U. S. NUCLEAR REGULATORY COMMISSION

REGION III

REPORT NO. 50-331/96003

FACILITY
Duane Arnold Energy Center
License No. DPR-49

LICENSEE
IES Utilities Incorporated
IE Towers, P. O. Box 351
Cedar Rapids, IA 52406

DATES
March 9 through April 19, 1996

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5/14/96
Date

AREAS INSPECTED

Routine, unannounced inspections of plant operations, maintenance, surveillance, onsite engineering, and plant support. An announced inspection of fire protection and announced evaluation of emergency exercise was also performed. Safety assessment and quality verification activities were routinely evaluated. Follow-up inspection was performed for certain previously identified items.

EXECUTIVE SUMMARY

Most activities observed at DAEC during this report period continued to be well performed. The inspectors noted some improvement in the area of human performance. This area was a concern during recent inspection reports. There were two cases in particular where coordination between departments and management oversight ensured positive outcomes for complex activities.

Within the area of OPERATIONS, the inspectors noted two concerns:

- Inattention to detail while venting the residual heat removal (RHR) system. While venting, operators did not follow radiological practice expectations, which resulted in clothing and clean area contamination (Section 4.4).

- In another case, a reactor core isolation cooling turbine overspeed trip occurred due to a combination of a sticky flow controller and weak communications within Operations (Section 2.3).

The inspectors noted two instances where operators demonstrated conservative actions and prompt follow-up to unexpected conditions.

- Operators stopped testing and reduced reactor power when an unexpected increase in thermal limits was identified during scram time testing. The problem was appropriately investigated and resolved prior to resuming the testing (Section 1.2).

- Operators noticed a smokey smell in a control room panel and investigated in a thorough manner until the cause was identified (Section 1.1).

The inspectors observed effective work planning and execution, with one exception, within the area of MAINTENANCE. This was an improvement in performance over earlier inspection reports. Complex activities such as scram solenoid pilot valve (SSPV) diaphragm replacements and nitrogen valve handswitch work were well planned, coordinated, and implemented (Sections 2.1 and 3.1). In one case, a work planning error resulted in work being accomplished on the wrong train of safety-related equipment (Section 2.2).

The inspectors identified thorough support for plant operations and materiel condition issues within the area of ENGINEERING (Section 2.1, 3.0, 3.1). One issue concerning the potential for pressure locking of an RHR drywell spray valve was considered an unresolved item (Section 3.2). Three discrepancies between the UFSAR and plant procedures and design are discussed in Section 6.0.

The inspectors identified no substantive concerns within the area of PLANT SUPPORT. Licensee performance during the Duane Arnold Energy Center 1996 Emergency Planning exercise demonstrated that the licensee could effectively implement their emergency preparedness plan.

The fire protection program was effective and met its safety objectives. A concern was noted regarding the potential for fire loading in the reactor building as a result of stored lumber for scaffolding (Section 4.1.1). Also, concerns were noted regarding emergency light battery life, emergency lighting aiming issues, and documentation of emergency lighting start and stop time testing (Section 4.1.2).

Two instances where organics entered the radioactive waste system were considered an inspection follow-up item (Section 4.3).

The inspectors identified several positive examples within the area of SELF ASSESSMENT AND QUALITY VERIFICATION. This was an improvement from the previous inspection period. There was active management oversight for the nitrogen valve handswitch replacement and the SSPV testing and maintenance activities (Sections 2.1 and 3.1). Inspectors observed conservative operator actions in response to a concern with thermal limits (Section 1.2). Thorough and critical self assessments were noted in the area of fire protection (Sections 4.1.3, 4.1.4). Licensee critiques following the emergency preparedness exercise were very good (Section 4.2.5).

Summary of items opened in this report
Unresolved Items: Identified in Section 3.2.
Inspection Follow-up Items: Identified in Sections 4.1.1, 4.1.2, 4.2.4, 4.3, 6.1, 6.2, and 6.3.

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 work 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.

Throughout most of the inspection period, reactor power was at approximately 100 percent. From March 18 through March 25, the licensee operated the reactor at reduced power levels to support control rod scram time testing and scram solenoid pilot valves (SSPV) diaphragm maintenance. On April 13, 1996, the licensee reduced reactor power to approximately 60 percent for a planned downpower evolution to perform the following activities: a control rod sequence exchange, monthly turbine valve testing, quarterly main steam isolation valve testing, and planned maintenance on the reactor recirculation motor generator sets.

In general, the inspectors concluded that activities were properly performed. The inspectors noted two instances where operators demonstrated conservative actions and prompt followup to unexpected conditions. However, the inspectors noted concerns with inattention to detail and communications as discussed in Sections 2.3 and 4.4.

1.1 Plant Materiel Condition

Plant materiel condition was acceptable. The inspectors noted that a number of materiel condition issues arose during the inspection period that required the plant personnel to take prompt action and/or resulted in TS limiting condition for operation (LCO) entries. The inspectors considered the licensee's response to these materiel condition issues to be appropriate. While each individual occurrence was of minor consequence, collectively the issues represented distractions for operators and other plant staff. In each case, the issue was entered into the plant's maintenance process or corrective action process and corrected, as appropriate. The examples are listed below:

- On March 3, 1996, during inspections in the condenser bay, the licensee identified a thru-wall extraction steam leak on a 1 inch drain. A temporary patch stopped the leak. Permanent repair was planned for the next refueling outage (scheduled to start 10/10/96).

- Special SSPV testing identified that the as-found average scram insertion time from position 48 to 46 was not within TS requirements. During testing, 87 of 89 control rods had the outboard SSPV diaphragm replaced to ensure that the as-left average scram insertion time met TS requirements. The testing and maintenance performed to investigate this recent industry issue were well-coordinated as discussed in Section 3.1.

- On March 13, 1996, operators reported an acrid smell near control room panel 1C07. The shift supervisor promptly investigated the back of the panel and indicated that he observed a flash. Subsequently, although the smell appeared to be gone, plant personnel performed a detailed check of components in the panel and found a burned resistor. The operators' response demonstrated a questioning attitude and thorough follow-up of an abnormal condition.

- The licensee identified a minor leak on the scram air header above hydraulic control unit 18-15. The leak was not isolable and repair was planned for a forced outage. The licensee was monitoring the leak.

- On March 28, 1996, the licensee inserted a Group III primary containment isolation signal and CV4371A failed to close. The valve, the nitrogen supply isolation to the drywell, closed during subsequent attempts, and the cause was determined to be a worn switch. The switch was promptly replaced as discussed in Section 2.1.

1.2 Conservative Response to an Unexpected Increase in Thermal Limits

On March 22, 1996, during scram time testing, operators observed an unexpected increase in thermal limits. One of the monitored parameters increased from an expected value of approximately 0.930 to a peak value of 0.994. In addition to documenting the occurrence via Action Request (AR) 96-0419, control room operators and reactor engineering personnel performed the following actions:

- immediately secured control rod scram time testing

- inserted control rods and reduced core flow to maintain an acceptable margin to thermal limits (control room personnel controlled by the highest indicated thermal limits value, even though this value was suspect)

- obtained vendor assistance to resolve the issue

- did not allow resumption of testing until limits returned to expected values

The higher than expected thermal limit value appeared to be an indication issue (rather than an actual high value) caused by the characteristics of the computer used. At the end of the inspection period the licensee was working with the vendor to resolve the matter. The inspectors concluded that deliberate and conservative actions were taken in response to an unexpected condition during testing.

2.0 MAINTENANCE AND SURVEILLANCE OBSERVATIONS (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 technical specifications (TS).

The inspectors observed safety-related surveillance testing and verified that testing was performed in accordance with appropriate 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 standby gas treatment (SBGT) fan and instrumentation, drywell nitrogen supply isolation handswitch, SSPV, and core spray and residual heat removal keep-fill pump. The inspectors witnessed portions of test activities on equipment such as SSPVs, SBGT, high pressure coolant injection (HPCI), and reactor core isolation cooling (RCIC).

Maintenance and surveillance activities observed during this report period were well performed. The inspectors noted effective coordination for complex maintenance work items. Selected briefings attended by the inspectors were thorough and discussed relevant information necessary to successfully complete the tasks. The licensee identified one work planning error as discussed below.

2.1 Drywell Nitrogen Isolation Valve Handswitch Replacement

On April 3, 1996, electricians replaced a handswitch for the override switch on CV4371A, the drywell nitrogen isolation valve. This maintenance required close coordination between operations, maintenance, and engineering and was performed within a 4-hour LCO window. The inspectors attended the pre-job maintenance briefing, pre-job control room briefing, and observed the set-up for the work, the actual

replacement, the post maintenance testing, and system restoration. The entire job was properly implemented and was well coordinated between departments.

2.2 Work Planning Error Results in the Performance of Maintenance on the Opposite Train

On April 16, 1996, instrument technicians had started calibration of residual heat removal service water (RHRSW) flow transmitter FT1944 when an operator realized that they were not working on the correct train. A maintenance action request had been written on March 5, 1996, when operators suspected a problem with the "A" RHRSW throttle valve MO2046 and its corresponding flow transmitter FT2050. Due to personal error, the planner prepared a troubleshooting instruction form (TIF) for FT1944 ("B" train of RHRSW) instead of FT2050 ("A" train of RHRSW). The error was not identified during the engineering review of the TIF or during shift supervisor authorization of the work.

The licensee replanned the work to be performed on the "A" train. There was no impact on operability of the RHRSW system as a result of the error. However, the inspectors were concerned with work planning, inattention to detail, and improper review in this case.

2.3 Reactor Core Isolation Cooling (RCIC) Overspeed Trip During Routine Surveillance

On March 13, 1996, during quarterly RCIC surveillance testing, the RCIC turbine tripped on overspeed after being transferred to local control at the remote shutdown panel. The cause was a combination of the limited indications available at the local panel, weak communications within operations, and a problem with the flow controller. The operators indicated that the flow controller seemed sticky or sluggish at the time. Apparently, following flow controller adjustment, there was a lag time before a response. The result was that the operator adjusted the speed too high without realizing it. Also, operators had decided not to use headphones or other communications equipment for this step, even though communications had been established in the past.

While the characteristics of the controller may have contributed to the RCIC turbine trip, the inspectors were concerned with the inconsistent use of formal communications by operations department personnel. During past performances of this surveillance test, operators established formal communications between the control room and the remote shutdown panel. In this case, a communications link was not established between the two locations; that fact, combined with the limited indications available at the remote shutdown panel, contributed to an unnecessary trip of the RCIC turbine.

The licensee's corrective actions included initiating an Action Request (AR) to document the event, initiating a maintenance request to check the flow controller for proper operation, and adding precautions to the

surveillance procedure to ensure better awareness and the establishment of communications prior to the transfer to local operation. The inspectors considered the corrective actions to be appropriate.

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 inspectors concluded that engineering support to plant operations and materiel condition issues was appropriate.

3.1 Scram Solenoid Pilot Valve (SSPV) Testing

On March 25, 1996, the licensee completed special scram time testing of all (89) control rods. The testing was performed in response to generic boiling water reactor (BWR) industry concerns with the performance of the SSPV viton diaphragms. The as-found test result for core average scram insertion time to rod position (notch) 46 was 0.393 seconds, versus a TS limit of 0.35 seconds. This was a 0.063 second increase over the as-left core average scram time test following startup from the last refueling outage (April, 1995). The licensee performed a like-for-like replacement of the diaphragms on the outboard SSPV for 87 of 89 control rods. The as-left core average scram insertion time to position 46 was 0.324 seconds.

All SSPV diaphragms had been changed out to the new viton type during the previous refueling outage (April 1995). At the end of the inspection period, the licensee was evaluating future testing options to track behavior of the SSPVs. The licensee planned to forward all the testing data, along with the failed viton diaphragms, to General Electric and the industry owners' group for analysis. The inspectors observed portions of the testing and diaphragm replacements. The inspectors concluded that the work was well planned and implemented. Coordination between maintenance, operations, and engineering during the testing and maintenance was effective. The inspectors concluded that based on current industry and regulatory guidelines, the DAEC control rod SSPV test program was acceptable.

3.2 Potential for Pressure Locking of RHR Valve MO-1902

As part of the submittal in response to Generic Letter 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Valves," the licensee identified that drywell spray valve MO1902 was potentially susceptible to the phenomenon of pressure locking. Corrective actions were scheduled for refueling outage 14 (October 1996), and a justification for waiting until October to make repairs was provided. The inspectors were concerned that the licensee did not provide a

technical justification of operability, but instead focused on the low safety significance of the valve. The licensee's submittal was under review by NRR at the end of the inspection period. Pending further review by NRR, this is considered an Unresolved Item (50-331/96003-01).

3.3 Follow-up of Previous Open Items (92903)

(Closed) Violation 50-331/93019-04(DRS): Failure to feedback test data to parallel train GL 89-10 MOVs. The licensee's MOV program and baseline testing acceptance procedures were appropriately revised to ensure that test information feedback was incorporated, as applicable, into design calculation assumptions. This item is closed.

4.0 PLANT SUPPORT (82301, 64704, 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.

No substantive concerns or issues were identified. The emergency preparedness program and the fire protection program were observed to be effectively implemented.

4.1 Fire Protection

Routine, announced fire protection inspection of surveillances, equipment, impairments, control of combustibles, fire brigade training and drills, and fire protection audits. The inspector utilized selected portions of NRC inspection procedure 64704.

The fire protection program was effective at meeting its safety objectives as evidenced by the low number of fires in the plant during the past 3 years. In addition, the inspector observed that combustibles were well controlled in the plant and that most fire protection equipment was well maintained. However, the licensee had delayed some fire barrier repairs because they were not included in the new 10 CFR Part 50, Appendix R, program. As a result, there were a high number of fire protection impairments, including Thermo-lag, that required a fire watch. The fire brigade was observed to be meeting its training requirements. Fire protection audits were also observed to be excellent with adequate resources devoted to assessments. The emergency lighting program was assessed as weak because of problems identified by the inspector in this area.

4.1.1 Observation of Plant Areas

The inspector toured the reactor and turbine buildings and the pump house to observe the control of combustibles, fire protection equipment material condition, and housekeeping.

The material condition for most of the fire protection equipment was good. This included fire dampers, barrier seals, fire suppression and detection equipment, and extinguishers. Inspector review of licensee surveillance results verified this assessment. Fire doors in the plant were in good condition and impaired doors were tracked by the fire protection personnel with associated fire watches assigned. No significant problems were noted during a review of fire watch logs, although the licensee had missed several fire watches during the past 3 years. Also, fire brigade and fire fighting equipment were observed to be in good condition and located at convenient locations in the plant.

The inspector noted that a high number of fire protection impairments, including Thermo-lag, required a fire watch. The licensee was developing a new Appendix R program to resolve its Thermo-lag problems. That program was scheduled to be implemented in August 1996. The new Appendix R program would reduce the number of fire barriers/fire barrier seals required for safe shutdown. The licensee had delayed the repair of some fire barrier seals for more than 2 years because they would not be required under the new program.

The control of combustibles was good with very few transient combustibles in the plant. In addition, there were a low number of fires in the plant during the past 3 years with none involving hot work (i.e., welding, brazing, etc.). This was a good indicator of effective hot work controls. Flammable liquids were stored in fire proof cabinets and in appropriate safety cans. Fire resistant wood was used in the plant. However, there was a substantial fire loading in the reactor building as a result of stored lumber used for scaffolding. The scaffolding storage areas (described in the UFSAR) were protected by a fire suppression system. In addition, the fire loading was below the Fire Hazards Analysis loading limit. However, the wood was stacked in a configuration that protected most of it from being sprayed by water from the fire suppression system during a fire. The inspectors plan to review the licensee's corrective actions for this issue. This is an Inspection Followup Item (50-331/96003-02).

4.1.2 Emergency Lighting

The inspector identified weaknesses in the licensee's emergency lighting program that had not been previously identified and corrected.

The manufacturer's data for the Model L100 emergency lighting unit indicated that it was rated for only one 12 watt emergency lamp to meet the requirements of an 8 hour discharge test. The inspector noted that the majority of Model L100 emergency lighting units at DAEC had two lamps attached. Subsequent to the inspection, the licensee verified by testing that the emergency lighting batteries were adequate to pass the 8-hour discharge tests with two lamps. However, the battery vendor stated that the battery life would be reduced from 15-20 years to about 12 years. Since the licensee was using the emergency batteries until

failure before replacing them, the operation of the batteries closer to their design limit will increase the percentage of batteries that will fail during each future 8-hour discharge tests.

A review of 1995 8-hour emergency lighting discharge surveillance results indicated that the licensee had a high failure rate (18 percent) for the emergency lighting batteries. The licensee was tracking emergency lighting material condition but had not formally evaluated this failure rate. During the inspection, the licensee wrote an Action Request (AR) to review the past failure trends for potential input into the emergency lighting maintenance program.

During a plant tour by the inspector, a significant number of emergency lighting lamps were noted as incorrectly aimed and 3 lamps were obstructed by plant equipment and structures, preventing them from adequately lighting the safe-shutdown path. In addition, the aiming data in the licensee's procedure, GMP-ELEC-03, Attachment 1, Revision 10, "DC and AC/DC Emergency Lighting," did not match the aiming data in design guide, DGC-F105B, "Design Guide for FHA." This problem included not having data for aiming some emergency lighting lamps. The licensee initiated DAEC procedure work request, PWR-E-96-03-23, to correct the discrepancies between the two documents. Also, an AR was written to review and correct the aiming and obstruction problems.

The 8-hour emergency lighting discharge procedure, GMP-ELEC-03, Section B, Revision 8, did not specify the voltage at which an emergency battery would be considered failed during the test. The licensee indicated that they did not need acceptance criteria at the end of the 8-hour discharge test because the emergency lights are designed to cutoff at an acceptable voltage to ensure adequate lighting in the plant for safe shutdown. The licensee's method for determining that a battery failed is that the lights would not be lit at the end of the test. Subsequent to the inspection, the licensee verified by testing that adequate lighting was available at the 4.5 volt cutoff to meet lighting requirements. This method of identifying failed batteries appeared to be acceptable.

The inspector was concerned that the licensee did not document the start and stop times of the 8-hour emergency lighting discharge test in its procedure. As a result, the inspector could not verify that the emergency lighting units had actually been discharge tested for 8 hours. This item was included on an AR for review.

Action Request 96-0455 was written by the licensee to assess and correct the above listed problems. The inspectors' review of the licensee's correction actions to resolve these issues is considered an Inspection Followup Item (50-331/96003-03).

4.1.3 Fire Brigade

The fire brigade training program appeared to be good. A review of training records indicated that the fire brigade members, who were listed as qualified, had met their quarterly and annual fire brigade training requirements. Live fire training was conducted on an annual basis. A review of fire brigade critiques indicated that good fire brigade drill critiques were performed with associated training to improve brigade performance. The critiques identified both fire brigade performance strengths and weaknesses. A fire brigade drill was not performed for the inspector because of the operations staff's involvement with control rod scram time testing.

4.1.4 Audits

Licensee audits reviewed by the inspector were excellent and had adequate resources devoted to assessments.

4.2 Emergency Preparedness Exercise (IP 82301)

An announced, daytime exercise of the licensee's emergency plan was conducted at the Duane Arnold Energy Center during April 9-10, 1996. This 2 day plume phase and ingestion pathway exercise included the full scale participation of the State of Iowa as well as Linn, Buchanan, and Benton counties. The NRC also fully participated in this exercise with Headquarters, regional Base and Site Teams. The exercise tested the capabilities of the licensee and offsite agencies to respond to an accident scenario resulting in a simulated release of radioactive effluent. The exercise demonstrated that onsite emergency plans were adequate and the licensee was capable of implementing them.

The performances of State, county, and local response organizations were evaluated by representatives of the Federal Emergency Management Agency (FEMA), which will issue a separate report.

4.2.1 Control Room Simulator (CRS)

Performance in the CRS was very good. The operators responded well to the conditions displayed by the simulator, including various transients. Operator decorum and "repeat backs" of important information were excellent.

Classifications of emergency conditions were timely and correct. Notifications were well within timeframe goals.

The CRS staff use of emergency and abnormal procedures were effective. For example, the CRS staff successfully controlled reactor power using emergency operating procedures (EOPs) in response to the scenario anticipated transient without scram (ATWS).

The CRS crew initially classified the simulated transformer explosion as an Unusual Event consistent with their emergency action level classification for an onsite explosion. The crew subsequently recognized that the explosion had affected plant operation (a chiller could not be reset) which met the criteria for an Alert, and appropriately upgraded the event classification. Both classifications were performed well, consistent with available information.

The operating crew was somewhat slow in initiating the venting of individual control rod drive (CRD) overpiston areas as a contingency action. Other more easily performed contingency actions were properly attempted first. The technical support center (TSC) staff had recognized the need for venting CRD overpiston areas and had initiated actions about a half-hour prior to the operating crew directing that action.

Two minor problems were identified during the exercise. The plant announcement for a simulated evacuation in response to the Site Area Emergency classification was not made until approximately a half-hour after the classification was declared. Additionally, plant announcements were, in general, not made for major changes in plant status such as reduction in power, attempted scramming of the reactor, initiation and isolation of emergency core cooling systems, or initiation of shutdown cooling.

4.2.2 Technical Support Center (TSC)

Performance in the TSC was excellent. Personnel were professional and teamwork and communications were excellent.

Facility activation was rapid and efficient. Facility personnel began to arrive within 2 minutes of the Alert. The Emergency Coordinator (EC) arrived after his briefing in the Control Room, declared the TSC operational, and provided a briefing on the emergency situation. Periodic briefings by the EC contained appropriate information.

The TSC/operational support center (OSC) Operations Liaison was proactive in tracking plant conditions and comparing emergency action levels to possible event paths for potential classification upgrades. Also, the liaison followed the emergency operations procedures (EOPs) to anticipate potential control room actions.

The Technical and Engineering Supervisor did an excellent job of identifying equipment and emergency problems, assisting in determining priorities with the EC, and coordinating priorities and repair teams with the OSC.

Emergency workers were redirected from the backup Offsite Relocation and Assembly Area (ORAA) to the Offsite Radiological and Analytical Laboratory/Offsite Decontamination Facility (ORAL/ODEF) due to the wind direction. If a release of radiological material had occurred at that time, the plume would pass over the ORAA. The plant announcement for

site evacuation included directions to use the North route for plant nonessential evacuation to go to the alternate ORAL/ODEF. Both these actions indicated good awareness of meteorological and plant conditions.

Communications with the CRS and OSC staff were excellent. Continuous communications with the CRS were maintained by the CRS Communicator who simultaneously monitored the plant data computer. Appropriate data was rapidly transmitted to the Reflections System Status Board and displayed on the wall for all facility personnel.

The Technical and Engineering Supervisor provided excellent continuous communications with the OSC. The supervisor requested OSC repair teams and identified the TSC's priorities in an effective, timely manner.

Communications in the TSC were excellent. Personnel provided very good teamwork by correcting any miscommunications made by other individuals. For example, a miscommunication concerning the identification of a standby liquid control pump was appropriately corrected.

4.2.3 Operational Support Center (OSC) and Inplant Teams

Performance in the OSC was excellent. The facility was promptly activated and adequate equipment was available to support maintenance activities. Tracking of repair teams' status and coordination of priority activities with the TSC staff were well done.

The OSC staff was quite competent in developing plans for restoring plant equipment and utilized system engineers from the TSC to support their efforts. The OSC teams were assembled quickly and additional personnel were called when needed to support repair activities. Team briefings were thorough and emphasized the need for personal safety, radiological conditions, tasks and responsibility of the team, and the reporting back of any unusual findings.

The OSC Supervisor maintained good command and control over the OSC staff and used his support staff well. Briefings from the TSC were audible in the OSC. This assured that both facilities had the same priorities and big picture on plant status and radiological conditions. However, the OSC Supervisor did not give briefings to the OSC staff. This did not affect the OSC staff performance during the exercise because the staff was well aware of its responsibilities and coordinated well with the OSC supervisor, but could affect performance of an OSC team which had not recently drilled together.

A reactor engineer reported to the OSC and provided excellent guidance to the over-piston vent team as to which control rods should be vented first to achieve maximum reactor power reduction.

The inspector observed the in-plant team dispatched to vent the over-piston area of the control rod drives. The in-plant team was knowledgeable of the process for venting the over-piston area and was

able to locate the equipment and procedures needed to perform the evolution in a timely manner. An HP technician accompanied the team and proper radiological precautions were taken.

4.2.4 Emergency Operations Facility (EOF)

Performance in the EOF was excellent. The EOF was declared operational approximately 70 minutes after the Alert declaration. Corporate Plan Implementing Procedure 1.3, "Activation and Operation of the EOF," was observed to be effectively used to activate the facility.

Following EOF activation, the Emergency Response and Recovery Director (ER&RD) and members of his staff functioned very effectively as a team in terms of their internal actions, their interactions with other Emergency Response facilities (ERFs), and their discussions with the State of Iowa and the NRC.

Numerous examples were noted where the EOF staff functioned in a very proactive manner to: (1) anticipate mitigative actions which might later have become necessary as a result of changing conditions or ineffective actions (such as developing an alternative source of boron and an injection path for it); and (2) to extrapolate existing plant conditions and anticipate possible changes to emergency action levels (EALs) which might impact the current emergency classification.

Dose assessment and field team coordination activities were performed in a very effective manner. Information sharing with State personnel was also very effective, due in part to their co-location in the EOF. Several dose assessments were performed prior to an actual release of radioactive materials in order to anticipate the potential consequences. Results compared well with those of the State of Iowa staff. The licensee aggressively pursued the relatively small number of areas where results (either from dose assessments or field team measurements) differed from those of the State.

Emergency classification activities and associated notifications to the State and local government, as well as the NRC, were both effective and very timely. Following declaration of Site Area and General Emergency classifications, notifications of the State and local government were completed within 5 minutes; notification of the NRC followed about 5 minutes later.

Following declaration of the Site Area emergency, the licensee was informed that the State had recommended that Linn county perform an evacuation of Sub-area No. 1, which included the population within 2 miles of the plant (up to 4 miles in some sectors). The licensee had not recommended such a protective action, but regarded these actions as prudent, considering the potential for degrading plant conditions, and so informed the State.

Considerable discussion centered around the protective action recommendation (PAR) flowchart included as Attachment 1 in Emergency Plan Implementation Procedure (EPIP) 3.3, "Dose Assessment and Protective Action." Table 2 of the attachment contained guidance on evaluating core damage and release or release potential. A decision diamond required a determination as to whether there was a "release underway or imminent projected containment failure." Yes or no paths from this diamond lead to recommended protective actions, with a wider evacuation recommended if a release was not in progress.

The underlying philosophy for the above was that an evacuation should not be conducted while a release was in progress. This philosophy was no longer consistent with current guidance/philosophy utilized for training NRC personnel, which was that evacuation was the best PAR even when it must be done in any but the briefest releases.

This led to NRC personnel expressing concern as to whether the initial PAR, although in accordance with licensee procedure, was adequate. The licensee responded well to this expression of concern, and discussed possible PAR upgrades with State of Iowa personnel. Review of the PAR flowchart for possible revision will be tracked by Inspection Followup Item (IFI) 331/96003-04.

Status boards were well maintained. An emergency planning zone map indicated the protective action recommendation provided to the State.

Recovery discussions were very good and were conducted in accordance with procedure EPIP 5.2, which included identification of a recovery organization, necessary conditions and equipment, quarantined equipment, and records and document retention. Licensee management properly concluded that "Recovery" would not be entered under the then current scenario conditions. TSC personnel had developed an extensive list of items and equipment for consideration.

4.2.5 Exercise Control and Critiques

The scenario was very good, and supported offsite exercise objectives. There were sufficient numbers of personnel to control the exercise. No significant examples of controllers prompting participants to initiate actions were identified.

The licensee conducted preliminary critiques immediately following the exercise, and a subsequent integrated (summary) critique. These critiques were very good, with participants freely identifying problems and suggesting possible fixes.

The inspectors presented their preliminary findings at an exit interview conducted on April 11, 1996. On the same date, NRC and FEMA representatives summarized their organizations' preliminary findings at a media briefing hosted by FEMA at the Iowa Electric Towers building.

4.3 Organics Intrusion into Radioactive Waste System

During the report period, two instances occurred where organics entered the radwaste system. The licensee issued separate ARs and initiated human performance enhancement system (HPES) reviews. There was no adverse impact on plant operations in each case. However, the inspectors were concerned that organics in the radioactive waste system could have the potential to impact plant operations in the future if not properly resolved. The two examples will be reviewed further when the HPES reviews are completed. This is considered an IFI (50-331/96003-05).

- On March 27, 1996, the licensee identified organics in the radwaste system, but could not determine the source. After several days of special processing, the radwaste system was restored to normal. In the interim, a contingency plan was established in case the operations department needed to drain any water.

- On April 16, 1996, a chemistry technician filling the well water chemical addition tank with demineralized water, walked away from the tank. When he returned several minutes later, approximately 20 gallons of water and residual chemicals from the tank had spilled onto the reactor building second level floor. Apparently, the technician did not expect chemicals to be in the water and decided to remove the plug from a floor drain, which resulted in organics entering the radwaste system.

4.4 Poor Radiological Protection Practices During Venting of Residual Heat Removal (RHR) System

On April 2, 1996, two licensed reactor operators vented the RHR system and spilled a small amount of contaminated water in the RHR valve room. Based on interviews, the operators did not take precautions to ensure the hose used for venting was completely drained before proceeding to vent another section of piping. One of the two operators also had contaminated shoes following the venting and subsequent cleanup. According to Operations Management, the operator clearly did not meet expectations. The inspectors were concerned that the operators demonstrated inattention to detail and poor radiological protection practices in this case.

4.5 Follow-up Of Previous Open Items (92903)

(Closed) Inspection Followup Item (50-331/93012-01(DRS)): This item pertained to a temporary modification which was installed to vent excess carbon dioxide from the cable spreading room to the atmosphere. The modification's purpose was to ensure that it did not leak into the control room, rendering it uninhabitable during fire suppression carbon dioxide (CARDOX) actuations. The modification was designed and constructed as nonsafety-related with no seismic requirements. The modification was replaced with a seismically qualified vent. During a

subsequent test of the CARDOX system the oxygen level in the control room was maintained above 20 percent. The inspector concluded that the licensee had effectively corrected the problem. This item is closed.

(Closed) Inspection Followup Item No. 50-331/95007-04: The DAEC Emergency Plan, Section E, Part 2.4., "Followup Messages to Offsite Authorities," indicated that various kinds of information would be provided to offsite authorities if known and appropriate to the circumstances. Emergency Plan Implementing Procedure 1.2, "Notifications," Attachment 5, "Emergency Action Level Notification Form," did not include much of the referenced information, such as recommended emergency response actions. Review of the current form (Revision 21) and attachments indicated that the information provided was adequate. This item is closed.

5.0 DEFINITIONS

Inspection Followup Items

Inspection followup items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee, or both. The IFIs disclosed during this inspection are discussed in Sections 4.1.1, 4.1.2, 4.2.4, 4.3, 6.1, 6.2, and 6.3.

Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations, or deviations. An unresolved item disclosed during the inspection is discussed in Section 3.2.

6.0 REVIEW OF UPDATED FINAL SAFETY ANALYSIS REPORT (UFSAR) COMMITMENTS

A recent discovery of a licensee operating their facility in a manner contrary to the UFSAR description highlighted the need for additional review that compares plant practices, procedures and parameters to the UFSAR description. While performing the inspections discussed in this report, the inspectors reviewed the applicable portions of the UFSAR that related to the areas inspected. The following inconsistencies were noted between the wording of the UFSAR and the plant practices, procedures and/or parameters observed by the inspectors.

6.1 The inspectors identified a discrepancy between the UFSAR and the licensee's Operating Instruction (OI) regarding the fuel pool cooling mode of the residual heat removal (RHR) system. According to the OI, the normal fuel pool cooling system and the fuel pool cooling mode of RHR shall not be operated in parallel. Section 9.1.3.3 of the UFSAR stated, in regard to the maximum possible heat load, that the RHR system was operated in parallel with the fuel pool cooling and cleanup system

to remove this larger heat load. In response to the inspectors' concerns, the licensee initiated AR 96-0393 to resolve the differences. This inconsistency is considered an IFI (50-331/96003-06).

6.2 On March 15, 1996, the licensee identified a discrepancy in Section 10.4.5.3 of the UFSAR in the discussion of a potential for flooding of the turbine building in the event of a ruptured circulation water expansion joint. There was a statement that there was no safety-related equipment in the floodable space (an 8 foot depth), however the licensee had identified several safety-related components located less than 8 feet above the basement floor. The components included main steam line high temperature switches, main steam line low pressure switches, and other switches and cabling. An initial evaluation concluded that there was no operability concern. The inspectors will review this item further upon closure of AR 96-0394, and this is considered an IFI (50-331/96003-07).

6.3 On November 16, 1995, the licensee identified an apparent discrepancy between the UFSAR description regarding secondary containment and the test method currently in place. Section 6.2.3.1.2 of the UFSAR, safety design basis Item 2, stated that the secondary containment system was designed with sufficient redundancy such that no single active failure could prevent the system from achieving its safety objective. Test procedure STP 47J001-CY tested the system by tripping both sets of secondary containment isolation dampers and then ensuring that a 1/4" vacuum was obtained. The licensee wrote AR 95-2327 to evaluate whether testing should be performed with only one set of dampers closed at a time. This issue will be reviewed further as an IFI (50-331/96003-08).

7.0 MANAGEMENT MEETINGS

7.1 Exit Meeting

At the conclusion of the inspection on April 19, 1996, 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, Manager, Nuclear Licensing
*J. Bjorseth, Maintenance Superintendent
*J. Cantrell, Manager, Nuclear Training
R. Hite, Manager, Radiation Protection
*M. McDermott, Manager, Engineering
*K. Peveler, Manager, Corporate Quality Assurance