U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-331/OL-91-02)

Docket No. 50-331 License No. DPR-49

Licensee: Iowa Electric Light and Power Company
IE Towers
P.O. Box 351
Cedar Rapids, IA 52406

Facility Name: Duane Arnold Energy Center

Examination Administered At: Duane Arnold Energy Center near Palo, Iowa

Examination Conducted: December 9 - 12, 1991

RIII Examiner: _____ 1/13/92
R. Doornbos Date

Chief Examiner: _____ 1/13/92
D. McNeil Date

Approved By: _____ 1/13/92
M. J. Jordan, Chief Date
Operator Licensing Section 1

Examination Summary
Written and operating initial license examinations were administered to three (3) Senior Reactor Operators (SROs) and five (5) Reactor Operators (ROs) on December 9-12, 1991. The RO written examination was also given to one additional RO who had failed the RO written examination in December 1990. Two of the SROs examined are licensed ROs at DAEC and were examined as Senior Reactor Operator Upgrades (SROU); the third SRO examined had not been previously NRC licensed and was examined as a Senior Reactor Operator Instant (SROI).
Results:
All license candidates successfully passed the written portion of the examination. One SROU, one SROI and all ROs passed the operating portion of the examination. One SROU failed Section B (Job Performance Measures (JPMs)) of the operating examination (See SROU Weaknesses, Section 7).

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The following is the summary of major strengths and weaknesses noted during the administration of the licensing examination.

Strengths: (see Section 4 for details)

- Knowledge of operating procedures.
- Knowledge of system equipment/components (ROs).
- Knowledge of annunciator (alarm) response procedures.

Weaknesses: (see Section 4 for details)

- Operation of the main generator and electrical busses.
- Difference between CRD notches and positions.
- Equipment available to the operators in the TSC.
- Signals that will initiate a Main Generator reverse power trip.
- KAMAN system operation.
- Reactor recirculation system response to feedwater system problems.
- Tagout procedures in a radiation area.

## DETAILS

1. Examiners

D. McNeil, Chief Examiner, RIII, NRC
R. Doornbos, Examiner, RIII, NRC
C. Carroll, Examiner, Sonalysts (Contractor)

2. Persons Contacted

Facility Representatives

D. Wilson, Plant Superintendent
G. Van Middlesworth, APS - O&M
C. Mick, Operations Supervisor
S. Swails, Manager, Nuclear Training
F. VanEtten, Supervisor, Operations Training
J. Bashore, Operations Training
D. Mankin, Operations/QA
M. Pettengill, Operations Training
B. Pitts, QA
K. Putnam, Supervisor, Technical Support
W. Render, Operations Training
J. Sims, Operations Training
G. Thullen, Operations Shift Supervisor
C. Tirella, Operations Training
T. Van Wyen, Operations Training

NRC Representatives

D. McNeil, Chief Examiner
R. Doornbos, Examiner, RIII
M. Parker, Senior Resident Inspector

3. Summary of Results

| INITIAL License | WRITTEN Pass/Fail | OPERATING Pass/Fail | OVERALL Pass/Fail |
|---|---|---|---|
| RO | 6/0 | 5/0 | 6/0 |
| SRO | 3/0 | 2/1 | 2/1 |

4. Operating/Written Examination Strengths and Weaknesses

The following is a summary of generic strengths and weaknesses noted on the operating/written portions of the licensing examination. This information is provided to aid the licensee in upgrading initial license and requalification training programs. No licensee response is required.

Strengths

- The operators displayed a strong knowledge of emergency operating procedures. ROs were able to anticipate the needs of the SROs and assist them in completing required actions.

- The operators displayed a good knowledge of system equipment and components. During performance of the JPMs, candidates were asked to locate infrequently used valves. All were able to locate the valves. When operating equipment during the simulator examination, they were also aware of how operating one system would impact other system operations.

- Candidates demonstrated the use of annunciator (alarm) response procedures several times. The candidates were timely in completing the required steps in the procedures and did not hesitate to pull out the procedures to verify their actions.

Weaknesses

- During performance of a JPM requiring candidates to prepare and parallel the main generator to the grid, several candidates were hesitant to operate generator controls. This was beyond the normal care operators display when operating equipment. Upon questioning, the operators admitted weaknesses in main generator operations. One candidate was unable to complete the JPM because he skipped a step in the generator startup sequence that would allow him to change generator voltage using the automatic voltage regulator. His knowledge of generator systems was insufficient to allow him to diagnose the problem and recognize the missed step in the procedure.

- During performance of a JPM requiring candidates to detect and take actions for an uncoupled control rod, only one candidate drove the CRDM 6 notches as required by procedure. The other candidates drove from 1 to 5 notches before continuing with the procedure. One candidate failed to make the coupling check.

- During the performance of a JPM involving control room abandonment, operators were asked how to verify control rod insertion. Only two candidates were able to state there is an SPDS terminal in the TSC that will give an "all rods in" indication.

- o A question was asked on the written examination requesting the initiating signal for the main generator reverse power trip. No candidates successfully answered the question.

- o A question was asked on the written examination concerning operation of the KAMAN system. The KAMAN system is a radiation monitoring system that monitors all release paths in the plant. It also collects and monitors the plant for particulate and halogen problems. No candidates successfully answered the question.

- o A question was asked on the written examination about Reactor Recirculation System runbacks. Several candidates were unable to successfully identify which runback would occur on a loss of a reactor feed pump.

- o A question was asked on the written examination about tagout procedures in a radiation area. No candidates were able to identify the proper response given on the examination.

5. General Observations

The following observations were made by the examiners while administering the licensing examination:

- o Plant housekeeping was good.

- o Security, radiation protection and training personnel were very cooperative in assuring there were no unnecessary delays associated with badging, dosimetry and accessing the station.

- o Throughout the operating tests, the candidates, training and operations personnel acted courteously and professionally.

6. Examination Review

The written examination was reviewed at the NRC Region III office by DAEC training department personnel during the week of November 24, 1991. All facility comments were resolved prior to the administration of the written examination. Following the examination, the licensee submitted seven (7) additional comments on the as-administered written exam. These post-exam comments identified questions which had two correct answers. These questions were inadvertently missed during the pre-exam review. The NRC resolution of these comments are enclosed in this report (See Enclosure 2).

The simulator scenarios were reviewed and verified on the DAEC simulator with personnel from the DAEC Training Organization. All licensee individuals involved with the review of the examination materials signed security agreements to ensure there was no compromise of the examination.

7. SROU Weaknesses

An SROU was assigned to perform two JPMs that are normal RO responsibilities (start HPCI, and identify an uncoupled control rod). The SROU's performance of these JPMs was judged to be unsatisfactory. He was unable to start HPCI and failed to perform a required rod coupling check when the control rod he was withdrawing reached notch 48. Because these responsibilities are safety significant, a recommendation was made to DAEC Operations and Training to provide refresher training to the individual prior to allowing him to resume normal control room duties.

8. Exit Meeting

An exit meeting was conducted at the DAEC Training Facility on December 13, 1991. The licensee representatives in attendance at the meeting are listed in Section 2 of this report.

The following items were discussed during the exit meeting:

a. The strengths and weaknesses noted on the operating examination. (See Section 4)

b. The general observations made by the examiners during the administration of the exam. (See Section 5)

c. SROU weaknesses discovered during performance of JPMs. (See Section 7)

The results of the examination were not presented at the exit meeting. The licensee was informed that the results would be ready within 30 to 45 days.

ENCLOSURE 2

Facility Comments and NRC Resolution of Comments

RO/SRO Examination

QUESTION: RO No. 29, SRO No. 31

A loss of offsite power has occurred. Which ONE of the following indications is available in the control room to indicate if power has been restored to the 161KV switchyard busses?

a. Voltage indication on buses 1A3 and 1A4.

b. Voltage indication on bus 1A1.

c. RUNNING voltmeter on panel 1C08.

d. INCOMING voltmeter on panel 1C08.

ANSWER c.

REFERENCE

1. AOP 301, page 48.

2. 295003G005 [3.7/3.6]

FACILITY COMMENT:

Answers c. and d. are correct. It depends on which synchroscope is selected by the candidates. One synchroscope has grid voltage as RUN voltage while another synchroscope has grid voltage as INCOMING voltage.

REFERENCE:

1C06 and 7, Control room panels

NRC RESOLUTION:

Accept facility comment, answer key changed to reflect both c. and d. as correct.

QUESTION: RO No. 48, SRO No. 54

For the High Pressure Coolant Injection (HPCI) components listed in column A, SELECT its description of operation from column B. (Items is column B may be used once, more than once or not at all. Only one answer may occupy an answer space in column A.) (4 required at 0.5 each)

| COLUMN A<br>Component | | COLUMN B<br>Operation Description |
|---|---|---|
| _____a. | MO-2202 Turbine Steam Supply Valve | 1. Closes on signals indicating both low steam line pressure and high Drywell pressure |
| _____b. | CV-2235 Radwaste Discharge Isolation Valve | 2. Cycles on condenser tank pressure |
| _____c. | MO-2238 HPCI Inboard Steam Line Isolation Valve Isolation | 3. Closes on MO-2321, Inboard Torus Suction Valve full open |
| _____d. | MO-2316 Redundant Shutoff Valve closes | 4. Closes when MO-2202, Turbine Steam Supply Valve closes |
| | | 5. Receives an open signal on initiation, if isolation and steamline low pressure signals are not present |
| | | 6. Opens on initiation signal |
| | | 7. Receives an open signal on initiation unless both suppression pool suction valves are full open |
| | | 8. Closes when MO-2202, Turbine Steam Supply Valve is fully open |
| | | 9. Closes on low steam line pressure |

ANSWER

a. 6

b. 8

c. 9

d. 3

REFERENCE

1. DAEC System Descriptions-3, High Pressure Coolant Injection System Table 2

2. 206000A108 [4.1/4.0]

FACILITY COMMENT:

Part c. of this question requires the candidate to match MO-2238, HPCI Inboard Steam Line Isolation Valve Isolation, to its function. This part has two correct answers, 9 and 5. The valve will open on an initiation signal when there is no closure signal present (answer 5) and will shut on low steam line pressure (answer 9).

REFERENCE:

1. DAEC System Descriptions-3, High Pressure Coolant Injection System Table 2

NRC RESOLUTION:

Accept facility comment, answer key changed to reflect both 5 and 9 as correct answers.

QUESTION: RO No. 71, SRO No. 68

A reactor scram has occurred from power operation, but rods have remained withdrawn and the reactor is not fully shutdown. Which ONE of the following is the reason for initiating Defeat 3, RPS Scram Logic Trip Defeat?

a. To allow the operator to drain the Scram Discharge Volume prior to resetting the scram

b. To allow the operator to reset the scram with existing scram signals present

c. To allow the operator to drive control rods without resetting the scram

d. To allow the operator to bypass existing scram signals in order to reset the scram

ANSWER b.

REFERENCE

1. DAEC EOP-C, EOP Flowchart Support Procedures, Defeat 3

2. 295037K201 [4.2/4.3]

FACILITY COMMENT:

Answers b. and d. are both correct. Answer b. allows the operator to reset the scram with existing scram signals present while answer d. allows the operator to bypass existing scram signals in order to reset the scram. These mean essentially the same thing. In both cases the scram signal is still present when the operator resets the scram.

REFERENCE:

N/A

NRC RESOLUTION:

Accept facility comment, answer key changed to reflect both b. and d. as correct answers.

QUESTION: RO No. 75, SRO No. 74

An ATWS is in progress. Plant conditions are as follows:

-Reactor pressure 600 psig, decreasing
-Drywell pressure 10 psig, decreasing
-Drywell sprays initiated
-HPCI, CRD, and SLC injecting

For the parameters described in column A, SELECT the FIRST action to be taken in accordance with the EOP's, in column B. (Items in column B may be used once, more than once, or not at all. Only one answer shall occupy an answer space in column A) (4 required at 0.5 each)

| | COLUMN A Parameter | | COLUMN B Required Action |
|---|---|---|---|
| _____ | a. | Torus water level cannot be maintained below 13.5 feet. | 1. Terminate injection into the RPV from sources external to the primary containment except from boron injection and CRD |

_____b. Any area temperature above the maximum normal operating temperature

_____c. RPV water level cannot be determined

_____d. RPV water level cannot be maintained above +15 inches during an ATWS

2. Initiate emergency RPV depressurization

3. Override MSIV Lo Lo Lo Level trip. Open MSIV's and establish main condenser as a heat sink

4. Initiate RPV flooding

5. Maximize Drywell cooling

6. Initiate Primary Containment Flooding

7. Maintain RPV water level above +15 inches

8. Terminate Drywell Sprays

9. Operate all available Torus cooling, using only those RHR pumps not required for adequate cooling.

10. Enter EOP-3, Secondary Containment Control

11. Maintain RPV water level between -30 and +211 inches

ANSWER

a. 8

b. 10

c. 2

d. 11

REFERENCE

1. DAEC Upgrade Program for BWROG EPG

2. 295031K302 [4,4/4.7]

FACILITY COMMENT:

Column A, Parameter c. can be successfully matched with answers 2. and 4. from column B depending on which portion of the EOPs is being used.

REFERENCE:

1. DAEC EOP RPV Flood

2. DAEC EOP Emergency Depressurization

NRC RESOLUTION:

Accept facility comment, answer key changed to reflect both 2 and 4 as correct answers.

QUESTION: RO No. 78, SRO No. 77

Match each Limiting Safety System Setting (LSSS) in Column A with its Basis in Column B. (Items in Column B may be used once, more than once, or not at all, and only a single answer may occupy an answer space in Column A.) (4 answers required, 0.5 each)

| Column A (LSSS) | | Column B (BASES) |
|---|---|---|
| _____a. | MSIV closure on low reactor pressure | 1. Prevents release of fission products due to fuel pin failure |
| _____b. | MSIV 10% closed. | 2. Prevents exceeding the MCPR Fuel Cladding Safety Limit |
| _____c. | APRM high power scram | |
| _____d. | Generator load reject scram | 3. Prevents exceeding the LHGR Fuel Cladding Thermal Limit |
| | | 4. Anticipates the neutron flux, heat flux, and pressure transient |
| | | 5. Prevents exceeding 2200 deg. F peak fuel centerline temperature |

6. Backs up the MSIV and turbine valve closure scrams

ANSWER

a. 2
b. 4
c. 2
d. 4 & 2

REFERENCE

1. Technical Specifications, Section 3.1

2. 212000G006 [3.4/4.3]

FACILITY COMMENT:

Column A, Parameter d. can be successfully matched with answers 2. and 4. from column B. Both answers are presented in DAEC Technical Specifications Basis.

REFERENCE:

1. DAEC Technical Specification 3.1 Basis

NRC RESOLUTION:

Accept facility comment, answer key changed to reflect both 2. and 4. from column B as correct answers.

QUESTION: RO No. 43

The reactor has scrammed from 100% power on a loss of condenser vacuum. When the MSIVs shut, reactor pressure went up to 1140 psig. Which ONE of the following describes the operation of the Low Low Set (LLS) system for these conditions?

a. Any two of three monitored SRV tailpipe pressures greater than 25 psig will arm the LLS valves; they will cycle open, then closed on their individual setpoints.

b. Any SRV tailpipe pressure >25 psig will ARM the LLS valves; the valves will open on a steam line pressure of 1010 psig and remain open until pressure decreases to 900 psig.

c. Any two of three monitored tailpipe pressures greater than 25 psig will arm the LLS, open the valves, and cycle them on their individual open and shut setpoints.

d. Any SRV tailpipe pressure greater than 25 psig will arm the LLS, the valves will then cycle open and closed on their individual setpoints.

ANSWER c.

REFERENCE:

1. DAEC System Description A-6, Main Steam, MSIV-LCS, and LLS System Section VII.A.2

2. 239001K407 [3.7/3.7]

FACILITY COMMENT:

Answers a. and c. are both correct. The two answers are essentially the same answer with minor wording changes.

REFERENCE:

N/A

NRC RESOLUTION:

Accept facility comment, answer key changed to reflect both a. and c. as correct answers.

QUESTION: RO No. 64

Given the following plant conditions:

Reactor Power 80%
Both Reactor Feed Pumps operating
Two recirculation pumps in operation
Normal reactor water level

RFP "A" trips resulting in an RPV water level of 150". Which one of the following describes the reactor recirc system response?

a. Both recirculation pumps run back to minimum speed

b. Both recirculation run back to 20% speed

c. Both recirculation pumps run back to 45% speed

d. No recirculation pump runback occurs

ANSWER a.

REFERENCE:

1. DAEC System Description A-2, Reactor Recirculation System, Figure 17

2. 202002A407 [3.3/3.2]

FACILITY COMMENT:

Both answers (a. and b.) are correct. Answer a. states the recirc pumps will run back to minimum speed while answer b. states the recirc pumps run back to 20% speed. The minimum runback speed is 20%. In this case minimum speed and 20% speed should be accepted as the same speeds.

REFERENCE:

1. DAEC System Description A-2, Reactor Recirculation System

NRC RESOLUTION:

The intent of the question was to check the knowledge of the candidates concerning recirc system runbacks. 20% is the minimum runback signal generated in the recirc system. Accept facility comment, answer key changed to reflect both a. and b. as correct answers.

ENCLOSURE 3

Simulation Facility Report

Facility Licensee: Duane Arnold Energy Center
Cedar Rapids, IA

Facility License Docket No.: 50-331

Operating Tests Administered On: December 9 - 12, 1991

During the conduct of the simulator portion of the operating tests, the following items were observed:

| ITEM | DESCRIPTION |
|---|---|
| 1. Torus Level Alarm | The torus level alarm on 1C03 energizes and deenergizes frequently. This may indicate the set/reset point is the same or that large masses of water are being moved at a rate exceeding natural laws. This alarm was also identified in previous examinations. |
| 2. River Water | During the performance of one of the scenarios the river water system began acting strangely. Valves would cycle and alarms energize and deenergize at a rapid rate. DAEC personnel witnessed the occurrence of this problem at the end of the scenario and are now aware of this problem. The alarm problem was identified in a previous examination. |
| 3. River Water | One of the river water system pumps' red/green mechanical status indicator is not being switch checked. One operator alertly detected the difference between the red indicating light and the green mechanical flag during an exam scenario. |