.5 mrem neutron dose based on timekeeping using a neutron survey meter. Following this work, the badge was left inside the lead box within the calibration facility until it was returned for processing at the end of the month.

The technician stated that he wore the neutron badge only on the three occasions described above and also wore a regularly issued TLD ring badge and an SRD. Otherwise he wore his regular TLD together with the ring badge and SRD. He also stated that throughout the month he had occasion to work with the gamma calibrator which is also located in the calibration facility. However, at these times, he did not wear the neutron TLD, but continued to wear his regular TLD along with his SRD and ring badge.

Routine processing of the technician's regular TLD at the end of October using the gamma algorithm gave a dose of 101 mrem which agrees with his SRD total for October (109 mR) and with the ring badge dose (80 mrem). The ring badge, which contains a LiF TLD, is processed by an offsite vendor. These results corroborate the technician's description of his activities and his assertion that the exposure indicated by his neutron badge could not be valid. The technician stated to the licensee and to an NRC inspector that he did not intentionally expose the neutron badge and he did not work in any situation that could have resulted in a significant exposure.

As part of its investigation the licensee intentionally exposed the technician's neutron badge in the gamma calibrator and obtained the expected reading of approximately 13 rem when the badge was processed in the same manner as on November 2, 1989. The licensee also exposed the badge to the D_2O-moderated Cf-252 source and confirmed that it properly responded to neutrons. The licensee is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) as a processor of TLDs in all eight NVLAP categories, including the category for badges exposed to neutrons. The licensee also tested the technician's SRD (a Stephen Model dosimeter, with a range of 0-200 mr) to verify it was functioning properly. The SRD successfully passed the five tests specified by ANSI N13.5-1972. These tests include a source response check, a drift from zero check, and a drop test.

The licensee's investigation also included:

a. review of security door access records, RWP sign-in logs, electronic dosimeter and high radiation area key sign-out logs, and auxiliary building and containment survey records to determine if the technician's stated work activities and dose records were consistent with various plant records;

b. survey of the calibration facility to identify any anomalous radiation levels;

c. survey of the lead storage box in which the technician stored his neutron badge;

d. verification of proper operation of the interlocks on the gamma calibrator (the calibrator is equipped with a 400 Ci Cs-137 source and 130 mCi Cs-137 source, and is capable of delivering a 13-rem dose in 30-seconds.); and

e. survey of all of the plastic TLD badge holders in an effort to locate contamination that could have caused the TLD exposure.

These efforts identified no irregularities.

The licensee has concluded from its investigation that the gamma dose of 13 rem registered by the neutron badge did not represent a valid exposure to the technician; instead, the technician was assigned a dose of 101 millirem, consistent with the reading of his regular TLD. The licensee also concluded that the 13-rem exposure was administered in the cesium-137 gamma calibrator by an unknown individual. The station manager and technical superintendent had several meetings with the members of the radiation protection group to impress upon them the seriousness of this matter and to confirm, if possible, the conclusion. No added information was forthcoming.

As a result of these findings, the licensee has changed its controls for access to the instrument calibrators containing the Cf-252 source and the two Cs-137 sources. Previously, the calibrator keys were kept in the calibration facility readily available to any radiation protection technician all of whom have keys to the facility. Now, technicians who use the calibrators must sign-out keys to the calibrators from the radiation protection supervisors. In addition, neutron badges must no longer be kept in the calibration facility but must be returned to the badge rack after each use. Licensee representatives stated that these changes are in the process of being formalized. Also the licensee is reviewing its policy of assigning neutron badges and its practice of requiring workers to exchange badges for neutron work. The results of these reviews and completion of procedure changes will be reviewed a future inspection.

The inspectors concluded from their review that the licensee made an in-depth and essentially correct evaluation of this event. Licensee management and staff appear to have taken the matter very seriously and licensee corrective action appears to be adequate.

No violations of NRC requirements were identified.

8. Allegation Followup

(Closed) Allegation (AMS No. RIII-89-A-0124)

Discussed below are two concerns contained in an allegation received by the NRC Region III Office, relating to radiation protection coverage of contractor work in the Unit 1 steam generators, which were evaluated during this inspection. The evaluation consisted of record and procedure review, inspection of facilities, and discussions with licensee and contractor personnel. The allegation was reviewed by the inspector onsite between October 23 and November 9, 1989.

a. Allegation Concern No. 1: On a Sunday in late September or early October 1989, Westinghouse contractors entered a high radiation area with an improperly controlled high radiation area key and worked without coverage by a radiation protection technician.

Discussion: The alleger stated that the contractors had been doing tube sheet cleaning (sludge lancing) for the previous six days and decided to work a seventh day, a Sunday, either September 24, or October 1, 1989.

Most of the Westinghouse employees directly involved with sludge lancing had left Braidwood shortly after it was completed and were not interviewed; however, several Westinghouse managers and radiation protection technicians who had been involved with sludge lancing were interviewed. Discussions with these individuals and with licensee representatives, and a review of documents indicated that sludge lancing was performed from Tuesday, September 12, through Monday, September 18, 1989. Sludge lancing was not performed on September 24 or October 1.

Radiation protection (RP) coverage for sludge lancing was provided by Westinghouse technicians until 6:00 p.m. September 16 and on Monday, September 18. Because of staffing shortages, Westinghouse could not supply technicians to cover the job from 6:00 p.m., Saturday to 12:00 a.m., Monday, and the licensee agreed to provide needed coverage. This fact was known to the licensee's RP supervisors and was documented in the shift turnover log. However, licensee technicians interviewed by the inspector stated that they did not remember providing coverage for the job. This is not surprising given the 1.5 month lapse between the sludge lancing and the inspector's review, and the limited radiological hazards of the job compared with other work in containment at that time, such as incore cleaning at the seal table and preparation for lifting the reactor head. The limited radiological concerns for the sludge lancing work which was performed on the secondary (clean) side of the steam generators, were confirmed by survey, RWP, and dose records examined by the inspector. These conditions had remained essentially unchanged throughout the period of sludge lancing.

The inspector also reviewed the licensee's procedures and various logs such as the high radiation area key log, and spoke with licensee representatives and contractors concerning control of high radiation area (high rad) keys. By procedure, a high rad key can be issued to a worker who is signed-in on the proper RWP and has an alarming electronic dosimeter. A review of the high rad key log indicated that a Westinghouse sludge lance supervisor had properly signed-out a high rad key for the weekend sludge lancing. The electronic dosimeter log and the RWPs indicated that the sludge lancers who worked for the supervisor had been issued electronic dosimeters and had signed-in on the sludge lance RWPs. Use of this key by the supervisor may have been unusual but it was in accordance with licensee procedures.

Findings: The concern of the allegation was not substantiated. No violation of licensee procedures or regulatory requirements were involved in the use of the high rad key by the sludge lance crews on September 16-18, 1989.

b. Allegation Concern No. 2: During the sludge lancing, a water leak developed in containment but, because of the lack of radiation protection coverage, personnel and equipment were not surveyed.

Discussion: From discussions with licensee personnel and contractor personnel and a review of log books and contamination reports it could not be determined if a leak developed in containment during this time. However, contractor personnel stated that minor water leaks in the sludge lancing equipment were not uncommon. The discussions and record reviews did indicate that on September 15, several gallons of oil from a snubber testing rig, leaked out and rained down onto workers doing sludge lancing on the "D" S/G. These workers were surveyed and found to be free of contamination from radioactive material as result of this leak. Again, on early Monday morning, September 18, 1989, an operator error resulted in water coming out of the equipment ports on the reactor head (discussed in Section 6). The containment was evacuated and a sludge lance worker passing by the reactor cavity on his way to the exit became slightly contaminated. The contamination was very low level and was identified when all workers who were in containment at the time were given whole-body counts. Licensee representatives stated that no contamination was detected on any of the workers leaving containment when they passed through the whole-body contamination monitors at the containment exit and again at similar monitors at the auxiliary building exit. Licensee representatives further stated that on both occasions, the snubber oil leak and the reactor head leak, an RP technician was stationed near the containment step-off pad to survey all equipment being removed. This is consistent with licensee practices observed by the inspector.

Findings: The concern of the allegation could not be substantiated. Only two events similar to the one described by the alleger could be identified and the inspector was unable to determine which, if either, was the one cited. In any case, the inspector's review was unable to identify any occasion where an individual became contaminated while sludge lancing or any event where lack of RP coverage resulted in failure to perform a required survey.

No violations of NRC requirements were identified by the inspector.

9. Control of Radioactive Material and Contamination, Surveys, and Monitoring (IP 83750 and 83729)

The inspectors reviewed the licensee's program for control of radioactive materials and contamination, including the adequacy of supply, maintenance, and calibration of contamination, survey, and monitoring equipment; procedures; adequacy of review and dissemination of survey data; and effectiveness of methods of control of radioactive and contaminated materials.

The inspectors observed preparations to lift the upper internals and the movement of several fuel bundles from the vessel to the spent fuel pool. Contamination control appeared good. In addition, the licensee had continuous air monitors operating in containment and the fuel handling building during the refueling operation. No problems were noted.

The inspectors selectively reviewed Personnel External Contamination Records (PERCs), event trending, and summary data through mid-November 1989. Approximately 90 personnel contamination events were reported for the year with approximately 40 reported since the outage began. The PERCs appeared complete, including causal factor determination. No problems were noted.

From a review of the sludge lance RWPs and surveys, the inspector noted several occurrences of survey records missing from the RWP package, surveys recorded on the wrong preprinted survey map, and attached air sample guidance not followed. These indicated weaknesses in the licensee's periodic review of RWPs. These were discussed with licensee representatives and at the exit meeting. These matters will be reviewed during a future inspection (Open Item 456/89025-02; 457/89025-02).

No violations of NRC requirements were observed.

10. Exit Meeting (IP 30703)

An inspector met with licensee representatives (denoted in Section 1) on October 27, 1989, and summarized the scope and tentative findings of the routine inspection. Specifically, the following items were discussed by the inspector:

a. One licensee-identified and corrected violation regarding periodic operability checks of several HEPA units--notably this was identified by a member of radiation protection management during an oversight tour (Section 5).

b. Fewer than expected contract radiation protection technicians for steam generator work were available during the initial weeks of the outage (Section 4).

c. An observation by one of the NRC inspectors that lighting on the 377' elevation in containment was poor.

d. The accidental wetting of the reactor head resulted in several person-rem of exposure during subsequent cleanup and inspection (Section 6).

e. Planning and execution of emergent repair work on a steam generator stop valve were good (Section 4).

f. Overall planning for the outage and implementation of those plans were good, as indicated by low dose totals and numbers of personnel contaminations.

The licensee acknowledged the inspector's comments and stated that they had made serious efforts early in the outage to have the contractor provide additional health physics technicians, and that the situation would not reoccur.

On November 9, 1989, the inspector met with licensee representatives (denoted in Section 1) and summarized the tentative findings of the special inspection. Specifically, the following items were discussed:

a. The allegation was not substantiated, however, the inspector identified that air samples were not taken, as mentioned in the RWP.

b. The Region III staff would review the licensee's investigation of the 13-rem exposure and inform the licensee of the results.

The licensee acknowledged the inspector's comments and stated that the air sample specifications were not intended to be requirements of the RWP, but were included with the RWP as guidelines.

On November 14, 1989, the inspector discussed with the licensee representative (Section 1) the results of the NRC review of the 13-rem badge exposure. The inspector noted that the NRC concurred with the results of the licensee's investigation, indicating that an overexposure had not occurred.

On November 29, 1989, NRC representatives further discussed with licensee representatives (denoted in Section 1), actions taken by the licensee in response to the 13-rem badge exposure (Section 7).