U. S. NUCLEAR REGULATORY COMMISSION

REGION III

REPORT NO. 50-331/95008

FACILITY
Duane Arnold Energy Center
License No. DPR-49

LICENSEE
IES Utilities Incorporated
IE Towers, P. O. Box 351
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DATES
August 17 through September 21, 1995

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10/25/95
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AREAS INSPECTED

Routine, unannounced inspection of plant operations, maintenance, surveillance, onsite engineering, and plant support by the resident inspectors. Announced inspections of Review of Plant Hardware Modifications to Reactor Vessel Water Level Instrumentation (TI 2515/128, Revision 1), Implementation of Revised 10 CFR Part 20 (TI 2515/123), routine chemistry inspection, and security. Safety assessment and quality verification activities were routinely evaluated. Followup inspection was performed for certain previously identified items.

EXECUTIVE SUMMARY

The inspectors and the licensee identified several concerns within the area of **OPERATIONS**. The concerns identified were:

- There were several examples where in-plant operator attentiveness appeared to have been weak (Section 1.2).

- A tagout issue identified by the licensee indicated that corrective actions for previous weaknesses in this area had been ineffective and resulted in a violation (Section 1.1).

The inspectors did note several examples of good operator response to plant events, communication and coordination (Section 1.2).

The inspectors and the licensee identified a number of concerns within the area of **MAINTENANCE**. These concerns are summarized below:

- Two examples of personnel errors resulting from inadequate self-checking were identified. In one example the thermal overloads on the safety-related instrument air compressor were not set in accordance with the maintenance instruction form resulting in the compressor tripping during testing. In the second example, the incorrect installation of jumpers during a surveillance test resulted in an unexpected half scram. (Section 2.1 & 2.2).

- Weak work planning resulted in an incorrect ventilation unit being tagged out for maintenance and potentially could have resulted in personal injury. (Section 2.3).

- Flow oscillations during core spray system testing resulted when the instrument lines for a flow instrument were restored to service without being properly back filled. The inspectors were concerned because this was a repeat occurrence and appeared to be caused by weak backfill and venting procedural guidance. (Section 2.5).

The inspectors did note that maintenance department performance was strong in identifying and correcting a potential reactor protection system (RPS) motor generator set supply breaker problem and that several examples where work planning was well implemented were observed (Section 2.0). An inspection followup item was opened when a 15 foot piece of rope was found in a fuel pool cooling pump (Section 2.4).

The inspectors identified one concern within the area of **ENGINEERING**.

- Engineering personnel failed to establish monitoring for water in the standby gas treatment system when changes were planned that affected that system (Section 3.2).

The inspectors did note good engineering participation for several equipment issues that arose (Sections 1.2, 2.6, and 2.8). Good engineering support was noted for radioactive shipments and process monitors (Section 4.2 and 4.3).

The licensee identified two weaknesses in the area of **PLANT SUPPORT**. Both of the following weaknesses pertained to inattention to detail:

- A station firewatch made an unauthorized entry into a posted high radiation area during the movement of a radioactive waste high integrity container (Section 4.1). This was characterized as a non-cited violation.

- Two occasions where alarm station personnel deactivated the wrong protected area gates and two other occasions where security officers failed to conduct required searches at the intake structure were identified (Section 4.5).

The inspectors did note that the licensee effectively implemented the Revised 10 CFR Part 20 regulations which were effective January 1, 1994 (Section 4.4). The solid radioactive waste reduction program continued to be aggressively implemented and supported by station management (Section 4.3). Licensee performance in the confirmatory measurements program (radiochemistry) and water chemistry parameters were very good (Section 4.6). Security program performance was strong in several areas and provided an appropriate level of protection to ensure public health and safety. Tactical training activities, security drills, and maintenance support activities were identified as specific program strengths (Section 4.5).

The inspectors' review of selected **SELF ASSESSMENT AND QUALITY VERIFICATION** activities did not identify any concerns. The licensee's self-assessment of Hardware Modifications to Reactor Vessel Water Level Instrumentation, performed in July 1995, was detailed and complete (Section 3.1). The chemistry self assessment program was strong, as was the radiochemistry quality assurance program (Section 4.7). The audits of the process and effluent radiation monitor program and the radiological environmental monitoring program were thorough and probing (Section 4.2).

Summary of items opened in this report
Violation: Identified in Section 1.1
Inspection Follow-up Item: Identified in Section 2.4
Non-cited Violation: Identified in Section 4.1

INSPECTION DETAILS

1.0 PLANT OPERATIONS (71707) (92901)

The inspectors observed control room operations, reviewed applicable logs, and conducted discussions with control room operators during the inspection. The inspectors verified the operability of selected emergency systems, reviewed tagout records, and verified proper return to service of affected components. Tours of the reactor and turbine buildings, pump house, and river intake structure were conducted to observe equipment materiel condition and plant housekeeping, and to verify that maintenance action requests had been initiated for equipment in need of maintenance. It was observed that the Plant Manager and Operations Supervisor were well-informed of the overall status of the plant and that they made frequent visits to the control room.

These reviews and observations were conducted to verify that facility operations were in conformance with the requirements established under technical specifications (TS), Title 10 of the *Code of Federal Regulations*, and administrative procedures. The inspectors were concerned that despite corrective actions for recent tagout implementation weaknesses, another example was identified by the licensee during this report period.

1.1 Incorrect Tagout Restoration of Containment Atmosphere Dilution System

In September, while performing routine testing of the containment atmosphere dilution (CAD) system, an instrument technician noted that two normally closed valves were open. The licensee's investigation determined that the valves had been part of a system tagout on September 6, 1995, and were restored improperly when that tagout was cleared. Both the person who removed the tags and the independent verifier failed to properly restore the valves to the normal position. Administrative Control Procedure (ACP) 1410.5, "Tagout Procedure," Revision 17, required that the correct valve position be determined prior to restoring systems. Based on interviews during the investigation, the licensee determined that neither person involved with the error followed the procedure to determine the proper position before restoring the system and instead relied on system knowledge to determine the correct as left position. Criterion V of 10 CFR Part 50, Appendix B, required that activities affecting quality be accomplished in accordance with procedures. The failure of the operators to follow ACP 1410.5 for system restoration is considered a **violation (50-331/95008-01)**.

The inspectors were concerned that this was a further example of weaknesses in the implementation of the tagout program. Although the CAD system error was of low safety significance, this and other recent tagout issues as discussed in NRC Inspection Reports (IR) 50-331/95002, 95003, 95006, and 95007 indicated that corrective actions had not been effective. The inspectors reviewed the preliminary corrective actions

for the CAD system error and will monitor the licensee's implementation of these changes.

1.2 Operator Attentiveness and Response to Plant Events

During the report period, the inspectors noted several examples where operator response to events and operator attentiveness were good. However, there were also examples where the inspectors questioned the attentiveness of in-plant operators. Overall, operator performance was considered mixed. The examples reviewed are listed below.

- On August 29, 1995, the licensee received primary containment isolation groups 2 through 5 isolations and a half scram when the "B" reactor protection system motor generator (RPS MG) electrical protection system (EPA) breaker B-2 tripped. All automatic actions occurred as designed. After extensive troubleshooting effort, the licensee was unable to determine the cause of the event and a decision was made to return the unit to service with monitoring equipment installed. The inspectors noted good operator response to the event and excellent communications during system realignment. There was also good engineering and maintenance involvement on this issue.

- On September 1, 1995, an in-plant operator on rounds in the reactor building, identified what sounded like a packing leak in the steam tunnel. Subsequently, it was determined to be a packing leak on RCIC motor operated steam supply valve MO2401, which was promptly repaired. Operator attentiveness in identifying the packing leak was considered excellent. See Section 2.8 for more details.

- On September 11 and again on September 12, 1995, the inspectors noted that water dripping into a bucket had overflowed and spilled water onto the floor in the turbine building basement, which presented a potential personnel hazard. The inspectors informed operations personnel of the situation, who indicated that it would be corrected. After the second occurrence, the licensee changed the drainage to go to a floor drain via a hose. The bucket was used to collect drainage from the plant heating system that was tagged out for maintenance. The inspectors were concerned that the in-plant operators had not noticed or taken care of the overflowed bucket until it was mentioned by the NRC.

- On September 14, 1995, the inspectors identified a laundry bag containing contaminated clothing that was in contact with sensitive instruments in the reactor building. Licensee personnel promptly corrected the situation when informed by the inspectors. The inspectors questioned the attentiveness of the in-plant operators in not identifying a potentially significant condition.

- On September 16, 1995, after hearing about high humidity conditions that had existed in the turbine building sump room on September 14, an in-plant operator decided to check the standby gas treatment (SBGT) fans for water. He drained out 1.2 liters of water from the "A" fan and 4.8 liters from the "B" fan. This was

an example of excellent operator attentiveness and demonstrated a good questioning attitude.

1.3 Plant Materiel Condition

The inspectors noted that a number of materiel condition issues arose during the inspection period that required the operators to take prompt action and/or resulted in technical specification limiting condition for operation (LCO) entries. While each individual occurrence was of low safety significance, they represented distractions for operators and other plant staff. The examples are listed below:

- On August 6, 1995, the licensee identified that the root cause for the standby gas treatment system (SBGT) inoperability on July 24, 1995, (LER 95-008) was due to poor materiel condition of seven feedwater heater drain valves that were found leaking past the seats. Four of the known leaking valves were repaired by sealant injection; however, on September 16, more water was found in the SBGT. See Section 3.2 for more details.

- On August 12, 1995, operators received an auxiliary transformer trouble alarm. Operators determined locally that the alarm was due to sudden internal pressure, and the shift supervisor decided to transfer loads and remove the transformer from service. It was later determined to be a faulty alarm relay and not a valid alarm; therefore, the transformer was returned to service.

- On August 17, 1995, maintenance was performed to determine the cause of low flow in the "B" fuel pool cooling pump. When the pump was disassembled, a 15 foot long piece of nylon rope was found partially blocking the pump inlet. See Section 2.4 for details.

- On August 18, 1995, the inspectors identified partially disassembled supports on the general service water piping that provided cooling for the reactor recirculation pump motor generator set. The licensee promptly reassembled the supports, but could not determine how or when the supports were disassembled.

- On August 29, 1995, the licensee received primary containment isolation groups 2 through 5 isolations and a half scram when the "B" RPS MG EPA breaker B-2 tripped. See Section 1.2 for details.

- On September 1, 1995, operators on rounds identified what sounded like a packing leak in the steam tunnel. Further investigation, including an entry into the steam tunnel, identified that the RCIC steam supply outboard isolation motor operated valve MO2401 had a packing leak. The routine monthly downpower, scheduled for September 9, was moved up a day to minimize damage to the valve and operator. On September 8, the valve was electrically backseated to stop the leakage. See Section 2.8 for details.

- On September 13, 1995, control power for a hydrogen and oxygen (H_2/O_2) monitor and a drywell radiation monitor was lost when two

breakers tripped. This required entry into a 30-day LCO. The suspected cause was a loose connection that resulted in heat damage to several wires in the breaker cabinet for the H_2/O_2 monitor.

- On September 19, 1995, a fire header pressure sensing line leak dripped on the diesel fire pump control panel and caused spurious annunciator alarms in the control room. The operators declared the diesel fire pump inoperable, performed the electric fire pump run, and wrote a priority 1 maintenance action request.

The inspectors will track licensee resolutions of the individual issues during future routine inspections. In all the above examples, the licensee took prompt action to restore the deficient condition and entered the item in the corrective action process. While the inspectors concluded that the safety significance of the items noted was low, the inspectors will also assess overall licensee performance with respect to preventing distractions to operators and other plant staff that arise as a result of equipment condition issues.

One violation was identified. No deviations were identified in this area.

2.0 MAINTENANCE AND SURVEILLANCE OBSERVATION (61726) (62703) (92902)

Station maintenance activities of safety-related systems and components listed below were observed and/or reviewed to verify that they were conducted in accordance with approved procedures, regulatory guides, industry codes or standards, and in conformance with TS.

The inspectors observed safety-related surveillance testing and verified that testing was performed in accordance with adequate procedures, that test instrumentation was calibrated, that limiting conditions for operation were met, that removal and restoration of the affected components were accomplished, that test results conformed with TS and procedure requirements and were reviewed by personnel other than the individual directing the test, and that any deficiencies identified during the testing were properly reviewed and resolved by appropriate management personnel.

The inspectors witnessed portions of maintenance activities on equipment such as residual heat removal (RHR) motor operated valves, RHR service water motor battery exhaust fan, feedwater heater drain valves, safety-related breakers, instrument air compressor high pressure coolant injection (HPCI) system valves, RPS motor generator, and EPAs. The inspectors witnessed portions of activities on equipment such as standby filter unit, RPS EPA breaker, RHR service water, standby diesel generator, and HPCI.

Overall, maintenance and surveillance performance was adequate during the inspection period. Some concerns were identified with respect to personnel errors, verification breakdown, backfill and venting procedural guidance, and work planning as discussed below. In other cases, work planning was well implemented.

2.1 Instrument Air Compressor Trips During Testing Due to Incorrect Setting

On August 18, 1995, following maintenance to replace the starter on a safety-related instrument air compressor, the thermal overloads (TOLs) tripped after approximately 7 minutes. Earlier in the day, the TOL dial setting was set at 85 percent instead of 115 percent as required by the maintenance instruction form. The licensee promptly set the TOLs to the correct setting, documented the finding on an Action Request (AR) form, and held a fact-finding meeting to interview personnel involved. Additionally, the licensee completed a human performance enhancement system (HPES) review to determine other causes and corrective actions. Corrective actions included additional management emphasis on the importance of self-checking, and revision of maintenance and inspection procedures to require QC verification of all future TOL settings and other similar settings during maintenance. Prior to this issue, the plant policy had not required QC verification for TOL settings. The inspectors considered the failure to set the TOL correctly to be a personnel error due to inadequate self-checking. The safety significance of this issue was minor and the error was identified during testing. The HPES evaluation was good and the suggested corrective actions appeared to be adequate to prevent recurrence.

2.2 Incorrect Installation of Jumpers Resulted in Half Scram During Surveillance Testing

On August 25, 1995, instrument technicians performing routine surveillance testing installed a jumper between two connections in order to prevent a half scram. Subsequently, control room operators received a half scram and it was determined that the jumper had been connected across the wrong terminals. The jumper was removed and relanded, the surveillance was completed, and a fact-finding meeting was held. This was considered a personnel error due to inadequate self-checking. Also, dual verification was not effective in this case. Corrective actions included revision of the procedure to address the uniqueness of the arrangement of the terminals in this case for future performance of the test and management emphasis on the importance of self-checking and dual verification. This area of self-checking and verification continues to need management attention as discussed in recent inspection reports (See IRs 50-331/95003 and 95007 for more details).

2.3 Inadequate Work Planning Resulted in Incorrect Ventilation Unit Being Tagged Out for Maintenance

On September 12, 1995, mechanical maintenance personnel attempted to perform work on the administration building air conditioning (AC) unit cooling fan. Earlier in the day, operations had been requested to tagout the technical support center AC unit, instead. Fortunately, as the mechanics approached the unit to begin work, they noted that the unit was running and contacted operations for resolution. Apparently, during the initiation of the work document and during the planning process, confusion regarding the component identification number led to a request for tagging the wrong unit. The licensee promptly initiated an AR and assigned an HPES investigation to determine causes and corrective actions. The work planning in this case was weak and could have resulted in personal injury.

2.4 Rope Found in Suction for Fuel Pool Cooling Pump

On August 17, 1995, during maintenance on the fuel pool cooling pump, a 15 foot long nylon rope was found in the pump suction. The maintenance request had been written in April 1995, when low flow was noted while starting the pump. The licensee promptly issued an AR to document a root cause analysis (RCA) and corrective actions. The licensee initially suspected that due to configuration and pump use history, the rope may have been in the piping for several years. The foreign material exclusion procedures had been revised following some issues in the Fall of 1993 and were determined by the inspectors to be improved (reference IR 50-331/95003). Pending completion of the license's RCA and inspector evaluation of the corrective actions, this is an **inspection followup item (50-331/95008-02)**.

2.5 Inadequate Instrument Backfill Causes Flow Oscillations During Core Spray Testing

During core spray system surveillance testing following maintenance, operators noted flow oscillations. From August 15 to August 16, 1995, the core spray system was removed from service for routine maintenance. The system was restored to service in accordance with plant procedures; however, the instrument lines for flow instrument FIS2111 were not adequately backfilled and vented. The LCO time for the maintenance doubled as a result of the need to refill and vent the instrument lines. The inspectors were concerned that this was a repeat occurrence and that the procedures did not provide specific guidance to ensure proper backfilling and venting for instruments. The licensee wrote AR 95-1387 to document the occurrence and a solutions team was assigned to determine corrective actions. The inspectors considered current backfill and venting procedural guidance to be a weakness.

2.6 Well Implemented Repair of Feedwater Heater Drain and Vent Valve Leaks

As part of the troubleshooting of the problems with standby gas treatment water intrusion (reference LER 95-008), the licensee used thermography to identify seven leaking feedwater heater vent and drain valves. These valves were normally closed and appeared to be leaking by the seats and contributing to increased leakage into the turbine building equipment drain sump system. On August 24 and September 8, 1995, the licensee utilized contractors to stop the leaks by injecting a sealant into the pipes above the leaking valves. In both cases, the inspectors reviewed the maintenance package planning and the established work controls, observed ALARA and other briefings, and witnessed portions of the maintenance. There was good engineering participation and the entire effort was well controlled and implemented.

2.7 Thermography Predictive Maintenance Identified Potential Breaker Problem

As part of routine thermography analysis of plant breakers on August 21, 1995, the licensee identified that the supply breaker for the "A" RPS motor generator set showed a 17 degree Fahrenheit difference between the A phase and the other two phases. After additional troubleshooting, operations personnel decided to transfer to the alternate power supply as a precautionary measure. The breaker was found to have a loose

connection and was promptly replaced. The RPS was successfully realigned to the normal power supply on August 23, 1995. The maintenance department performance was strong in identifying and correcting the potential problem.

2.8 Excellent Coordination for Repair of RCIC MOV Packing Leak

After the licensee identified a packing leak on RCIC steam supply valve MO2401, there was excellent coordination between operations, maintenance, and engineering personnel to determine and implement a course of action. The licensee decided to electrically backseat the valve in an attempt to stop the packing leak and avoid further damage to the valve or operator. The monthly routine downpower, scheduled for September 8, 1995, was moved up a day to allow prompt repair. The licensee performed a routine inspection of the operator to identify any obvious degradation or damage. Following backseating, stroke time was measured to ensure design limits were met and then the valve was backseated again. This was considered a temporary repair until the next outage. The inspectors considered the repair to be well implemented.

No violations or deviations were identified in this area. One inspection followup item was identified.

3.0 ONSITE ENGINEERING (37551)

Selected engineering problems or events were evaluated to determine their root cause(s). The effectiveness of the licensee's controls for the identification, resolution, and prevention of problems was also examined. The inspection included review of areas such as corrective action systems, root cause analysis, safety committees, and self assessment. The licensee's implementation of a modification on reactor vessel level instrumentation was good. A concern was identified with respect to the engineering department's monitoring of the standby gas treatment system when plant conditions were changed.

3.1 Review of Plant Hardware Modifications to Reactor Vessel Water Level Instrumentation (TI 2515/128, Revision 1)

The inspectors reviewed the modification implemented in response to NRC Bulletin 93-03, "Resolution of Issues Related to Reactor Vessel Level Instrumentation in BWRs," and identified no concerns. Included in this review were the licensee's 10 CFR 50.59 safety evaluation, review of NRC Information Notice (IN) 93-89, "Potential Problems With BWR Level Instrumentation Backfill Modifications," operating instructions, preventive maintenance of system components, and a walk-down of accessible portions of the system. Design change package (DCP) 1543 was completed during refuel outage 12, which commenced July 1993.

The licensee's review of IN 93-89 concluded that the problems regarding the consequences of reference leg depressurization were not directly applicable to Duane Arnold. The Duane Arnold design had Yarway level instruments which provided automatic depressurization system and emergency core cooling system initiation logic. The Yarway reference legs were not backfilled and were not susceptible to the problems discussed in IN 93-89. Also, the licensee maintained administrative

controls over the reference leg isolation valve to minimize the potential for inadvertent closure. The inspectors did not identify any concerns. The temporary instruction is considered closed.

The inspectors also reviewed a QA department surveillance that was performed using the guidance of TI 2515/128. The surveillance, performed in July 1995, was documented in report S-95-012, and was detailed and complete. No problems or recommendations were identified in the surveillance.

3.2 Standby Gas Treatment System (SBGT) - Repeat Occurrence of Water Intrusion

The licensee implemented corrective actions to prevent recurrence of water intrusion after this resulted in system inoperability on July 24, 1995. However, after changes were made to the turbine building sump system on September 13, 1995, the licensee found water in both fans of SBGT on September 16, 1995. One change was the removal of a temporary cooler installed in the sump to minimize the effects of several known leaking high energy turbine building drain valves. Another change was made to raise the sump level and create a loop seal for the over flow pipe from the condensate back wash receiving tank. The two changes resulted in high humidity conditions on September 15, 1995, in the sump room, which exhausted into the same ductwork as SBGT. The inspectors were concerned that engineering failed to establish monitoring of SBGT before making the changes and again after the high humidity conditions were observed. This issue is being tracked by a previously documented unresolved item (50-331/95007-02), which remains open.

No violations or deviations were identified in this area.

4.0 PLANT SUPPORT (71750)

Selected activities associated with radiological controls, radiological effluents, waste treatment, environmental monitoring, physical security, emergency preparedness, and fire protection were reviewed to ensure conformance with facility procedures and/or regulatory requirements. Overall plant support was very good during the assessment period. Performance in the radiation protection, chemistry, security and self assessment programs continued to be strong. One concern was noted when a radiological posting was not heeded, as discussed below.

4.1 Unauthorized Entry Into a Posted High Radiation Area (HRA) During Radioactive Waste High Integrity Container Movement

On September 12, 1995, while the licensee was moving a high integrity container (HIC) into a transportation cask for transfer to an offsite burial facility, a station firewatch entered the area controlled for the work activity. The individual apparently entered the area to gain permission to go to an area on his rounds which must be observed on an hourly basis. The area was posted as a HRA with additional signs on the rope boundary. The worker was stopped a few feet inside the boundary by a QA worker who was inside the area to observe the HIC movement. The firewatch was immediately moved outside the controlled area and the

licensee initiated a Level 3 Action Request to investigate the incident and address root cause/human performance. Due to the limited amount of time the individual spent in the area, and the fact that the actual high radiation area was several feet away, no additional exposure was received by the firewatch during the entry.

The inspectors discussed the incident with workers involved and licensee supervision to identify any programmatic weaknesses associated with the event. Licensee management indicated that an attempt was made to alert the firewatch of the activity in the area, but this was unsuccessful. Corrective actions at the time of the exit meeting included a communications session with all firewatch staff and plans to equip all firewatches with pagers so that they could be reached in all areas of the plant. Apparently the firewatch was not notified during the HIC movement due to the fact that he was in a high noise area and could not hear the plant paging system. Other corrective actions were planned, based on recommendations from the root cause evaluation of the incident.

The failure to heed radiological postings is a violation of Technical Specification 6.9.1 which requires that procedures prepared for personnel radiation protection be adhered to for all operations involving personnel radiation exposure (specifically, Administrative Control Procedure 1411.22, "Personnel Access and Egress In Radiological Areas"). However, this violation will not be cited because the criteria set forth in Section VII of the NRC Enforcement Policy as published in NUREG-1600 were met.

4.2 Radioactive Waste Treatment, Effluent, and Environmental Monitoring

The licensee had aggressively implemented its process and effluent radiation monitor program in accordance with the licensee's offsite dose assessment manual (ODAM). Personnel were knowledgeable of the system, including overall system status, outstanding deficiencies, and plans to address those deficiencies. The majority of the deficiencies associated with the process monitors were due to electrical problems (voltage spiking, noise interference, and inoperable geiger-mueller (GM) tubes); however, in each instance where problems occurred, there was good communication between the system engineer, chemistry, and instrumentation and control personnel to identify and address the problem.

The Radiological Environmental Monitoring Program (REMP) and the 1994 Annual Operating Report appeared to comply with the REMP requirements. Environmental samples had been collected and analyzed, missing samples were documented and the annual land use census had been conducted as required. The environmental sample data indicated that there had been no discernable radiological impact on the environment from the operation of the Duane Arnold Energy Center.

The inspectors toured selected air sampling stations with the REMP technical supervisor. The air sampling equipment had proper calibration documentation and was in very good operating condition. The sample collection program was conducted by licensee personnel. A review of selected records indicated that sample collection was performed as

required. Licensee personnel were knowledgeable of the REMP, and program management was very good.

4.3 Solid Radioactive Waste and Transportation Program

The licensee continued to effectively implement the solid radwaste and transportation programs. Improvements were noted in volume reduction of dry active waste (DAW) during the 1995 refueling outage. Total solid waste produced through August 1995 totaled 1,266 cubic feet (outage) and 804 cubic feet (non-outage). Both values were within the licensee's goals and indicated a continued programmatic focus on waste volume reduction.

The inspectors observed good control of stored waste within the licensee's low level radioactive waste processing building during facility tours.

No problems were noted with the radioactive material transportation program. While observing a radioactive shipment loading, the inspectors noted good management oversight, QA reviews, and system engineer and radiation protection personnel coordination. Workers responsible for implementing the shipping program were knowledgeable of transportation and burial site regulations.

4.4 Implementation of Revised 10 CFR Part 20 (Temporary Instruction (TI) 2515/123)

The inspectors reviewed the licensee's implementing procedures and practices with respect to the January 1, 1994, changes in the 10 CFR Part 20 regulations. Specific areas reviewed were as follows: control of high and very high radiation areas (VHRA); planned special exposures (PSEs); declared pregnant worker (DPW); and maintaining total effective dose equivalents as low as reasonably achievable (TEDE ALARA).

The implementing procedure for the station's control of HRAs and VHRAs was Administrative Control Procedure 1411.13, "Control of Locked High Radiation Areas." The station maintained an additional control level to the Technical Specification allowed HRA lock controls at 1,000 mrem (10 mSieverts (mSvs)). Areas with dose rates in excess of 10 rem/hr (0.1 Svs/hr) were controlled as double locked high radiation areas (DLHRA) and required constant health physics technician coverage and the control of a special radiation work permit. Keys for all locked HRAs (including DLHRAs) were controlled by the health physics office. The shift desk health physics technician was responsible for the inventory and issuing of the keys to workers. An additional set of keys was maintained in the control room which were to be used only in the event of an urgent or emergency need. Appropriate training was provided to health physics technicians and workers who entered HRAs. Overall, the inspectors determined that the station's implementation of HRA and VHRA control was effective.

The PSE program was described in Administrative Control Procedure 1411.25, which described that PSEs would only be considered in extraordinary situations. In the event a PSE would be undergone, the authorization for such exposure would require the authorization of the

Vice President for Nuclear Operations. The control procedure adequately addressed the specific requirements necessary to be considered for a PSE.

The Declared Pregnant Worker (DPW) program was described in the licensee's Radiation Protection Program Manual. The option for a worker to declare their pregnancy was discussed in the general employee training program and describes that it is the responsibility of the worker to inform the Radiation Protection Manager (RPM) in writing of their intent to declare a pregnancy. No pre-established declaration form was maintained for use by the workers, rather, the worker would submit their own memorandum to the station RPM. The licensee has monitored 4 DPWs since January 1994 with no external exposures recorded for those individuals. The inspectors determined that the licensee's DPW program was functioning as designed and met all relevant regulations.

The licensee's program for maintaining TEDE ALARA was described in several procedures discussing respiratory protection decision making, radiation work permits, and ALARA job planning. The licensee referenced a flow chart for decision making for the use of respirators, which included various safety parameters such as heat stress and overall worker inefficiency when wearing a respirator. The licensee effectively reduced respirator use as illustrated during the latest refueling outage during which only four respirators were issued for radiological control purposes. This effectiveness was also substantiated through the low number of positive whole body counts in conjunction with the reduction in respirator issuance. During the 1995 refueling outage, 9 workers were identified with positive whole body counts and the highest assigned committed effective dose equivalent was 23 mrem (0.23 mSvs). Worker acceptance has been very good to the respirator reduction policy.

Overall, the inspectors determined that the licensee had effectively implemented the Revised 10 CFR Part 20 regulations. The TI is considered closed.

4.5 Physical Security Inspection

A routine physical security inspection was conducted, which included: audits, corrective action and management support; effectiveness of management controls; security program plans; protected area detection equipment; and security training and qualification. Inspection findings regarding performance in the areas of personnel access control and alarm station duties are presented below.

Security program performance was strong and provided an appropriate level of protection to ensure public health and safety. Performance was characterized by strong management effectiveness and support; effective security equipment performances and reliability; and generally excellent implementation of day-to-day security requirements. Tactical training activities, security drills, and maintenance support activities were identified as specific program strengths.

Personnel access controls and alarm station operator duties were generally conducted in an effective manner, and regulatory and

licensee's security requirements were met. However, weaknesses were evident in recent routine implementation activities by some security officers and some alarm station operators/supervisors. The errors and implementation problems appeared to result from a lack of attention to detail. Examples of weak implementation activities included two occasions where alarm station personnel deactivated the wrong protected area gates and two other occasions where security officers failed to conduct required searches at the intake structure. Those events were all identified by the licensee. The security significance of each event was minimized because required monitoring activities immediately identified the problem and corrective action was implemented.

The Security Superintendent was cognizant of the self-identified errors and had initiated a program analysis to determine if these events were isolated personnel errors or if they had common causes. The licensee indicated the analysis would also determine if these recent events showed a negative trend in security performance. Results and corrective actions will be monitored during future inspections.

4.6 Confirmatory Measurements and Laboratory Quality Assurance

Five samples including reactor coolant, liquid waste, reactor coolant stripped gas, reactor coolant crud filter, and an NRC calibration standard were analyzed for gamma emitting isotopes by the licensee and in the Region III mobile laboratory on site. All samples were counted on the 2 detectors normally used for counting plant and effluent samples. Selected samples were counted on a detector located in radiation protection which is not normally used for effluent analyses. The licensee achieved all agreements in 96 comparisons and no significant biases were observed in comparisons using the NRC calibration standard. The licensee performed very well in the confirmatory measurements program.

The laboratory quality assurance program for radiochemistry was very good. Statistically based control charts were used to monitor the performance of counting equipment and the laboratory performed well in a vendor supplied laboratory cross check program. Radiochemistry trend charts for reactor coolant isotopic analysis indicated that there were no significant problems with fuel integrity. Management of the radiochemistry program was very good.

4.7 Chemistry Self Assessment (IP 84750)

Site quality assurance audits of chemistry were comprehensive and emphasized both analytical and operations chemistry. Audit reports indicated that the self assessment group understood the chemistry program, used performance based criteria in audit planning, and were well trained and knowledgeable of the areas they reviewed. The self assessment program was performance based and capable of identifying weaknesses. Audits included reviews of:

Sample acquisition, preparation, analysis, and technician performance;

In line monitor performance and operational response to abnormal readings;

Laboratory quality assurance program;

Corrosion control;

Plant water quality and make-up water program; and

Review of chemistry data.

The inspectors reviewed audits of the licensee's process and effluent radiation monitor program, REMP, and the environmental monitoring quality assurance program. The audits appeared to be thorough and probing, and exhibited a good questioning attitude on the part of the QA staff. Audits included observations of sample collection, reviews of sampling and analysis requirements and the land use census. Environmental reports were reviewed along with the vendor laboratory's participation in an independent crosscheck program.

Recommendations by the QA staff were evaluated by the applicable department. Those recommendations warranting corrective actions were effectively implemented. For those recommendations which were rejected by the applicable department, adequate justification for not accepting the recommendation was documented. The inspectors determined that the licensee's QA program for this functional area, and the departmental response to findings and recommendations, were well managed and a strength.

4.8 Water Chemistry Control Program (IP 84750)

The licensee's water chemistry program was consistent with the Electric Power Research Institute (EPRI) BWR Guidelines. A review of selected trend records for 1994 and 1995 indicated that plant water quality was very good and no significant problems were observed. The licensee continued to be a leader in use of hydrogen water chemistry for reduction of intergranular stress corrosion cracking (IGSCC). Following an extensive on site testing program, the licensee began a vendor supplied zinc addition program in order to reduce source term from Cobalt-60 (Co-60) in reactor coolant. A review of trend charts for 1994 and 1995 indicated that reactor coolant soluble Co-60 had dropped by approximately 50 percent following the implementation of the zinc injection. The radiological impact of this program will be reviewed in future inspections. The licensee's commitment to advanced technologies for reactor protection from IGSCC and dose reduction was a strength.

4.9 Follow-up on Previously Opened Items (92904)

(Closed) Inspection Followup Item (IFI) (331/94004-01(DRSS)): The licensee's corrective actions to address a freezing problem in the offgas stack flow sensing line appeared to be effective. Heat tracing of all small diameter gaseous effluent lines in the offgas stack has effectively prevented freezing of condensable gases in the lines. The licensee did not have any similar problems during the subsequent winter (December 1994 - March 1995). This item is closed.

(Closed) IFI (331/95003-01(DRSS)): Weak attention to detail was identified in two areas: (1) plant personnel not properly logging into or out of vital areas and (2) NRC one-hour reporting requirements not being fully understood by some security supervisors. This included licensee action to address the logging issue including additional keycard training for plant personnel, a software modification of card key readers to increase log-in time, and heightened individual awareness by re-instructing personnel that failed to use the system properly. Inspection results showed a significant reduction in logging failures from May to July 1995. Regarding the reporting issue, the licensee conducted special training for all security supervisors regarding NRC one-hour reporting requirements and made procedural changes to clarify NRC reporting expectations in this area. Inspector review of procedure changes and interviews of randomly selected security supervisors concluded the licensee had adequately addressed our concerns. This item is closed.

No violations or deviations were identified in this area. One non-cited violation was identified.

5.0 PERSONS CONTACTED AND MANAGEMENT MEETINGS

The inspectors contacted various licensee operations, maintenance, engineering, and plant support personnel throughout the inspection period. Senior personnel are listed below.

At the conclusion of the inspection on September 21, 1995, the inspectors met with licensee representatives (denoted by *) and summarized the scope and findings of the inspection activities. The licensee did not identify any of the documents or processes reviewed by the inspectors as proprietary.

*J. Franz, Vice President - Nuclear
*G. Van Middlesworth, Plant Manager
*R. Anderson, Manager, Outage and Support
*R. Anderson, Operations Supervisor
*P. Bessette, Acting Manager, Nuclear Licensing
T. Gordon, Acting Maintenance Superintendent
*J. Cantrell, Manager, Nuclear Training
*R. Hite, Manager, Radiation Protection
M. McDermott, Manager, Engineering
*K. Peveler, Manager, Corporate Quality Assurance