U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 50-346/80-12

Docket No. 05000346 License No. NPF-3

Licensee: Toledo Edison Company
300 Madison Avenue
Toledo, OH 43652

Facility Name: Davis-Besse

Inspection At: Davis-Besse Site, Oak Harbor, OH

Inspection Conducted: April 21-24 and May 2 and 6-8, 1980

Inspectors: L. J. Hueter 6-24-80

Luis Reyes for 6/26/80

Approved By: W. L. Fisher, Chief 6-25-80
Fuel Facility Projects and
Radiation Support Section

Inspection Summary

Inspection on April 21-24 and May 2 and 6-8, 1980 (Report No.50-346/80-12)
Areas Inspected: Routine, unannounced inspection of radiation protection activities during refueling, including: procedures; advance planning and preparation; training; external exposure control; internal exposure control; posting, labeling, and control; material control; surveys; review of pipefitter concerns; radiation protection consideration from power loss during outage; contract rad tech qualifications; IE Information Notice 79-08; IE Circular 79-15; and a November 1979 waste shipment labeling problem. The inspection involved 76 inspector-hours on site by two NRC inspectors.
Results: Of the 14 areas reviewed, no noncompliance or deviations were found in 11 areas. Three apparent items of noncompliance were found in three areas (violation - overexposure to direct radiation; violation - inadequate exposure rate evalutions; and infraction - failure to follow procedures regarding planning and preparation). (Paragraph 4)

DETAILS

1. Persons Contacted

T. Murray, Station Superintendent (1)
D. Huffman, TECO Administrative Coordinator (1) (2)
B. Geddes, Operations QA (1)
D. Briden, Chemist and Health Physicist (1) (2)
M. Horne, Health Physics Supervisor (1) (2)
D. Miller, Operations Engineer (2)
B. Bayer, Assistant Station Superintendent (2)
C. Greer, Operations QA Supervisor (2)
J. Tapley, Chem and HP Foreman
D. Snyder, Operations Shift Supervisor
B. Armstrong, Chem and HP Foreman

The inspectors also contacted several other licensee employees, including members of the technical and operations staffs.

(1) Present at exit interview on April 24, 1980.
(2) Present at exit interview on May 8, 1980.

2. General

This inspection, which began about 12:45 p.m. on April 21, 1980, initially constituted a routine, unannounced inspection of radiation protection activities during refueling. Following notification on the morning of May 1 that one individual of a two man entry team had received a radiation overexposure while checking below the reactor vessel for leakage from the canal seal plate, additional inspection effort commenced. About half of the total inspection effort was devoted to examining this incident.

3. Licensee Action on Previous Inspection Findings

None within the scope of this inspection.

4. Radiation Exposure Incident - April 30, 1980

a. General

On April 30, 1980, about 11:30 p.m., a senior chem and rad tester accompanied an assistant shift supervisor in a descent to the normal sump tunnel (Figure 1) for a momentary look into the reactor vessel cavity, if radiation levels permitted, to check for any evidence of water leakage from the canal seal plate. This check was made to fulfill step 4.2 of procedure SP1102.15 titled "Fill, Drain, and Purification of the Refueling Canal." No evidence of significant leakage was detected. At the time

of the occurrence, the incore instruments were in the parked position (Figure 2) beneath the reactor vessel and extending into the incore instrument tunnel. The cavity was a recognized locked, and posted high radiation area. Entry of both persons was covered by proper Radiation Exposure Permits (REP's).

Before the entry, job planning and preparation was inadequate as evidenced by failure to review and/or note: (a) a previous H.P. Log entry, (b) previous survey data and area diagram applicable to the situation, and (c) the use of an apparent malfunctioning dose rate monitoring device. (Noncompliance with licensee procedure HP 1601.05.1, Section 6.3.4). The entry was made without an evaluation sufficient to ensure that the dose limits of 10 CFR 20.101(b) were not exceeded. (Noncompliance with 10 CFR 20.201(b)).

The entry resulted in one individual receiving a whole body dose exceeding 3 rems during the second calendar quarter of 1980. (Noncompliance with 10 CFR 20.101(b)).

A simulated reenactment of the entry by the two individuals indicated the total time in the tunnel was about 55 seconds, of which about 45 seconds was spent by the senior chem and rad technician untying a rope which secured the improperly located temporary wooden door. The exposure rate monitoring device showed, as confirmed by both individuals, the radiation field in front of the door to be about 10-20 mR/hr. Upon opening the door and seeing that they were looking straight in at the guide tubes housing the incore instruments (nearest one located an estimated 8-9 feet away), they immediately left and noted that both individuals' 0-1R personal dosimeters were offscale. The assistant shift supervisor's dosimeter hairline indicator, while offscale, was still visible, resulting in an estimated dose of 1.2 rems. He had only entered the high radiation field the last 15-20 seconds to assist in opening the door and during this time was standing behind the senior chem and rad tester. The plant chemist and health physicist, upon notification at home, came to the plant and initiated additional surveys and the simulated reenactment. The NRC Resident Inspector was notified about one hour after the occurrence (at which time the preliminary dose estimate was less than the three rem quarterly limit). By about 0230 on May 1, 1980, it was determined by use of an Eberline R02A survey meter, a Teletector survey meter, and timed exposures of both a 5R and a 100R dosimeter that exposure rates ranged from about 1R/hr in the tunnel, at the base of the ladder, to about 10 R/hr as one approached the right angled turn near the temporary door. About six inches directly in front of the door, exposure rates were measured in the range of 250-350 R/hr. Individuals conducting these measurements using extended probe instruments received small doses.

Using the above exposure rate measurements and simulated reenactment resulted in an estimated dose range of 3 to 8 rems but a most probable dose estimate of 4.5 rems for the senior chem and rad tester. For the assistant shift supervisor, the estimated dose range was 1 to 2 rems but a most probable dose estimate of 1.5 rems. The thermoluminescent dosimeters (TLD's) worn by the two individuals plus a third one exposed for a one minute timed interval at six inches in front of the temporary door were flown and hand carried to the vendor for prompt analysis on the morning of May 1, 1980.

For the senior chem and rad tester, a TLD dose of 4700 millirems was determined before midday on May 1, 1980, for the badge which had been worn for just the one shift. Added to the dose incurred the preceding month, the quarterly dose estimate became 4755 millirems.

This individual was removed from radiation work for the remainder of the quarter and for the remainder of the year will not be assigned jobs having significant exposure potential. For the assistant shift supervisor, a TLD dose of 1300 millirems was determined, his total dose for the quarter.

b. Previous Normal Sump Tunnel Entry and Survey

At the time of a previous outage in 1978, when the incore instruments were to be withdrawn to the "parked position" beneath the reactor vessel, a temporary wooden door was constructed at the base of the ladder in the tunnel to separate the section of the tunnel leading to the cavity under the reactor vessel from the other end of the tunnel where the normal sump and related equipment are located. A little later in 1978, a Facility Change Request (FCR) was submitted to provide a permanent woven wire barricade or doorway to replace the temporary structure. The proposal suggested the structure be prefabricated for quick installation during shutdowns. Although coded as a "Special High Priority Item" on the FCR, it had not been prepared for installation during the current 1980 refueling outage. Therefore, another temporary door was requested in the tunnel. Contracted crafts personnel constructed the temporary door just around the 90 degree turn in the normal sump tunnel (dotted Line B in Figure 1) rather than the requested location at the base of the ladder (dotted Line A in Figure 1), reportedly due to the complication of pipings located in the latter area. Radiation protection supervisory personnel efforts to relocate the door during the weekend before the scheduled late Sunday evening (April 27th) beginning of incore withdrawal to the parked position were unsuccessful. An entry in the H.P. Log on April 27, 1980, noted that the referenced door was improperly located and because of shielding considerations the location was not satisfactory. On April 28, after the

withdrawal of incore instruments to the parked position, a contract H. P. Technician was sent to conduct a cursory survey of the Normal Sump Tunnel to determine the feasibility of constructing a second temporary door at the intended location near the base of the ladder. The survey was curtailed when it was determined that construction activity was not feasible due to an exposure rate of 1 R/hr at the base of the ladder. A survey sheet showing the survey data was filled out and filed with other completed surveys.

c. The Entry on April 30 by the Senior Chem and Rad Tester and the Assistant Shift Supervisor

The following chronology was determined from interviews with involved individuals, including: the shift supervisor on duty; the health physics foreman on duty; the senior chem and rad tester who entered the tunnel, and the assistant shift supervisor who entered the tunnel.

About 10:30 p.m. on April 30, the shift supervisor notified the health physics foreman that he would be wanting health physics to accompany the assistant shift supervisor to the normal sump tunnel to momentarily look under the vessel, radiation levels permitting, to check for evidence of leakage from the canal seal plate. The procedure, SP 1102.15 titled "Fill, Drain, and Purification of the Refueling Canal," authorized a visual inspection with the notation that health physics support will be provided as required. The senior chem and rad tester who later made the entry was notified by his foreman that he should provide the health physics coverage when needed. Some comment was made about the potential for overexposure. About 11:00 p.m., the senior chem and rad tester was notified that the assistant shift supervisor was ready to start preparation for the entry. The chem and rad tester had assumed that the entry would not be made until after a planned electrical outage which was to begin at midnight. He was assisting in H.P. coverage of two other jobs in containment at the time. After making preparation, including proper logging out of the key for the locked access (top of the ladder to the normal sump) to the posted high radiation area, the senior chem and rad tester selected from the three Teletector survey meters located in containment the one which had the highest (mid range) battery check. He took the meter to an area where he had reason to believe, from previous experience, that the exposure rate was 1-2 mR/hr and placed the meter on the 0-2 mR/hr scale and observed a reading between 1 and 1 1/2 mR/hr, indicating operability of the instrument. The instrument selected had recently been purchased new and was calibrated by the manufacturer on January 23, 1980. It was due for recalibration in July 1980. The two then proceeded to the locked access. The results of the previous survey showing an exposure rate of

1 R/hr at the base of the ladder were not posted at the access to the tunnel nor was the senior chem and rad tester specifically told of the survey by his supervisor. Also, the senior chem and rad tester neither inquired nor reviewed the survey records regarding previous survey data for the tunnel area.

Although a survey sheet/floor plan of the normal sump tunnel (showing only one 90 degree bend leading directly to the Reactor Vessel Cavity) is a standard form available to H.P. personnel, this form was neither posted at the access nor was it consulted by the senior chem and rad tester before entry. Both he and the assistant shift supervisor were unfamiliar with the area, due to very infrequent entries.

During a subsequent interview by the inspectors, the senior chem and rad tester stated he was unaware that the door had been constructed at the wrong location in the tunnel. Although the fact had been noted in the H.P. Log two days earlier, he stated he did not recall reading it. He further stated his normal practice was to read the H.P. Log, but on this occasion he failed either to read or remember the entry. The normal sump tunnel entry without adequate job planning and preparation, as noted by examples described above, constitutes noncompliance with Technical Specification 6.8.1.a and implementing procedure HP 1601.05.1, Section 6.3.4.

Unlocking the access and descending the ladder, the senior chem and rad tester noted the reading on the black 0-50 mR/hr scale to be between 10 and 15 mR/hr with occasional spikes to 20 mR/hr. He stated that he then switched to the next higher scale, the red 0-2 R/hr scale. Noting the needle dropping to the low end of the scale, he switched back to the 0-50 mR/hr scale and observed readings as before. (The assistant shift supervisor has stated that he observed the readings and scale changes and that the readings were as described by the senior chem and rad tester.)

The senior chem and rad tester then made the comment, "This may not be as bad as I expected." He then proceeded toward the 90 degree turn, followed by the assistant shift supervisor, while observing the Teletector reading and remembers thinking, "This wall must be providing better shielding than I thought it would." Placing the Teletector probe in front of the improperly located door, the instrument still showed exposure rates of 10-15 mR/hr with occasional spikes to 20 mR/hr. The higher scale check was again tried with the same results as before, again observed and verified by the assistant shift supervisor. The senior chem and rad tester, not aware of the door being improperly located or of the previous recorded survey showing an exposure rate of 1 R/hr at the base of the ladder, mistakenly assumed that there must be one more turn in the tunnel providing shielding from the incore

instruments located in the parked position beneath the reactor vessel. In a subsequent interview by the inspectors, the senior chem and rad tester stated that the spiking of the instrument in a radiation field of 10-15 mR/hr should have been an indication to him that the instrument was malfunctioning. Further, he was anticipating a radiation field much higher than that indicated by the survey meter in use. This failure to make an adequate exposure rate evaluation to ensure that the dose limits of 10 CFR 20.101(b) were not exceeded was in noncompliance with 10 CFR 20.201(b), which requires each licensee to make evaluations as necessary to comply with other sections of the regulations in Part 20.

The chem and rad tester then stepped in front of the door and proceeded to untie the rope used to secure the door, which was held in the frame by hasps located on both sides of the door. The door could not be pushed open after untying one hasp, so effort was made to untie the second hasp. Experiencing difficulty with the second hasp, the assistant shift supervisor stepped from his relatively shielded position to a position just behind the senior chem and rad tester to assist. As noted previously, the assistant shift supervisor spent an estimated 15-20 seconds in front of the wooden door. Pushing the door open and immediately noting they were looking directly at the incore instrument guide tubes, they both made a hasty retreat, observed that their dosimeters were off scale, and reported to their supervisors.

The senior chem and rad tester, in disgust, realizing what had happened, gave the Teletector a toss upon returning to the instrument laboratory. It struck the door frame, fell a small distance, and slid a small distance on the floor. Shortly after, its calibration was checked and found satisfactory. Further attempts to reproduce a malfunction of the instrument by saturating the detector on the low scales, by tapping the instrument, and by visually checking for loose connections were unsuccessful. Further check of the instrument on May 2, 1980, in the presence of the NRC inspector also showed satisfactory calibration, showed no evidence of saturation of the low scales in exposure rates up to 540 R/hr, and showed no other problems.

d. Exposure Rate and Dose Determination

The plant chemist and health physicist was promptly notified, as was the NRC resident inspector.

Within about an hour, using two different types of high range survey meters, an entry was made to the base of the ladder and a Teletector was used with an extended probe placed about six inches in front of the door to measure the exposure rate (noted

to be about 250 R/hr). Attached to the extended probe were an unexposed TLD, a 5R dosimeter, and a 100R dosimeter, which were then held in front of the door for a timed one minute. The lower range dosimeter indicated an exposure rate of about 250 R/hr, while the higher range dosimeter indicated an exposure rate of about 350 R/hr. The TLD was hand carried a few hours later, along with the TLD's worn by the two exposed individuals, for immediate processing. At this time (before the simulated reenactment) it was believed that neither individual had exceeded the 3-rem quarterly limit, in that the assistant shift Supervisor's dosimeter hair line was offscale but still visible, indicating about 1.2 rems. About 2 1/2 to 3 hours after the occurrence (02000230), in a simulated, timed reenactment, it was demonstrated that the assistant shift supervisor spent only 15-20 seconds of the 45 seconds spent by the other individual in the high radiation field. Further, he stood behind the senior chem and rad tester, thus benefitting from a little greater distance and shielding. It was then concluded that the assistant shift supervisor had received 1 to 2 rems (1.2 rems considered most probable) and the senior chem and rad tester had received 3 to 8 rems (4.5 rems considered most probable).

Following this it was decided that a plant health physicist, who had previously been to the vendor's facility on an audit, would fly the TLD's to the vendor for analysis. The analysis of the TLD's and the daily instrument check of the reader system used for the analysis were observed by the health physicist. Later in the morning, the following results were telephoned to the licensee:

Badge Identification	Whole Body Dose (mrem)
Senior Chem and Rad Tester	
Badge worn during event	4700
Badge worn previously during calendar quarter	55
Assistant Shift Supervisor	1300
Timed TLD Exposure	
One minute in front of door	6000

The doses received by the individuals, as indicated by the badges worn in the lower central chest region, not only were within the ranges estimated by the licensee but were very close to the most probable estimated doses for the two individuals. With the incore instruments located about 1-1.5 feet above the floor and the nearest one located about 8-9 feet away from the individuals, the licensee concluded that the radiation field at the exposure location was relatively homogeneous and that the TLD's worn by the individuals properly represented their whole body doses.

Receipt of a whole body dose of 4.76 rems by the senior chem and rad tester, while working in a restricted area during the second calendar quarter of 1980, constitutes noncompliance with 10 CFR 20.101(b), which limits such dose to 3 rems.

e. Problems Revealed by this Event

The occurrence revealed several problems related to the high radiation area entry. The decision for entry was somewhat hastily made and was executed without adequate preparation, planning, and evaluation of the radiation hazard, as evidenced by the senior chem and rad tester being: (1) unfamiliar with a floor plan of the area, (2) unaware of a door being improperly located in the tunnel, and (3) unfamiliar with previously available limited survey data regarding the area.

The pace of events, the work load on the senior chem and rad tester at this particular time, and the lack of posting at the entrance regarding both a floor plan of the area and previous survey data were probably contributory. The senior chem and rad tester assigned the job assumed that the entry would be conducted after a scheduled electrical outage rather than before. That delay would have allowed him time to complete other jobs he was involved in and, possibly, to better prepare for the high radiation area entry. Had the latest survey data/floor plan of the area been posted at the entrance to the area, that information alone might have precluded the overexposure. Hindsight demonstrates in this case that no door at all would have been better than a door constructed in the wrong location.

The reactor cavity was recognized as a source of potential high exposure. Radiation protection personnel had been made aware of exposure problems encountered with reactor cavity areas at other facilities and the senior chem and rad tester, at the time of the occurrence, was aware that this was a problem area. Further, the week before the occurrence, the NRC Inspector had discussed the potential hazards of this area and cautioned licensee radiation protection management personnel regarding high radiation areas generated by incore instruments removed from the reactor core. Thus, the incident appears to have occurred despite general knowledge of these problems and despite the existence of administrative controls. Following this occurrence, the licensee was requested to respond to IE Circular No. 76-03, dated September 13, 1976, titled, "Radiation Exposures in Reactor Cavities," as was requested of all licensees having operating reactors when the circular was issued. This response was prepared and reviewed by the inspectors in light of the occurrence. These matters were discussed in the exit interview on May 8, 1980.

f. Prompt Corrective Action Taken

Immediate corrective action taken by the licensee to preclude recurrence included:

(1) Procedures were modified to prohibit visual inspection of the reactor vessel cavity when the incore instruments are withdrawn to the parked position.

(2) Two high range survey meters of different types must be used for any entry into a high radiation area.

(3) The occurrence and changes to procedures put into effect were discussed with operations and health physics personnel.

(4) The entrance to the normal sump tunnel and other high or potentially high radiation areas in containment have now been posted with a floor plan of the area and, where applicable, the most recent survey data, in the manner previously used for posting such areas located outside of containment.

5. Procedures

Radiation protection activities for refueling are covered under the licensee's regular radiation protection procedures. The licensee had reviewed these procedures over the past several months, updated several to correct minor errors previously identified, and updated others to reflect procedural changes. Review of these procedures by the inspector revealed, in addition to a couple of typographical errors, a weakness in implementing procedure HP 1601.05, Revision 1, titled "Methods to Reduce Radiation Exposure," regarding job planning and preparation with particular reference to high radiation area entries. These procedural problems were related to the radiation exposure incident described in Paragraph 4. In this regard, the licensee now posts floor plans at entries to high or potentially high radiation areas in containment and, where applicable, also posts the latest survey data. Two high range survey meters of different types are now required for entry into high radiation areas. Also, in addition to normal administrative control of keys to locked high radiation areas, H.P. management (above the H.P. foreman level) must now provide approval before the entry.

No other procedural problems were noted.

6. Advance Planning and Preparation and ALARA

Aside from the advance planning and preparation problem identified in the preceding paragraph, no other problems in this area were identified. Radiation protection equipment and supplies, including dosimeters, TLD's, survey meters, and monitoring equipment, appeared to be adequate.

Respiratory protection equipment appears adequate for present plant conditions but might be marginal if the secondary system became contaminated or the primary system became more highly contaminated.

ant efforts appear to be good at minimizing contamination buildup both internally and externally to plant systems. A decontamination crew works full time during the outage to minimize contamination levels; this in turn minimizes need for protective clothing and respiratory protective equipment. The number of radiation protection personnel generally appears adequate considering the relatively low levels of contamination and considering that the services of at least 30 contract radiation protection personnel have been obtained for the outage. The previous outage for burnable poison and orifice rod removal was critiqued and utilized to train and plan for the current outage. A special training class was held with both maintenance and trades personnel before the outage to discuss radiation protection matters. Weekly safety meetings are held during the outage to answer questions.

Radiation protection management personnel receive a copy of Maintenance Work Orders, generally 2-3 weeks before the work is to begin, for review with the intent of keeping radiation exposures as low as reasonably achievable (ALARA). Facility Change Requests (FCR's) are handled similarly. The review includes consideration of whether a "primary system boundary" will be broken; consideration of the need for presurveys to determine if contamination areas, high radiation areas, and/or airborne activity areas will be involved, preporatory to evaluating needed protective measures; and consideration of possible alternate ways of accomplishing the task. The review frequently involves evaluating the merits of decontaminating an area and/or using temporary shielding of "hot spots" before the work begins.

No items of noncompliance or deviations were identified.

7. Training

The inspector participated in the complete security, general safety, and radiation safety training and testing used for both initial indoctrination and annual retraining. This training involves four or more hours of instruction and testing and is well presented. This training in general appears to be comprehensive in radiation protection matters and covers all of the "Instruction to Workers" items delineated in 10 CFR 19.12.

No items of noncompliance or deviations were identified.

8. External Exposure Control

The overexposure incurred by a plant employee near the reactor cavity area during entry to the normal sump tunnel has been described earlier

in this report (Paragraph 4). During the early stages of the outage, the inspector reviewed exposure records for other workers and the licensee's procedures for maintaining day-to-day control of exposures. All persons entering the controlled area are required to wear a self-reading, 0-500 mR, pocket dosimeter and TLD a badge,which is processed monthly by the vendor. In addition, persons working in potentially high exposure areas are issued a second higher range self-reading dosimeter. The exposure history of each individual is maintained on a radiation exposure card, which is updated with dosimeter data upon each egress from the controlled area, with appropriate corrections made to replace dosimeter data with the official TLD data for the corresponding period when such data become available. Personnel are placed on ascending priority alert lists when their quarterly dose reaches levels of 600, 1200, and 2500 mrem. Special colored tape is placed on the individual's dosimeter when alert levels are reached to draw further attention to the individual's quarterly dose. Except for the reactor cavity area exposure incident, no problems were observed in the licensee's system of maintaining control of outage exposure. The licensee, in their rather short history of operating experience, has a very good record of keeping overall exposures (total annual man-rems) at very low levels.

No items of noncompliance were identified, other than those noted in Paragraph 4.

9. Internal Exposure Control

No problems were identified with the licensee's practices for control of internal exposure. Potential for uptake by either inhalation or ingestion is minimized by (a) the relatively low levels of both fission and activation products in the primary system (attributable in part to good chemistry control, (b) the use of local enclosures with filtered venting when breaking a primary boundary to aid in contamination control (such as for eddy current testing of steam generator tubes), and (c) the use of full time decontamination crews to keep areas clean. As a result of these efforts, contamination levels in containment have been kept in general to levels of 400-600 dpm per 100 cm^2. These efforts also have resulted in the need for very little use of respiratory protective equipment. The licensee's respiratory protection program includes: properly approved equipment; medical evaluation; fit testing and training of potential users; inspecting, maintaining, and cleaning of equipment; and a means for documenting MPC-hours of exposure when needed. A routine and special air sampling program is used to assess the need for respiratory equipment or to limit stay times.

Incoming people are whole body counted before entry to radiation areas. Whole body counts are also planned for terminating employees (including contract personnel) who have worked in airborne areas and, in special situations, for evaluing the overall program effectiveness in limiting internal exposures.

A number of whole body counts, mostly counts of incoming employees for determination of base-line levels and a few counts of terminating employees (few people had terminated at the stage of the review) were reviewed during the inspection. No problems were identified.

The licensee normally performs some tritium urinalysis quarterly but plans some special additional urinalysis during the period of fuel transfer.

10. Posting and Control

The inspectors toured portions of the controlled area, including containment and the auxiliary building, in company with licensee representatives. A licensee-furnished instrument was used to conduct independent measurements, to observe radiation levels, and to verify high radiation area posting and controls. The inspectors observed:

a. Housekeeping was in general good for outage conditions.

b. Additional shielding had been constructed in potentially occupiable areas near the fuel element transfer tube.

c. Entrance to high radiation areas associated with the incore instruments in both the parked position and during transfer to the cut-up tank were locked and posted as high radiation areas.

d. Posting, while initially meeting regulatory requirements, was improved following the overexposure incident by posting of a floor plan of the area and, where applicable, the latest survey results.

e. No problems were identified in use of the radiation exposure permit (REP) system.

No items of noncompliance or deviations were identified.

11. Material Control

The licensee's procedures and practices for controlling radioactive and contaminated materials were reviewed. No problems were identified.

12. Surveys

The licensee has a program of daily, weekly, monthly, and special situation surveys for direct radiation, contamination, and airborne activity. The inspector concentrated on review of surveys conducted in the containment for the outage. As noted in Paragraph 9, contamination levels appear to be well controlled in containment. Air sample data show that airborne activity in general, has been low and has been well controlled to date. Accesses to high radiation areas were found to be locked and properly posted.

In the early part of the inspection, alert and high alarm set points were found set at about 10 MPC and 100 MPC, respectively, for both particulate and noble gas monitors on the two fixed air monitors in containment. This reflects the relatively high set points needed when the plant is at power but not necessarily needed when the plant is shutdown. Licensee personnel acknowledged that much lower set points were practical, and lowered the set points accordingly.

A noncompliance for an inadequate exposure rate evaluation is discussed in Paragraph 4.

13. "Walk-Off-of-Job" by Three Pipefitters, on April 15, 1980

The inspector reviewed from a radiation protection consideration the walk-off-of-job by three pipefitters on April 15, 1980. The work involved grinding specified areas in the refueling canal after the areas had been decontaminated as determined by appropriate surveys. Permission had been given to the job foreman to start grinding in certain areas where decontamination and satisfactory surveys had been completed. After grinding had commenced in the authorized area, a decontamination crew arrived to continue their efforts at a nearby area. Air samples taken in conjunction with such grinding operations have shown no significant airborne activity. The pipefitters then feared that the area in which they were grinding was not decontaminated, in that their foreman had not communicated to them that some of the area on which grinding was to be done later had not yet been decontaminated. The individuals did not work in an airborne radioactivity area. The resident NRC inspector later talked to one of the workers who stated that he was now satisfied that radiation protection coverage was proper and that he had not worked in an airborne area. The licensee, although their procedures do not require whole body counting if individuals have not worked in airborne areas, contacted the union hall and requested that the workers return for exit whole body counts. The workers had not yet availed themselves of this opportunity.

No items of noncompliance were identified.

14. Loss of Offsite Power on April 19, 1980

The inspector reviewed, for radiation protection considerations, the partial loss of offsite power, which occurred at about 2:45 p.m. on April 19, 1980 during the early stage of the refueling outage. The loss of power affected a loss of all capability to vent, including containment (as the exhaust fans were inoperable); a loss of operability of the radiation monitors and the fixed air samplers; and a loss of operability of the plant-wide GAITRONICS system, a combined phone and page system. (The concern that this latter system was not operable under emergency power is being pursued by the resident inspector.) Until power was restored to the instruments about 1 1/2 hours later, radiation conditions were monitored by radiation protection personnel.

The monitoring included collection and analysis of air samples to determine airborne concentrations. Radiation protection personnel promptly toured containment and told workers to leave.

At the time of this occurrence, two individuals were working in the decay heat pit in some contaminated water on the floor area. These workers were wearing proper protective clothing and received no personal contamination. One other individual during this time received minor clothing contamination (about 300 cpm with frisker probe) but no skin contamination from a "vent bottle."

Power was restored to the GAITRONICS system in about a half hour at which time an announcement was made by the station superintendent for personnel to leave both containment and the auxiliary building primarily because of lack of ventilation and heat build-up. An air sample analysis had already indicated that no significant airborne hazards existed.

Subsequently, two unidentified workers related to the news media that about 45 minutes after loss of power they exited containment but had neither heard the radiation protection personnel verbal instructions or the later page message instructing all personnel to leave containment. Air samples taken in containment showed no significant airborne concentration of either radioactive particulates or iodines. Noble gas concentrations in containment ranged from 0.17 to 1.5 MPC. Therefore the exposure of the two individuals who were in the containment for about 45 minutes should have been less than 1.5 MPC-hours, compared to the weekly 40 MPC-hour control measure in 10 CFR 20.103. Further, the MPCs for noble gases, due to their inert nature, are based on the direct radiation from the gas. Therefore, this dose should be accounted for in the TLD badge worn by each worker.

About four hours after the initial power loss, when power had been restored to all monitors and to fans, the low-level noble gas activity from containment was released as a planned, monitored release via a normal containment purge. A calculated 1.1 curies of the noble gas Xe-133 was vented in this planned release. The inspector reviewed the sample analysis and calculations and identified no problems.

Following this occurrence a change in security procedures was instituted requiring those entering containment to leave their picture badge with security personnel at the entrance to containment to provide better control and knowledge of individuals working in containment.

No items of noncompliance were identified.

15. Contract Rad Tech Qualifications

To assist in the refueling and maintenance outage the licensee is utilizing the services of about 30 radiation protection technicians

contracted from Rad Services. These technicians are hired and assigned responsibilities on the basis of three designated levels (Levels 1, 2, and 3). Level 2, the basic level, is equivalent to the licensee's regular technician level (chem and rad tester) and requires that the technicians have 4000 hours or two years of experience with Rad Services with some allowance permitted for previous military training and experience in radiation protection. These individuals are permitted to perform, under supervision, routine radiation protection technician duties, which include monitoring, conducting various surveys (surface and airborne contamination and direct radiation), and ensuring that appropriate radiation protection policies and practices are followed. Anyone who does not meet Level 2 requirements is considered Level 1 (about one-third of the contracted technicians) and is assigned to assist in tasks under proper supervision. Decontamination work is the major assignment for Level 1 technicians. All Rad Services technicians are given a B & W basic health physics course. Level 3 duties, over and above those for Level 2, are essentially administrative responsibilities for the Rad Services technicians. The two contract technicians in this level each had at least ten years total radiation protection experience, of which three years were with Rad Services.

Both had supervisory experience before their employment with Rad Services and one of the two had completed three years of college. The licensee had resumes on file for all contract technicians and had reviewed these for mutual agreement on acceptance of each technician and for assignment of the proper level. The licensee retains the right to reject any individual whose resume is considered unsatisfactory and to terminate the services of any technician who does not perform to the licensee's satisfaction. The resumes were selectively reviewed by the inspector. No problems were noted. No significant problems in this area have been encountered by the licensee thus far in the outage.

16. IE Information Notice 79-08

The licensee has reviewed the service air system used as a source of breathing air for any interconnection with contaminated systems. No interconnections were identified. Further, the licensee uses nitrogen rather than the service air system as the gas for gas operation of any contaminated system. As an additional precaution, operating procedures require that the valve on the service air be opened and allow air to flow through a cloth filter for 1-2 minutes and to check this filter to verify the absence of radioactive contamination before any use of the air.

No items of noncompliance or deviations were identified.

17. IE Circular 79-15

Regarding certain problems identified by NIOSH with Serviv Air Mark I SCBA, the licensee neither possesses or uses this equipment.

18. Waste Shipment Labeling Problem, November 1979

The Bureau of Radiological Health, South Carolina Department of Health and Environmental Control, notified the licensee by letter dated November 13, 1979, of the arrival from the licensee of an improperly labeled radwaste shipment on November 8, 1979, at the Chem-Nuclear Systems burial site near Barnwell, South Carolina. The shipment consisted of eight wooden crates of contaminated structure parts containing a total of 0.002 curies. Upon arrival, the crates each had a yellow III label and were marked "UNHARMFUL", rather than the "Radioactive LSA" label specified by Toledo Edison RSR dated November 6, 1979. The licensee stated that the proper labels and only the proper labels were on the containers as they left the licensee's site. The labels were stapled on the crates. The licensee surmises that the original labels blew off and that someone, probably the truck driver, put on other labels in an attempt to avoid the obvious problem of no labeling. To prevent recurrence, the licensee discontinued the use of stapled "Radioactive LSA" signs and now uses a stencil and paint for affixing the labels.

19. Management Meeting

a. Exit Interview, April 24, 1980

The scope and following findings of the first part of the inspection were discussed with Mr. Murray, Station Superintendent, and others (Paragraph 1) at a meeting on April 24, 1980.

1. The inspector noted that radiation protection equipment and supplies appeared to be adequate. The inspector stated his judgment that, while the supply of respiratory protective equipment appeared adequate for present plant conditions, it might be marginal if, in the future, the primary system becomes more highly contaminated and/or the secondary system (including the turbine) becomes contaminated. The licensee noted the comment.

2. The inspector commented that the training in radiation protection matters appears to be good, while noting that adequate training cannot be overemphasized in preparing workers for initial work experience in a nuclear facility.

3. The inspector noted that the alert and high alarm set points for both the particulate and noble gas fixed air monitors in containment were still set at 10 MPC and 100 MPC, respectively, based on previous plant operating conditions and not current outage conditions. Licensee personnel acknowledged the comment and agreed to promptly lower the set points based on outage conditions. During the last part of this inspection, it was noted that the set points had been appropriately lowered.

b. Exit Interview, May 8, 1980

The scope and the following findings of the second part of the inspection (overexposure incident) were discussed with Mr. Bayer, Assistant Station Superintendent, and others (Paragraph 1) at a meeting on May 8, 1980.

1. The inspectors discussed with licensee personnel the three items of apparent noncompliance identified during the inspection: (a) the overexposure of one individual, (b) the inadequate exposure rate evaluations, and (c) the inadequate planning and preparation. (The latter two both contributing to the overexposure.)

   The licensee noted measures promptly taken to preclude recurrence of overexposure of personnel, including modification of procedures, increased management control over entry to locked high radiation areas, and use of two high range survey instruments of different types for such entries. The licensee provided a requested response to IE Circular 76-03, "Radiation Exposures in Reactor Cavities," dated September 10, 1976. The response includes some of the measures taken to preclude recurrence of personal overexposure.

2. The inspectors expressed a concern over the apparent low regard by management for Facility Change Requests assigned a high priority from a radiation protection standpoint, as evidenced by long periods of inaction on the requests.

c. Meeting with Corporate Management, June 4, 1980

On June 4, 1980, Region III management met with W. A. Johnson, R. P. Crouse, L. C. Phillips, and T. D. Murray to discuss, among other things, the April 30, 1980, overexposure. The licensee was advised that the NRC views the overexposure as a serious occurrence which probably will result in escalated enforcement action.

Attachment: Figures 1 and 2

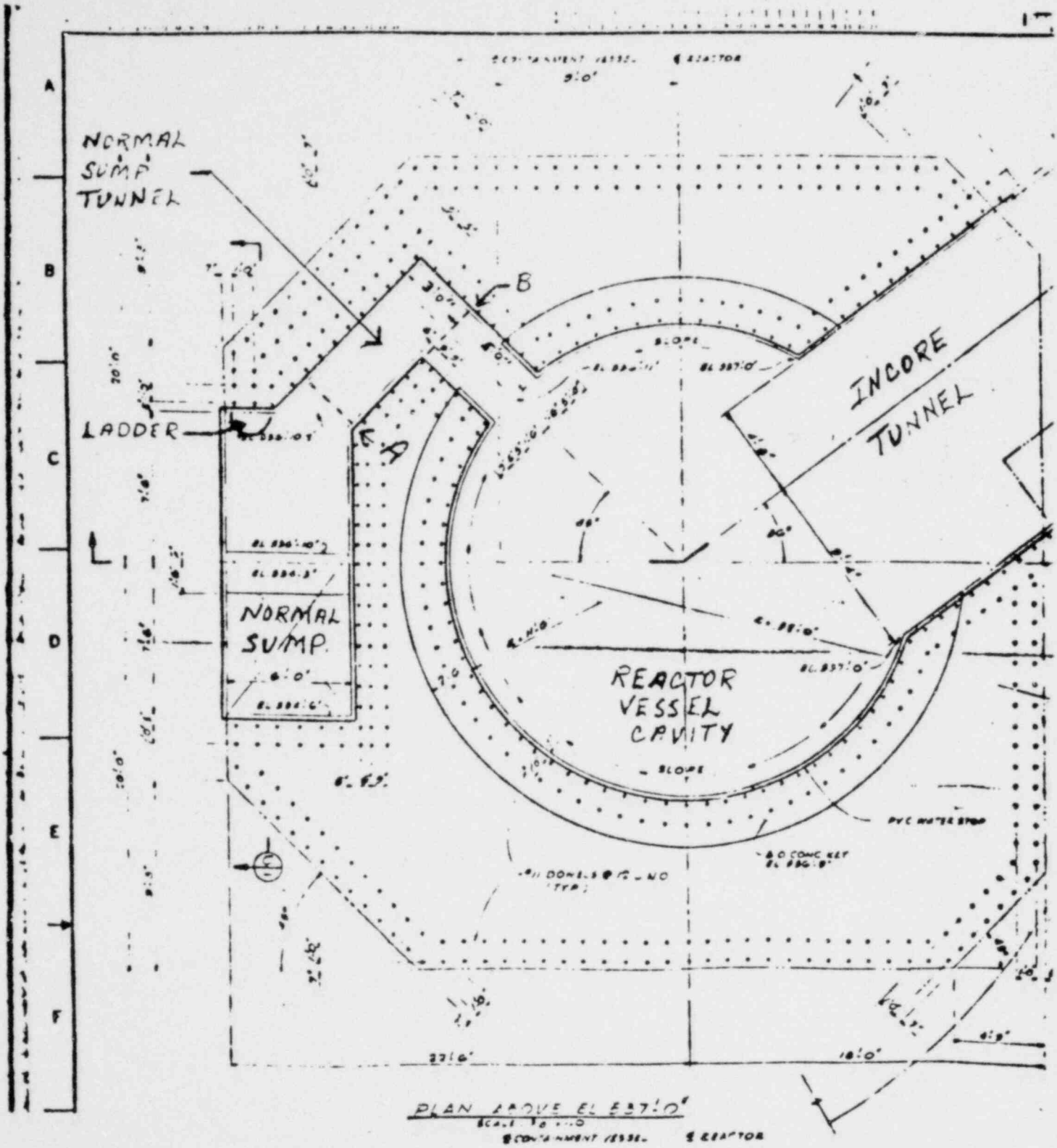
NORMAL SUMP TUNNEL
LADDER
NORMAL SUMP
REACTOR VESSEL CAVITY
INCORE TUNNEL
A
B
C
D
E
F
PLAN ABOVE EL 837.0"

FIGURE 1.

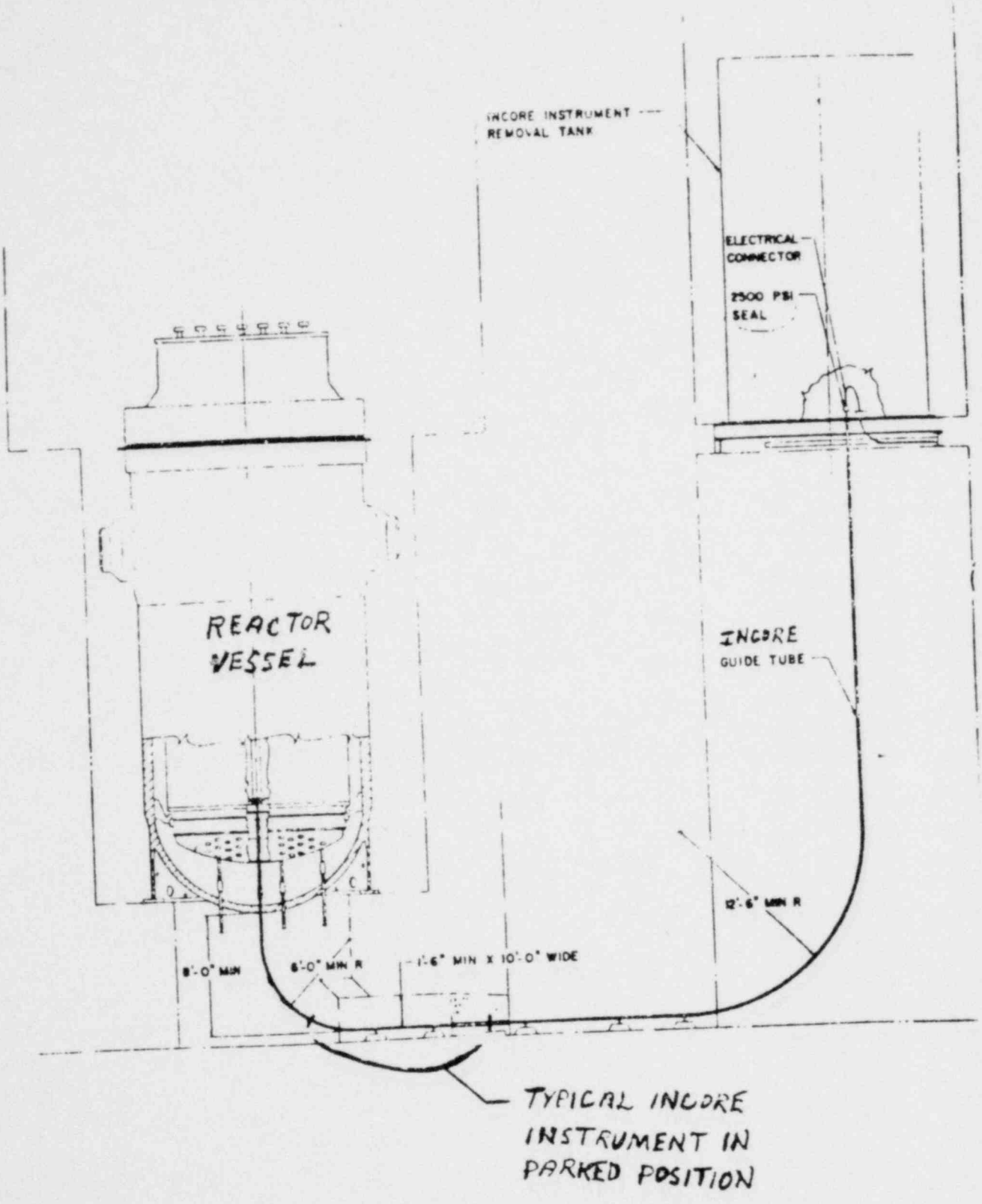
INCORE INSTRUMENT
REMOVAL TANK
ELECTRICAL
CONNECTOR
2500 PSI
SEAL
REACTOR
VESSEL
INCORE
GUIDE TUBE
12'-6" MIN R
8'-0" MIN
8'-0" MIN R
1'-6" MIN X 10'-0" WIDE
TYPICAL INCORE
INSTRUMENT IN
PARKED POSITION

FIGURE 2.