

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-373/88009(DRSS); 50-374/88009(DRSS)

Docket Nos. 50-373; 50-374

Licenses No. NPF-11; NPF-18

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

Facility Name: LaSalle County Station, Units 1 and 2

Inspection At: LaSalle County Station, Marseilles, Illinois

Inspection Conducted: March 28 through April 7, 1988

Inspectors: *R. A. Paul*  
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5/9/88  
Date

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5/9/88  
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Date

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Facilities Radiation  
Protection Section

5-9-88  
Date

Inspection Summary

Inspection on March 28 through April 7, 1988 (Reports No. 50-373/88009(DRSS);  
No. 50-374/88009(DRSS))

Areas Inspected: Routine, unannounced inspection of the licensee's transportation, solid radwaste management and radiation protection programs during the Unit 1 refueling/maintenance outage, including: organization and management controls (IP 83722); training and qualifications of contractor personnel (IP 83729); planning and preparation (IP 83729); external and internal exposure controls (IP 83729); control of radioactive materials and contamination (IP 83729, 83726); the ALARA program (IP 83729); solid radwaste (IP 84722); and transportation activities (IP 86721). Also reviewed were previous open items (IP 92701), an administrative overexposure event (IP 92701), the recirculation system chemical decontamination project, and spent fuel pool liner leakage (IP 92705).

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Results: One multiple-example procedural violation was identified (failure to re-evaluate ALARA measures when radiological conditions significantly differ from those originally assumed - Section 12, failure to follow respirator return procedure - Section 8, and failure to follow personal frisking procedure - Section 17). Although one violation was identified, the licensee's radiation protection program continues to be effective in protecting the health and safety of occupational workers. The licensee's ALARA measures appeared generally effective for reducing personnel exposures. The licensee's programs for controlling solid radwaste and transporting radioactive material are effective.

## DETAILS

### 1. Persons Contacted

- \*L. Aldrich, Rad/Chem Supervisor
- \*C. Allen, Nuclear Licensing
- \*D. Brown, Quality Assurance
- \*G. Diederich, Station Manager
- M. Friedmann, Health Physicist
- T. Greene, Health Physicist
- \*D. Hiegelke, Lead Health Physicist
- \*W. Huntington, Services Superintendent
- \*J. Lewis, ALARA Coordinator
- R. Littleton, Site Coordinator, Power Systems Energy Services, Inc. (Contractor)
- \*W. Luett, Rad/Chem Supervisor Staff
- \*P. Manning, Assistant Superintendent, Technical Services
- \*W. Marcis, Engineering Site Supervisor
- G. McCallum, Health Physicist
- \*J. Renwick, Production Superintendent
- \*J. Schrage, Technical Services Health Physicist
- \*A. Settles, Regulatory Assurance
- \*L. Shearer, Operations, Radwaste Group
- \*J. Steinmetz, Project and Construction Services
  
- \*L. Greger, NRC, Section Chief, Facilities Radiation Protection
- \*R. Kopriva, NRC Resident Inspector

The inspectors also contacted other licensee and contractor personnel.

\*Denotes those present at the exit meeting on April 7, 1988.

### 2. General

This inspection, which began on March 28, 1988, was conducted to review the licensee's radiation protection program during the Unit 1 refueling/maintenance outage, and portions of the solid radwaste and transportation management program, including organization and management controls, qualifications and training, planning and preparation, external and internal exposure controls, control of radioactive materials and contamination, the ALARA program, and an administrative overexposure event. Also, fuel pool liner leak integrity, open items, and the chemical decontamination of the reactor recirculation system were reviewed. The inspectors toured and conducted independent surveys of selected plant areas including the Unit 1 drywell. Area posting and general housekeeping were adequate.

One multiple-example procedural violation concerning ALARA reviews, respirator return record-keeping, and personal frisking was identified and is discussed in Sections 8, 12 and 17, respectively.

3. Licensee Action on Previous Inspection Findings (IP 92701 and 92702) and on NRC Information Notices (IP 92701)

(Closed) Open Item 50-373/84006-03: Installation of additional permanent shielding around several Unit 1 containment penetrations. This modification has been scheduled for the next refueling outage. Completion of the modification will be tracked under Open Item No. 50-373/88009-05.

(Closed) Violation 50-373/87020-01; 50-374/870202-01: Failure to properly verify that source response was within the acceptance range of the decay-corrected initial calibration response for a liquid process monitor. The licensee re-performed the detector response check with a properly decay-corrected source. The detector responded to within 8.5% of the expected response, within the  $\pm 20\%$  criterion.

(Closed) Open Item 50-373/87020-02; 50-374/87020-02: Evaluate the feasibility of reducing the number of egress locations before entry into gatehouse and improving the quality of personnel contamination surveys at other egress locations. The licensee evaluated the feasibility of reducing the number of egress points and has decided to eliminate seven egress points. The points will be eliminated either by posting doors as "no exit allowed," locking doors, or by redefining the boundaries of the radiologically controlled area (RCA). To improve the quality of personnel contamination surveys at other egress locations, the licensee has purchased and will be installing (or has already installed) six Nuclear Enterprises Model IPM-7 whole-body contamination monitors and several Nuclear Enterprises Model HFM7-A Hand and Foot Monitors. An additional IRT Portal Monitor has been installed in the gatehouse. The three total IRT Portal Monitors in the gatehouse have now been equipped with red and green personnel control lights to assure an approximate 2-second count. The licensee's actions in response to this open item have been extensive.

(Closed) Open Item 50-373/87020-03; 50-374/87020-03: Protective shoe covers and gloves, to minimize the potential spread of contamination, are not provided at most of the frisker stations. The licensee has purchased 90 metal boxes for dispensing gloves and shoe covers. The boxes will be mounted near frisking/contamination monitor stations with signs instructing contaminated personnel to don the gloves and shoes as needed, and to telephone rad/chem for assistance without crossing the step-off pad (SOP).

(Closed) Violation 50-373/87032-05; 50-374/87031-05: Adequate procedures for operation and shutdown of the radwaste building heating and ventilation systems were not available. The licensee has revised procedure LOP-VW-03, Radwaste Ventilation System Shutdown, to require operation of at least one exhaust fan when the radwaste ventilation system is shutdown and one or both reactors are operating. In addition, caution cards have been hung on the radwaste exhaust fan switches in the radwaste control room. The caution cards state that at least one fan must be operating. The licensee has also revised procedure LOP-WX-15, Dry Waste Compactor Operation, to instruct the operator of the compactor to verify that the radwaste ventilation system is operating before using the compactor.

(Closed) Unresolved Item 50-373/87032-01; 50-374/87031-01: Review appropriateness of the continued use of the correction factor for beta dose TLD spiking. The licensee has revised procedure LRP-1250-5, Film Badge/TLD Spiking, to delete the requirement for spiking TLDs with a beta source. The beta spiking will be performed quarterly using a Tl-204 source as part of the corporate Interstation Comparison TLD Program. The inspectors noted several editorial errors in the revised procedure that will be corrected by the licensee. In addition, the licensee has recalculated performance quotients using true values rather than absolute values and has determined that the quotients still meet the acceptance criteria.

(Open) Open Item 50-373/87032-02; 50-374/87031-02: Clarify procedure LRP-1340-10, Calculation of MPC-hours from WBC Data. The licensee has revised this procedure, but ambiguities still exist. This matter will be reviewed at a future inspection.

(Closed) Open Item 50-373/87032-03; 50-374/87031-03: Review effectiveness of controls on doors and ventilation dampers in the mechanical maintenance shop. The licensee has locked the roll-up doors in the shop, with keys assigned to the rad/chem staff. Dampers in the decon shop within the mechanical maintenance shop, and the control panel for the supply and exhaust fans, have been posted with signs prohibiting unauthorized operation. These controls have been explained to the maintenance workers in tailgate sessions.

(Closed) Open Item 50-373/87032-04; 374/87031-04: Review effectiveness of 1) the new, strict policy on repeat "no-shows" for respirator testing and whole-body counting, and 2) the liaison between mechanical maintenance and radiation protection. The licensee's new policy has been effective and will continue. The liaison position, as staffed with a contractor, is no longer in effect; however, a liaison is still functioning between station construction and radiation protection. (See Section 4.) In addition, an individual has been designated to coordinate RWP activities in mechanical maintenance. Because of the success of the "no-show" policy, the appointment of a maintenance person to coordinate RWP activities, and the apparently continuing effort by the station to ensure that mechanical maintenance is aware of and adheres to station radiation protection procedures, this open item is closed.

(Closed) Open Item 50-373/87032-06; 50-374/87031-06: Review procedures and training for drywell access during spent fuel movement. Prior to fuel movement during this outage, the licensee revised procedures LFP-100-1, Master Refuel Procedure, and LFS-100-4, Core Alteration Shiftly Surveillances; and wrote a new procedure, LAP-1120-3, Drywell Access Control During Fuel Moves. These procedures consistently describe drywell access controls during fuel movement. Formal training and notifications were given to personnel before fuel movement. In addition, with data obtained from a study conducted during this outage, the licensee has resolved the apparent discrepancy between a dose rate value in the FSAR and a previous study. The difference between the values is attributed

to the fact that the FSAR value is based on calculations that did not consider background radiation levels, whereas background was included in values recorded in the previous study.

(Closed) Open Item 50-373/87032-07; 50-374/87031-07: Implement separate controls for access to high, high-high, and very high radiation areas in the two units. The licensee has modified the status level designation of doors to high and high-high radiation areas in the two units so that different keycards are required for entry. Access to doors to very high radiation area (those areas where a whole-body dose of >20 Rem could be received in one hour) is controlled on an individual entry basis.

(Closed) Open Item 50-373/87032-08; 50-374/87031-08: Review adequacy of the routine contamination survey program for horizontal surfaces above 6 feet and prepare to decon the radwaste truckbay above 6 feet. Based on their review, the licensee will continue to smear-survey horizontal surfaces above 6 feet only if individuals are scheduled to work in the area, except for the radwaste truckbay which will be surveyed and cleaned quarterly.

As described below, the licensee has made an adequate review of several recently issued NRC Information Notices.

Notice No. 86-20: Low-Level Radioactive Waste Scaling Factors, 10 CFR Part 61. The station program for low-level radwaste adequately addresses the problems described in this Notice (see Section 14).

Notice 87-03: Segregation of Hazardous and Low-Level Radioactive Wastes. Station procedures require inspection of solid radwaste to verify that no solid or liquid chemicals are packaged with the radwaste. Liquid radwaste is evaluated, usually with corporate assistance, to determine the presence of EPA hazardous wastes (see Section 14).

Notice No. 87-07: Quality Control of Onsite Dewatering/Solidification Operations by Outside Contractors. The licensee's QC and QA departments routinely audit radwaste/transportation activities, including those involving dewatering/solidification operations by the onsite contractor (see Section 15).

Notice No. 87-31: Blocking, Bracing, and Securing of Radioactive Materials Packages in Transportation. Station procedures, with appropriate checklists, adequately address this Notice. The licensee's QC and QA departments also verify the blocking, bracing, and securing of radioactive materials packages in each shipment of radioactive material that leaves the site (see Section 15).

Notice No. 87-32: Deficiencies in the Testing of Nuclear-Grade Activated Charcoal. In response to this Notice, the licensee has changed vendors and now uses one of the two vendors who satisfied the requirements of interlaboratory comparison conducted for the NRC by the Idaho National Engineering Laboratory.

Notice No. 86-23: Excessive Skin Exposures due to Contamination with Hot Particles, and Notice No. 87-39: Control of Hot Particle Contamination at Nuclear Power Plants. The licensee has a strong corporate/station program concerning instruction on and control of hot particles (see Section 9 of this report and Section 15 of Inspection Reports No. 50-373/87032 and No. 50-374/87031).

4. Organization and Management Controls (IP 83722)

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

Currently, 38 of the 39 station Radiation/Chemistry Technician (RCT) positions are filled; one RCT was recently reassigned as engineering assistant to the ALARA Coordinator replacing the former assistant who was promoted to Radiation Protection Foreman. All 38 RCTs currently meet ANSI 18.1-1971 qualifications for technicians in responsible positions; the last group of 6 technicians became ANSI-qualified in March 1988.

The permanent radiation protection staff appears stable with minimal staff turnover. Since last reported (Reports No. 373/87032 and No. 374/87031), one of the station's four staff health physicists (HPs) with nearly two years station experience terminated employment. The licensee is actively recruiting to fill the vacated position. The remaining three staff HPs have degrees in health physics or a related field and range in station experience from about nine months to over four years.

The Rad/Chem contractor who was a liaison between the radiation protection staff and station construction and mechanical maintenance has been reassigned to the ALARA group; however, much of the individual's liaison duties have been assumed by a newly appointed Rad/Chem contractor (Section 3). The latter individual reports to station construction. The inspectors reviewed the experience and qualifications of the two contractor liaisons; both individuals possess several years related working experience in radiation protection at various operating plants.

In 1988, the station formed a task force to review personal contamination events. The task force is composed of two health physicists and supervisory personnel from plant services, operations, maintenance, and contractor organizations. The group typically meets at least weekly to review contamination events that occurred during the previous week (Section 9(c)).

No violations or deviations were identified.

5. Training and Qualification of New Personnel (IP 83729)

The inspectors reviewed the licensee's selection criteria and the education and experience qualifications of contract radiation protection personnel and training provided to them.

Licensee selection of contracted radiation protection technicians includes review of resumes to determine conformance to ANSI 18.1-1971 criteria for responsible technicians. The licensee considers individuals with three years (6,000 hours) working experience in their speciality or two years plus a related associate degree, as senior technicians. Junior technicians must possess at least one year experience. The licensee does not routinely verify the experience/qualifications stated in resumes and normally reserves such verification for the contractor. According to the vendor site coordinator, resume authenticity is verified by telephone contact with previous employers. Over 50% of the contract radiation protection personnel hired for the outage have previous nuclear station radiation protection experience. Resumes of selected technicians currently working at the station were reviewed by the inspectors; no problems were noted.

After technicians arrive on-site they are required to undergo a one-half day radiation protection theory (refresher) course. Senior technicians must pass with a minimum score of 70% a written exam on nuclear physics theory, 10 CFR 20, and practical health physics problem solving. A retest is allowed at the licensee's discretion for those who fail the initial exam. The 40-50 question exam was reviewed by the inspectors and appeared to be moderately difficult; several completed exams were reviewed. Following successful completion of the radiation protection theory exam for applicable personnel, each contracted technician is required to complete Nuclear-General Employee Training (NGET), respirator training and fit testing, and three days of site-specific radiation protection procedures training. An exam is administered at the conclusion of the procedure training; a minimum score of 70% is required for senior and junior technicians. Two control point technicians working at the station during the current outage also attended the procedures training but were not required to complete the test. During the outage, the two technicians were exclusively assigned to observe, and correct if necessary, workers removing PCs at the Unit 1 control point. Inspectors selectively reviewed lesson plans and training and exam records; no problems were noted. Technicians not meeting ANSI 18.1-1971 experience criteria are assigned duties commensurate with their training and experience. The licensee's training and qualification program for contract radiation protection personnel appears acceptable.

No violations or deviations were identified.

6. Planning and Preparation (IP 83729)

The inspectors reviewed the outage planning and preparation performed by the licensee, including: additional staffing, special training, increased equipment supplies, and job-related health physics considerations.



For the outage, health physics personnel were involved in pre-outage reviews for major jobs and routine jobs. The reviews were apparently performed in consideration of radiological conditions and scope of work to be performed and in accordance with procedures (except for incident described in Section 12). Radiation protection staff reported that there were periods in which many work requests requiring review were issued at one time. However, the licensee indicated that although this problem slowed certain outage activities, there were no compromises in performing adequate radiological reviews.

The station's radiation protection group had been augmented with 30 contract health physics workers during the first several weeks of the outage and increased to 36 workers to provide more surveillance and control over radiological activities. For this outage, the station maintained adequate coordination between the station radiation protection department and contract workers.

7. External Exposure Control and Personal Dosimetry (IP 83729, 83724)

The inspectors reviewed the licensee's external exposure control and personal dosimetry programs, including: changes in the program to meet outage needs; use of dosimetry; planning and preparation for maintenance and refueling tasks including ALARA considerations; and required records, reports and notifications.

For the Unit 1 refueling/maintenance outage, the licensee established a temporary radiation protection ingress/egress and dosimetry control station in Unit 2. Personnel needing access to the Unit 1 drywell (and the control rod drive rebuild room) were channeled through this station. Normally two radiation protection technicians continually man the control station where drywell-related RWPs, associated survey maps and secondary dosimetry are maintained and issued. Minimum personal monitoring requirements for drywell access include a TLD, direct reading dosimeter (DRD), and an electronic dosimeter. Technicians manning the control station issue the electronic dosimetry and record the exposures received by drywell workers on dose cards. The flow of materials, equipment and personnel in and out of the Unit 1 entrance is monitored by the technicians manning the station and by one of two control point technicians assigned exclusively for that purpose. Dose cards maintained at the radiation protection office (main RCA control point) are used to track daily DRD exposures for non-drywell related work.

Currently, about 2100 workers are issued dosimetry at the station, of which 65% are contractors supporting the outage. According to the licensee, this is the largest number of individuals that have been issued dosimetry at the station at any one time.

For 1987, the station's total exposure was about 1395 person-rem; exceeding the goal of 1150 person-rem. According to the licensee the Unit 2 refuel outage from January to June 1987 was responsible for approximately 800 person-rem, of which 300 person-rem were received

on snubber testing and reduction and a drywell cooling modification. The unscheduled Unit 1 maintenance outage from May to September 1987 contributed approximately 300 person-rem to the year-to-date total. The licensee's station exposure goals for 1988 and for the Unit 1 refuel/maintenance outage are 1100 and 520 person-rem, respectively. Through March 1988, 346 person-rem has been expended.

No violations or deviations were identified.

8. Internal Exposure Control and Assessment (IP 83729)

The inspectors reviewed selected aspects of the licensee's internal exposure control and assessment programs, including: determination whether engineering controls, respiratory equipment, and assessment of intakes meet regulatory requirements, and planning and preparation for maintenance tasks including ALARA consideration.

a. Overview

The licensee's programs for controlling internal exposures during this outage include the use of protective clothing, respirators, and portable ventilation equipment as well as control of surface and airborne radioactivity. The inspectors selectively reviewed the licensee's air sample and survey program for drywell activities. It appears that sufficient air samples are collected and analyzed, and that sufficient direct and smear surveys are performed.

The licensee used their commercial whole-body counter during this outage for base-line counting of incoming contractor personnel. The inspectors observed whole-body counting of several workers and selectively reviewed whole-body count results. No person exceeded the 40-hour control measure and no significant internal deposition was identified. Contractor and nonstation CECo personnel are counted when they complete their work at the Station.

The inspectors selectively reviewed the licensee's relevant whole body count (WBC) procedures and the WBC facility and equipment. The inspectors noted that a vendor recently verified that the WBC system response had not changed significantly since the previous calibration performed in March 1987. A full calibration of the WBC system is scheduled for April, 1988.

b. Respiratory Protection

Workers' NGET cards indicate their qualifications related to respiratory protection. This includes their medical evaluation, proof they have received required training, and type of respirators they are qualified to wear. The inspectors observed the issuance of respirators during several shift changes. To receive a respirator, the workers must show their NGET cards to the RCT. The RCT reviews the card to determine if the worker is qualified for the respirator requested, and is required by Procedure LRP-1310-4 to initial the Respirator Equipment Log Sheet to verify that the recipient was

qualified and the respirator was issued. The inspector noted that several of the Log Sheets for March 1988 had not been initialed. This is a violation of the licensee's Procedure LRP-1310-4 (Violation 373/88009-01(A); 374/88009-01(A)).

The licensee's primary respirator accountability mechanism to ensure respirator equipment is returned by an individual before another respirator is re-issued to the same individual is that the RCT is required to initial the Log Sheet upon return. During this inspection, it was noted that several days may elapse before the RCT verifies that respirators have been returned and initials the Log Sheet. This system for respirator accountability appears weaker than the licensee's previous system of requiring workers to turn in their NGET card before respirator issuance, and returning the NGET card after respirator return. This matter was discussed with the licensee and will be reviewed at a future inspection (Open Item 373/88009-02; 374/88009-02).

A cursory check of respirators that were ready for use showed that respirator inspection, storage, and maintenance was adequate.

One violation was identified.

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

The inspectors reviewed the licensee's program for control of radioactive materials and contamination, including: changes in instrumentation, equipment, and procedures; effectiveness of survey methods, practices, equipment, and procedures; adequacy of review and dissemination of survey data; 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.

a. Drywell Radiological Controls

The inspectors selectively reviewed records of routine and special radiation, contamination, and air sample surveys conducted during the outage to date. Routine weekly surveys are performed within the drywell at various elevations and locations to identify general radiological conditions and trends. Job-specific drywell surveys are performed prior to job initiation and as needed during the course of a job. Survey results are normally reviewed by a shift radiation protection foreman for completeness and any unusual conditions. Radiological protection requirements for drywell activities are dictated by the job-specific survey results and their implementation is verified by technicians providing job coverage and manning the control point station, and by the radiation protection foreman assigned to supervise drywell activities.

The inspectors reviewed several RWPs and associated survey maps for various drywell work activities, discussed their appropriateness with radiation protection representatives, and observed numerous workers performing activities under the RWPs. No problems were noted. Specifically, the inspectors reviewed RWPs No. 80279A and B for drywell snubber removal and No. 80346A for removal and installation of insulation in the drywell. Protective requirements including respiratory protection appeared appropriate. Due consideration also appeared to be given to dosimetry placement and ALARA. Generally, respiratory protection was not required for most drywell activities unless cutting, grinding or other possible airborne or liquid contaminant production activities were conducted. No significant problems were noted with the methods established for control of radioactive materials and contamination.

b. Radiological Controls for Diver Operations

The inspectors observed portions of the dryer/separator pool gate repairs which required diver entry into the pool. An appropriate RWP was written and pre-job surveys of the work area were performed. Adherence to station procedure LRP-2100-12, governing such activities, was verified by the inspectors and included an ALARA review and pre-job briefing, and use of multiple, personnel monitoring devices including remote readout electronic dosimetry monitored by RCTs covering the dive. Surfaces were wetted to reduce potential airborne contaminants when the gate was raised from the pool. No significant problems were identified.

c. Personal Contamination Events

LaSalle Radiation Protection Procedure, LRP-1470-6, requires a "Personnel External Contamination Event Record" be completed when personnel contamination (skin and/or clothing) is detected with an HP-210 probe or equivalent in a background  $\leq 300$  cpm or a "Contamination Event Log" entry made when contamination is initially detected with a whole-body contamination monitor but is not greater than 100 cpm above background with an HP-210. A Radiological Occurrence Report (ROR) is required if skin or personal clothing contamination yields radiation levels greater than 1 mR/hr above background.

The inspectors reviewed personal contamination event (PCE) trending and summary data and discussed the identification, investigation, and corrective action program with the licensee; several recent events were specifically reviewed. In 1988, the station formed a task force to review PCEs and strengthen event investigation and implementation of corrective actions. Since then, the inspectors noted improvement in the investigation and documentation of PCEs. Corrective actions include contacting the individual's supervisor, counselling, and requiring those involved in repetitive events to re-attend relevant aspects of NGET. More stringent disciplinary actions have been taken when warranted.

In 1987, the station recorded approximately 565 PCEs of which 85% occurred coincident with outage activities. Approximately 450 events occurred each in 1985 and 1986. Ninety events were reported for the first three months of 1988; thirty-three since the start of the outage on March 13, 1988. The number of PCEs per 1000 RWP hours worked has trended down since 1985. The station averaged about 19 PCEs per 100 RWP hours in 1985 and about 3-4 in both 1986 and 1987. However, such data comparison is highly dependent on the specific work activity and total number of RWP hours worked. It does not include events attributed to non-RWP activities which, as noted below, appear to comprise a significant contribution.

The licensee attributed the cause of most 1987 contamination events to "poor work practices" and "contaminated clean areas." In 1987 and 1988 to date, about 27% and 20% of the PCEs were attributed to contaminated clean areas, respectively. However, the licensee believes the data may be skewed, particularly in 1987, because of doubts concerning determination of the true root cause. Alternatively, many contaminated clean area events may be attributed to weaknesses in the routine radiological survey program for clean areas. In addition, worker adherence to frisking procedures may need strengthening as described in Section 17 and further evidenced by several outage-related significant PCEs (>30,000 dpm on the skin) which were initially identified at downstream whole-body contamination monitors and not detected at the drywell egress frisk station. Only about 20% of the approximately 20 outage-related contamination events occurring in the drywell were detected at the drywell egress frisker (hand-held) station. Skin contamination including hot particles could go undetected if hand-held detector frisks performed after PC removal are not performed properly. Although workers exiting the RCA usually pass through a whole-body contamination monitor and then must pass through a gatehouse portal monitor before leaving the station, this is done after donning street clothes which could mask the presence of beta-emitters. Therefore, it appears desirable to monitor primary egress points during periods of increased plant traffic flow to assure personal frisking is performed properly, contaminated equipment and tools are not inadvertently taken into clean areas, and frisker alarms are reported.

The 1988 station goal is 245 PCEs; individual department and work group goals have also been established. These goals may be difficult to meet unless the licensee reduces the number of events occurring in clean areas and improves worker adherence to radiological work practices. Therefore, it appears desirable to review the routine radiological survey program conducted in general (clean) plant areas, particularly as performed at and around SOPs. These matters were discussed at the exit meeting and will be reviewed during a future inspection (Open Item No. 373/88009-03; 374/88009-03).

d. "Hot Particle" Events and Skin Dose Assessment

The inspectors selectively reviewed the licensee's investigation of personal contamination incidents involving minute discrete radioactive particles (hot particles) recorded for 1987 and 1988 to date. Seven incidents were identified during this period, three of which were previously discussed (Inspection Reports No. 373/87032; 374/87031). The licensee conducts an investigation of each event including interviews with the individual involved and a review of related work activities. A skin dose assessment is performed for all hot particle events, and for non-hot particle skin contamination events involving greater than 1.7EF dpm on the soles of the feet or palms of the hands, and greater than 42,000 dpm on other areas. The inspectors reviewed the licensee's investigation and dose calculational methods; no problems were noted. No overexposures occurred as a result of the incidents and no violations of regulatory requirements were identified; however, improvements are desirable in documenting the assumptions used to determine the duration of the exposure.

e. Laundry Program

Protective clothing is laundered at the licensee's facility by stationmen using three dry-cleaning units and/or by sending the laundry to a commercial laundry for wet washing. In 1988, the station began using the services of a commercial nuclear laundry facility located off-site but near the station. Approximately 80% of the laundry resulting from outage activities is currently sent to the vendor, the remainder is laundered by the licensee. Licensee representatives stated that the turnaround time for the vendor is about two days. The licensee appears to have an adequate supply of "clean" PCs available for the outage. The licensee recently made operational an automated laundry monitor employing gas flow proportional detectors located above and below, and traversing the width of a conveyor mesh. The station fabricated two cobalt-60 100 cm<sup>2</sup> plate sources each with an activity of about 120 nCi to establish monitor alarm setpoints. The licensee plans to gradually reduce the monitor alarm setpoints to comply with recently issued corporate guidance. The corporate release limit of 104 nCi/cm<sup>2</sup> is based on contamination inside the PC so as not to exceed 25% of the NRC quarterly skin dose limit from a four-hour cobalt-60 hot particle skin exposure. According to the licensee, the vendor laundry monitors clothing using equipment and methods equivalent to those of the licensee. Vendor monitor alarm setpoints are established using one of the licensee's fabricated sources and are set slightly below that used by the licensee. The licensee randomly spot-checks (monitors) clothing laundered by the vendor. The inspectors observed workers using the station laundry monitor and questioned them concerning monitor alarms and PC rejection criteria; no problems were noted. Any article of clothing which causes the monitor to alarm two out of three times is considered to have failed; clothing is monitored

inside out. Procedures have been developed for operation and alarm setpoint verification of the monitor and for laundering and surveying methods. However, the procedures do not address the frequency of alarm setpoint verification, indicate that PCs be monitored inside out, and do not address spot-checking of vendor-laundered items. The licensee agreed to revise the procedures to address these items. The procedures will be reviewed at a future inspection (Open Item No. 373/88009-06; No. 50-374/88009-05).

No violations or deviations were identified.

10. Radiation Occurrence Reports (RORs)

The inspectors reviewed RORs generated pursuant to station procedure LRP-1150-1 for 1988 to date and reviewed trending data for 1987. The licensee trends and categorizes RORs by work group and type of occurrence under the major classifications of external dose control, internal dose and surface contamination, administrative controls, and others. RORs are generally written for violations of station radiation control standards and procedures and any significant action or situation inconsistent with the ALARA philosophy.

During the first three months of 1988, eleven RORs were generated. Most involved contamination or exposure control problems caused by failure to follow radiation protection procedures or adherence to RWP requirements. The reports were reviewed for significance, recurrence, and adequacy of corrective actions. No significant problems were identified; adequate corrective actions appear to have been taken. Three RORs generated in March 1988 remain open pending further licensee investigation. One recent exposure incident that was the subject of an ROR is discussed in detail in Section 12. Sixty-three RORs were generated in 1987, 35% attributed to contamination control problems and 27% to administrative (procedure or RWP non-adherence) controls. Since previously reported (Reports No. 373/87032 and No. 374/87031), two RORs were issued against the mechanical maintenance department; no significant repetitive problems were noted in 1988. None of the RORs generated thus far in 1988 were related to respirator testing or whole body count scheduling.

Overall, the licensee's review and corrective action program for RORs appears adequate.

No violations or deviations were identified.

11. ALARA (IP 83728 and 83729)

The person responsible for the ALARA program was involved in the planning of certain outage jobs. Some of the major outage jobs include removal and replacement of 16 control rod drives (CRD); decontamination of the drywell; drywell insulation; removal, testing and replacement of snubbers; and the installation of supplemental cooling equipment in the drywell.

The licensee took major ALARA steps to reduce exposures for the outage. To implement ALARA for certain job tasks, the licensee performed a chemical decontamination of the recirculation loops (Section 13), flushed the ECCS system, hydrolized the reactor cavity drain and the scram discharge volumes, purchased a CRD removal/replacement machine, shielded the reactor bottom drain line and hot spots as warranted, and video taped drywell work. Except for the problem described in Section 12, no violations or deviations were identified.

12. Personal Exposures in Excess of Administrative Limits

At about 9:30 p.m. on March 30, 1988, five construction workers performed flapping (power sanding) operations on a feedwater nozzle located on the 796-foot elevation of the Unit 1 drywell. Based on a survey performed at about 5:00 p.m. on the same day, the highest radiation fields found ranged from 1.5 R/hr and 12 R/hr at 18 inches and contact, respectively, on the top of the feedwater nozzle to 6 R/hr and 45 R/hr at the same locations on the bottom of the nozzle. The workers were personally timekept and under constant surveillance of a health physics technician. Each worker wore five alarming digi-dosimeters, five TLDs and five DRDs on various parts of their body, and were authorized a whole-body dose limit of 300 mRem for the day. The digi-dosimeters were set to alarm at 256 mRem. During the flapping, two of the workers exceeded the authorized limit. One worker whose dosimetry equipment was worn above his right knee received 385 mRem and 390 mRem on the DRD and digi-dosimeter, respectively. The other worker whose dosimetry was worn above the right elbow received 450 mRem and 588 mRem on the DRD and digi-dosimeter, respectively. After the second worker exceeded the authorized limit the licensee discontinued feedwater nozzle flapping operations, performed a post-job survey, sent the TLDs for processing, and initiated an ROR and an investigation to determine the cause of the administrative overexposures.

The licensee's review of the incident indicated the following:

- a. Stay times for all workers were based on radiation fields found during the 5:00 p.m. pre-job survey and a pre-job survey performed by the attending health physics technician immediately before the operation started. The stay times for both workers who exceeded the administrative limit were based on a contact dose rate of a 10 R/hr, hot spot found on the left side of the pipe. Although the workers were not performing flapping operations at this spot, the technician conservatively determined it was the highest dose rate to which the workers could be exposed.
- b. A survey performed after the incident indicated a small hot spot of 20 R/hr on the feedwater nozzle near the 10 R/hr hot spot found during the pre-job surveys. The 20 R/hr spot was not found during the pre-job surveys.
- c. The first worker to exceed the administrative limit was working in a position such that his right knee was close to the nozzle. After working in this position for a while he thought he heard his



digi-dosimeter alarm, however, he wasn't sure, and after thinking about it for a few moments he decided to leave the work area. The second worker to exceed the limit was working even closer to the nozzle and was authorized to work in the area for 90 seconds. However, during that time, the digi-dosimeter set to alarm at 256 mRem malfunctioned and no alarm was sounded; he continued to work. The workers probably exceeded the administrative limit because of their location relative to an unknown higher radiation field, and because one worker didn't hear his digi-dosimeter and the other worker's digi-dosimeter malfunctioned.

- d. The processed TLDs indicated the worker whose right knee and the worker whose right arm were close to the 20 R/hr hot spot received whole-body doses of 546 mRem and 410 mRem respectively.

The inspectors' review of the incident indicated the following:

- a. The licensee's ALARA review for this job was based on radiological survey results found during a similar job previously performed in Unit 2. The highest radiation level found on the feedwater nozzles during those surveys was 6 R/hr. Although procedure LRP-1160-4, "ALARA Action Review," allows the licensee to base ALARA reviews on radiological conditions from similar jobs previously performed, it also requires that if actual radiological conditions are significantly different than the values first used (6 R/hr), then the ALARA review shall be amended or rewritten. The survey results used for this job indicated 10 R/hr to 40 R/hr hot spots on the feedwater nozzle and the ALARA review was not rewritten or amended; this is a violation of procedure LRP-1160-4 (Violation No. 373/88009-01(B); 374/88009-01(B)).
- b. Although the 20 R/hr hot spot was not identified during the pre-job surveys, the radiation protection technician covering the job had set stay times conservatively enough to prevent a regulatory overexposure.

### 13. Unit 1 Recirculation System Chemical Decontamination

During this outage, the licensee chemically decontaminated the Unit 1 recirculation system. The decontamination was performed by LN Technologies Corporation (LN) using the LOMI (Low Oxidation-State Metal Ion) decontamination process. LN has used this process recently at several other Commonwealth Edison plants, however, this was the first use at LaSalle. Preliminary results of the decon indicated that decontamination factors of 3-5 were attained and that approximately 31 curies of Co-60 and 90 curies of Fe-55 were removed from the system. LN also packaged and solidified the resins used for the decon (Sections 14 and 15). An inspector observed the setup and initiation of the sluice of resin from the ion exchange vessels to a liner in the Unit 1 Reactor Building trackway. The setup included coordination of activities with security and the shift engineer, designation of a temporary high radiation area, obtaining dose limit extensions for workers, and conducting a pre-job briefing. The sluicing operation was conducted during the late backshift hours. No problems were identified by the inspector.

14. Solid Radwaste (IP 84722)

The inspectors reviewed the licensee's solid radwaste program for compliance with waste generator requirements in 10 CFR 20.311 and 61.55. Included in this review was an examination of waste manifests, scaling factor and curie-content determinations, and management oversight.

As stated in Section 15 most of the radwaste shipped by the licensee is dry active waste (DAW). A smaller volume is solidified and dewatered waste. To date, the licensee has not shipped liquid process/radwaste filters. A selective review of manifests for shipments made in 1987 and 1988 indicated that the manifests contained all of the information required by section 20.311 (b) and (c).

At least annually, the licensee sends waste stream samples to Science Applications International Corporation (SAIC) for isotopic analyses and scaling factor determination. These waste stream samples include swipes from the compactor and general plant work areas (for DAW characterization) and samples of reactor water, reactor water crud, evaporator bottoms (concentrator wastes), and waste sludge, spent resin, ultrasonic resin cleaner (or URC), and phase separator tanks. In addition, in-house isotopic analyses are usually performed for each batch of liquid system waste prior to dewatering and solidification. For DAW, in-house isotopic analyses are performed quarterly to determine if there has been a significant change from the values determined by SAIC. Results of SAIC analyses and scaling factor determinations, and dose rate measurements of prepared packages are used by the licensee to generate manifests. A selective review by an NRC inspector of the results of these analyses and determinations indicated no problems.

To date, the licensee has not shipped Class B or C waste. The Class A waste is shipped either as unstable waste or as stable waste in high integrity containers or solidified in cement with the licensee's Stock Equipment Company solidification system or, more commonly, with a vendor's solidification system (Westinghouse Hittman Nuclear Incorporated). Station QC verifies dewatering and solidification. The NRC inspector identified no problems with the licensee's waste characterization and stabilization programs.

In early 1988, the onsite QA department conducted an audit of Westinghouse Hittman's onsite operations to verify that the vendor was implementing their (Hittman's) QA program for radwaste solidification and packaging. The audit was initiated after a similar audit of the same vendor at Byron resulted in several findings. The audit at LaSalle resulted in 5 findings and 3 open items, all of which had been closed by the time of the NRC inspection.

For the spent resin from the recirculation system decontamination job (Sections 13 and 15), the licensee determined the quantities of chelating agents (required by 10 CFR 20.311 and by the burial sites) and EPA hazardous wastes. Because the chelant loading (consisting of formic and

picolinic acids) was 5.4% by weight, exceeding the burial site limit of 0.1%, the licensee stabilized the waste in cement. The only hazardous waste in the resin was chromium, but because the concentration of the chromium was below EPA limits, the solidified waste was not considered a mixed waste (see NRC Information Notice No. 87-03). In addition, tests were performed on samples of the solidified wastes to verify that requirements of LN's Process Control Program were met. According to a licensee representative, the solidified waste met those requirements.

No deviations or violations of NRC requirements were identified.

15. Transportation of Radioactive Materials (IP 86721)

The inspectors reviewed the licensee's radioactive materials transportation program to determine whether shipments are prepared and made in compliance with NRC and DOT requirements and with the licensee's administrative and implementing procedures. In addition, selected aspects of the corporate and station oversight activities were reviewed.

Most of the radioactive material shipped from the station, by volume and by activity, is low specific activity (LSA) DAW and solidified or dewatered wet waste. In 1987, approximately 150 shipments of radwaste (totaling approximately 2300 Ci) were made, with most of the radwaste sent to the burial site in Beatty, NV. To date in 1988, 14 shipments have been made. Most of the DAW shipped is packaged in 55-gallon drums, but 96 ft<sup>3</sup> boxes are occasionally used. Recently, the station has been shipping compressible DAW to facilities in Illinois and Tennessee for supercompaction. In addition, non-compressible, contaminated metal items have been sent to waste-treatment facilities in Pennsylvania and Tennessee for decontamination and disposal. The licensee expects to make greater use of the supercompaction and decontamination facilities in the future. Solidified/dewatered wastes are shipped in 55-gallon drums, or large capacity liners and high-integrity containers. Radwaste shipments are usually controlled by the operations department.

As part of the contract for the decontamination of the Unit 1 recirculation system (Section 13), the vendor sluiced the resin from the ion-exchange beds to a vendor-supplied liner, solidified (with cement) the waste after dewatering, and will be transporting the liner to a burial site. Because the resin contained greater than Type A quantities of radioactive material, the licensee as a shipper had to comply with requirements of the general license specified in 10 CFR 71.12. (Preliminary calculations indicated the resin contained approximately 31 curies of Co-60; the Type A limit for Co-60 is 7 curies.) As required in section 71.12, the license was registered as a user of the Model LN 14-170 cask containing the solidified resin prior to using the cask.

With the start of the 15-week outage, the licensee has been shipping protective clothing (PCs) to a nearby nuclear laundry (see Section 9). The PCs are shipped as LSA and packaged in 96 ft<sup>3</sup> boxes. Laundry shipments are controlled by the stationmen department.

In addition to radwaste and laundry, the licensee also ships radioactive samples to contractor labs for analyses. This material is usually sent as "excepted material, limited quantity," per 49 CFR 173.421 or as Type A material. Shipments of samples are usually controlled by the chemistry department.

A review by an NRC inspector of selected shipment records for 1987 and 1988 and the 1987 semi-annual solid waste reports (required by Technical Specification 6.6.A.4.), discussions with licensee representatives, and observations of packages being loaded for shipment offsite indicated no problems.

Coordinating the shipments of the three departments for radiological purposes is the health physics staff (HP) and the QA and QC departments. HP surveys all outgoing packages and vehicles containing radioactive material. In addition, HP verifies curie content calculations; reviews shipping papers and package marking and labelling; and verifies that the consignee is licensed to receive the radioactive material. The QA and QC departments review all of the shipments for compliance with selected procedures, requirements, and commitments.

In addition to inspections of each shipment prior to shipment, the QA department performs monthly surveillances of radioactive shipment activities and an annual audit of radwaste-transportation activities. The QA department has also inspected the new offsite nuclear laundry used by the station and has inspected repair work being done on a licensee-leased shipping cask at two out-of-state facilities. A selective review by an NRC inspector of reports of these surveillances and of the 1987 audit indicated that the scope of the surveillances and audit was adequate. Training records for several of the QA personnel involved in reviewing shipments indicated that the auditors were qualified to review this area.

The NRC inspection indicated overall high corporate and station involvement and performance in transportation activities.

No deviations or violations were identified.

16. Fuel Pool Liner Leakage (IP 92705)

Each of the station's two units is equipped with a spent fuel storage pool lined with stainless steel. Each pool is designed such that it cannot be drained to a level below that of the top of the fuel storage racks. A leak detection system is provided for the detection and collection of possible leakage behind the pool's liner plate. Each liner is segregated into quadrants which collect leakage (through leak-off lines) at independent sumps located under each corner of the pool. Flow from the sumps is monitored by flow switches equipped with alarms that annunciate in the control room; alarms are set at 1.92 gpm. Liner leakage is diverted from the sumps into the waste collector tank.

Shiftly operator rounds include visual observation of each sight flow indicator, recorded (checked-off) on "Reactor Building and Off-Gas Building Rounds" sheets. Abnormal conditions identified during rounds are required to be corrected on the spot or reported to the shift foreman. The inspector selectively reviewed operator rounds sheets for 1988 to date; no liner leakage was noted. According to the licensee, no significant liner leakage has ever been identified.

No violations or deviations were identified.

17. Surveillance-Plant Tours

The following were identified during tours of the plant:

- a. On one occasion, workers who had removed their protective clothing in accordance with step-off pad (SOP) instructions, were observed to exit from the SOP area and perform a rapid, superficial frisk of themselves. The failure to make a personal contamination survey (whole-body frisk) in accordance with frisking instructions is a violation of the licensee's procedure, LRP-1480-4, "Personal External Contamination Surveys (Hand Held Probe)," (Violation 373/88009-01(C); 374/88009-01(C)). Somewhat related to this violation are the inspectors' concerns pertaining to personal contamination events; see Section 9c.
- b. One of the major egress points from the reactor building during this outage was the Unit 2 D/G corridor which is equipped with three whole-body friskers. Contract HP technicians are scheduled to cover this egress point during selected peak traffic hours. The primary function of the technicians are to ensure that workers sign-in on the correct RWPs, ensure workers properly monitor themselves, direct contaminated workers to the 15-line monitoring station in the turbine building, and ensure no tools/equipment are carried out. On a few occasions during this inspection it was observed that technicians were not in attendance during the selected hours for coverage in the Unit 2 D/G corridor, and on one occasion the inspectors noted the attending technicians were not aware of their responsibilities for ensuring worker adherence to requirements. In addition, the inspectors noted that significant numbers of workers egress at this location during non-peak periods in which HP technicians were not in attendance. Although a large percentage of workers egressing at this location have performed hand-held frisk surveys at upstream work locations, the lack of full-time health physics coverage at the primary reactor building egress location during a major maintenance outage is a poor practice. This matter was discussed at the exit interview.

- c. During a tour of the auxiliary building on elevation 767', the inspectors observed the sampling and measurement skid of the SAIC Model 400 Radioactive Gaseous Effluent Isotopic Monitoring System (RAGEMS) used by the State of Illinois to monitor station gaseous releases from the stack. From discussions with licensee representatives, it was determined that the licensee does not impose as stringent of radiological controls for State of Illinois personnel who are performing work on the RAGEMS as are imposed for CECO personnel who perform work on the licensee's gaseous effluent monitoring equipment. State of Illinois personnel reportedly do not routinely consult with licensee radiation protection personnel before working on the RAGEMS, and licensee personnel do not normally perform radiological surveys of the RAGEMS equipment incident to work performed by State of Illinois personnel. However, according to licensee personnel, the RAGEMS skid presented only a minimal radiological concern, similar to that of the licensee's own stack monitoring system. Licensee representatives stated that the electronic repair equipment used by the State of Illinois technician who maintains the RAGEMS is surveyed by the licensee before removal from the plant. Discussions with the licensee and the technician indicated that samples from the skid are not removed from the station by the technician. According to the technician, these samples (iodine and particulate cartridges from the automated sampling and measurement portion of the RAGEMS) are disposed of by the technician in the station's trash. The employee did not indicate that he performed surveys in the skid or of the filters with a survey meter, nor was a survey meter visible in the skid or with the technician's equipment. The technician stated that his training was in electronics and that he was responsible for maintaining the skid. A review of CECO training records indicated that the technician has received NGET training. According to the technician this particular skid was a prototype of systems installed at other stations in Illinois and has been plagued with electronic and mechanical problems. Discussions with the technician and the licensee indicated that the licensee was unaware of the extent and frequency of maintenance performed on the system.

The licensee agreed to perform more extensive surveys of the interior and exterior of the skid, to ensure that any material removed from the skid is properly disposed of, and to ensure that station radiation protection procedures are followed during maintenance on the system. This matter will be reviewed further at a future inspection (Open Item No. 373/88009-04; No. 50-374/88009-04).

- d. During one of the tours of the Unit 1 drywell, licensee representatives emphasized to the inspectors that prior to the outage a high priority was placed on painting the drywell control area (bullpen) to facilitate decontamination; and that during the outage the RCTs assigned to the bullpen are instructed to keep workers who are in the bullpen area away from the drywell hatch. The licensee stated that although the dose rate at the hatch was only 1 mR/h (approximately), the dose rate in an adjacent area was 0.3-0.5 mR/h. The instruction was

intended as an ALARA dose-saving measure. During this tour, the inspectors observed workers staging in this low-dose area and an RCT directing personnel away from the drywell entrance. The inspectors also observed signs posted outside the drywell directing personnel away from higher dose areas. Inside the drywell, the inspectors observed postings, temporary shielding, portable HEPA ventilation systems in use, and several RCTs and work groups. No problems were noted.

RWPs for drywell work were posted at the work area control points and appeared to adequately reflect the respiratory protection requirements for the job; health physics personnel manning these control points verify workers are properly equipped.

18. Exit Meeting (IP 30703)

The inspectors met with licensee representatives (denoted in Section 1) at the conclusion of the inspection on April 7, 1988. The inspectors summarized the scope and findings of the inspection and also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspectors during the inspection. The licensee did not identify any such documents/processes as proprietary. In response to certain items discussed by the inspectors, the licensee acknowledged:

- a. the procedural violation (Sections 8, 12, and 17).
- b. the inspectors' comments concerning unmanned RCA egress control points and stated that a review would be made to determine if stronger controls were needed at the Unit 2 D/G corridor (Section 17).
- c. the inspectors' comments concerning the number of personal contamination events attributed to "contaminated clean areas" (Section 9(c)).
- d. the inspectors comments on the high level of corporate and station involvement in transportation activities (Section 15).
- e. the inspectors comments on the licensee's recent acquisition of several whole-body and hand and foot monitors; and on the improvements in contamination detection ability at the gatehouse.
- f. NRC management comments on the noticeable, high-quality improvement in the station's radiation protection program over the past several years.