U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No: 50-331/OL-90-02

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

Licensee: Iowa Electric Light and Power Company
PO Box 351
Cedar Rapids, IA 52406

Facility Name: Duane Arnold Energy Center

Examination Administered At: Duane Arnold Energy Center
Palo, Iowa

Examination Conducted: June 25-29, 1990

RIII Examiner: Michael E. Bielby, Sr. 8/1/90
M. Bielby Date

T. Bettendorf
J. Muth

Chief Examiner: [signature] 8/1/90
H. Peterson Date

Approved By: [signature] 8/2/90
M. J. Jordan, Chief Date
Operator Licensing Section #1

Examination Summary

Examination administered on June 25-29, 1990 (Report No. 50-331/OL-90-02)
Written and operating requalification examinations were administered to nine Senior Reactor Operators (SROs) and seven Reactor Operators (ROs). Three operating shift crews, and one staff crew, consisting of three SROs and one RO, were evaluated on the simulator portion of the NRC examination.
RESULTS: Total of three crews, two operating shift and one staff, failed the dynamic simulator portion of the NRC requalification examination. Total individual failures consisted of three SROs and one RO. One SRO failed the operating portion of the examination, both the dynamic simulator and Job Performance Measure (JPM). Two SROs failed only the dynamic simulator, and one RO failed only the JPM portion of the examination. The facility failed the same crews and individuals. Additionally, the facility failed one SRO and two ROs on the dynamic simulator and one SRO on both the simulator and JPM portions of the examination. Independent grading by the NRC, in accordance with the criteria of NUREG-1021, Revision 5, Operator Licensing Examiner Standards, ES-601, D.1.c.(2)(c)4, assigned the Duane Arnold Requalification Training Program an overall rating of unsatisfactory (greater than one third of the crews were determined to be unsatisfactory).

Although the training program was considered unsatisfactory, the evaluations made by the facility evaluators were accurate and conservative. Specific information concerning the major discrepancies are listed in section 4.

On July 5, 1990, a management meeting was conducted between the NRC and the facility to discuss corrective actions regarding the unsatisfactory requalification training program and the individual examination failures. A Confirmatory Action Letter was subsequently issued on July 13, 1990 to document the proposed facility corrective actions.

The facility was shut down for a scheduled refueling outage on June 27, 1990 and therefore, an immediate Operational Evaluation was not necessary. An Operational Evaluation of the remaining three operating crews along with the re-examination of the crews and individuals who have failed the requalification exam have been scheduled for August 13-17, 1990.

REPORT DETAILS

1. Examiners

+*H. Peterson, Chief Examiner, NRC, Region III
+ M. Bielby, NRC, Region III
+ J. Muth, Battelle-Pacific Northwest Laboratories (PNL)
  T. Bettendorf, PNL

2. Persons Contacted

Facility Representatives

+*D. Mineck, Manager Nuclear Division
+*R. Hannen, Plant Superintendent
+ G. Van Middlesworth, Assistant Plant Superintendent
+*S. Swails, Training Superintendent
+ C. Mick, Operations Supervisor
+ D. Fowler, Acting Assistant Operations Supervisor
+*F. Van Etten, Operations Training Supervisor
+ R. Potts, Procedure Supervisor
+*K. Putnam, Technical Support Supervisor
+ L. Heckert, Lead Requalification Instructor
+ K. Dawald, Senior Instructor

NRC Representatives

*A. Davis, Regional Administrator, Region III
*H. Miller, Director, Division of Reactor Safety (DRS)
*G. Wright, Chief, DRS Operations Branch
+*M. Jordan, Chief, DRS Operator Licensing Section 1
+ M. Parker, Senior Resident Inspector
*R. Knop, Chief, Division of Reactor Projects (DRP), Branch 3
*J. McCormick-Barger, Project Engineer, DRP Branch 3

+Denotes those present at the Training Staff and Management exit meeting on June 29, 1990.

*Denotes those present at the Region III Management meeting on July 5, 1990.

3. Requalification Training Program Observations

The quantity of examination material per the criteria of NUREG-1021, Revision 5, Operator Licensing Examiner Standards, ES-601, was acceptable. However, material quality was of concern and corrective action should be taken to improve the quality of the Requalification Written Question Bank, Scenario Test Bank, and the Job Performance Measure (JPM) Test Bank. The licensee training staff required constant prompting by the NRC in correcting the deficiencies identified during the development of the requalification examination. Observations were

made in the following areas and will require additional attention to avoid difficulties in the future.

A. Written Exam

(1) Better quality assurance towards the development of exam questions and answers. The format of the multiple choice selections should be consistent, the choices should be labeled as A, B, C, D rather than 1, 2, 3, 4 or the combination of the two. The references for the questions should be more specific. For example, "None", "Plant Conditions", or "Operator Knowledge" are not considered acceptable references. Several questions had two correct answers or the answers were too obvious. For example, a negative stem question concerning control rods had three distractors concerning rods and the correct answer was the only one which did not concern control rods.

(2) Most of the questions were adequate, they were not all direct look-ups. Several of the questions tested the higher levels of knowledge (analysis, and comprehension) and not just memorization. The licensee needs to continue to upgrade the exam questions to this level of testing.

B. Scenarios

(1) The pertinent steps of the procedures need to be included in the scenario to properly ascertain the operators expected actions. Simply referencing a procedure number should be avoided.

(2) The administrative format of the scenario guides needs improvement. The scenario guides do not adequately identify which individuals were responsible for what actions. The organization of the administrative information to assist in the evaluation of examinees were too cumbersome. Even the facility evaluators did not use the scenario guides which were submitted to the NRC. The facility evaluators maintained a separate events time line of operator actions. This gave question on the usability of the scenario guides.

(3) Individual Scenario Critical Task (ISCT) designation was poor. Attention should be placed on identifying ISCTs that are more specific and safety significant. ISCTs that are too general should be reduced. For example, "Perform the required actions per EOP-2" as an ISCT should be incorporated into several safety significant ISCTs. Also, consistency in ISCT designation should be maintained throughout the scenario.

(4) The scenarios used in the examination were adequate in scope

and involvement into the Emergency Operating Procedures (EOP). These scenarios initially required extensive assistance by the NRC to make them adequate in examining the operators in accordance with NUREG 1021. Overall, the majority of the provided scenarios were too simple. For example, one scenario consisted of a loss of condenser vacuum with one control rod being stuck out as an entry into an ATWS EOP. In the future, scenarios in the Test Bank will require upgrading to adequately exercise a representative cross-section of EOPs and to test the operators in the indepth use of these EOPs.

C. Job Performance Measures (JPM)

(1) In several cases, the JPM questions were simple look-up questions from the procedure just performed or just a simple systems question. The JPM questions should be more task oriented and should address the higher levels of knowledge (analysis and comprehension). Additionally, JPM questions should have adequate references.

(2) The JPMs require more specific and definitive cues and standards to assure that the examinee understands what is expected of him. This is particularly apparent for in plant JPMs which are time critical.

(3) The JPM time validations should be extensively reviewed to ensure proper time allocation. Several JPMs appear to have unrealistic time validations. For example, the transferring of startup Feedwater Regulating Valve (FRV) to BFRV was listed as 15 minutes, but the average time of completion was approximately 30 to 35 minutes. Several individuals completed the task satisfactorily in 40 to 45 minutes and one individual took 1 hour and 17 minutes. If the task is thought to be of high importance and/or a time critical action, then proper time validation should be ensured to adequately distinguish a competent operator.

D. Evaluators

Overall, the evaluators during the requalification examination were very good. Only a few instances of excessive verbal cuing were noted by the examiners. Also, the evaluative skills of the evaluators were very good.

During the dynamic simulator phase of the requalification examination, the evaluators demonstrated good judgment and detection skills (ability to pick-up on errors). Although, the evaluators initially refrained from asking follow up questions after the simulator scenarios, the NRC and facility came to a 100% agreement on all crew failures including the three individual failures. Additionally, the facility evaluators were more

stringent in grading the dynamic simulator which resulted in a more conservative evaluation of four additional examinees.

4. Major Discrepancies

A. During the performance of simulator scenarios No. 3, Recirculation Pump Seal Failure / Small Steam Line Break Inside Containment, and No. 15, ATWS with Stuck Open Relief Valve, three out of four crews failed the simulator evaluation. A concern was raised by the NRC with respect to the utilization of the Emergency Operating Procedures (EOP).

(1) The crews consistently did not appreciate the seriousness of the casualty and waited to reach and/or exceed the parameter limits in the EOPs prior to performing the required corrective actions. For example, in accordance with EOP-2, Primary Containment Control, it dictates that before Drywell temperature reaches 280 deg F initiate Drywell Sprays. The operators did not take this action until the Drywell temperatures reached or exceeded 280 deg F. In the ATWS EOP, Anticipated Transient Without Scram, it dictates that Standby Liquid Control (SBLC), boron injection, must be initiated before the Torus Water temperature reaches the Boron Injection Initiation Temperature, which is 110 deg F for power levels above 8.5 percent. The operators consistently waited to reach or exceed this parameter prior to initiating the SBLC system. In one case, the delay was considerable enough that the Torus Water temperature, even after boron injection, eventually exceeded 250 deg F which resulted in exceeding the Heat Capacity Limit of the Torus.

(2) The operators had difficulty correctly transitioning through and between EOPs. For example, the operators were too involved in Drywell temperature and did not adequately monitor Torus pressure. The operators were unaware of the importance of this parameter. Consequently, they did not initiate the EOP-2 requirement for Torus Sprays or Drywell Sprays before reaching Torus pressure of 9 psig and exceeding 9 psig, respectively. The operators on a stuck open relief valve was required to transition from EOP-2 to EOP-1 before the Torus Water temperature reached 110 deg F, which in turn required the reactor to be scrammed. The operators after exhausting all actions to shut the relief valve, consistently waited until the Torus Water temperature reached or exceeded 110 deg F before initiating a reactor scram. This action aggravated the response to the subsequent ATWS casualty. In one case the crew was so perplexed that they allowed the Torus Water temperature to exceed the Torus Heat Capacity Limit.

(3) The operators had difficulty interpreting action statements in the EOPs. For example, the ATWS EOP which required

lowering of reactor water level for Power/Level control dictates that all injection into the Reactor Pressure Vessel (RPV) be secured except from boron injection and Control Rod Drive (CRD) systems, however, the crews consistently failed to recognize and anticipate the possible injection from the Emergency Core Cooling System (ECCS). This lack of foresight caused undesired injections by the HPCI and RCIC systems after intentionally lowering reactor water level during an ATWS condition. Subsequently, these actions created an uncontrolled power transient.

B. The Command and Control exhibited by the Senior Reactor Operators were less than adequate and requires reconditioning. The lack of proper direction and use of EOPs by the SROs resulted in the failure to perform EOP steps requiring the Automatic Depressurization System (ADS) to be inhibited, and incomplete performance of EOP defeats. Additionally, the lack of command and control caused the overloading of one RO to perform numerous critical actions all at once, creating opportunities for detrimental errors.

There were several cases of SROs being inattentive when important information was provided or requested. There were several cases where the supervisors did not heed the inputs from others, which resulted in incorrect and/or untimely decisions. For example, two SROs in an operating crew, one SRO in charge performing EOP-1 and the other SRO assisting in performing EOP-2, gave contradicting orders which created confusion in part of the ROs. One order was to maintain reactor water level and the other order was prematurely anticipating Emergency Depressurization (ED) without initiating ED and ordered all injection to the RPV to be stopped. This action was challenged by the ROs but resulted in reactor water level decreasing to top of active fuel. Eventually, the combination of improper decisions and actions degraded the plant condition beyond the design of the plant and the scope of the simulator. The scenario had to be stopped by the facility simulator operators before causing any simulator damage.

5. General Observation

A. The training staff was courteous and professional throughout the preparation and examination weeks. But, apparently there was some lack of communication from the management to the training staff. This created some confusion and delays in meeting the needs of the NRC examiners. For example, on the first days of the JPM and simulator exams, copies of the exam evaluation materials for the NRC were not made ready until after being asked for by the NRC examiners.

B. The facility was somewhat inattentive to the NRC advice towards the requalification examination process. This was exhibited by the lack of understanding by the training supervisor to the NRC

advice regarding the exam scheduling and the time expectation of the exam. For example, the facility wanted to pool all the examinees in a holding room and cycle them progressively through specific JPMs rather then having the crews perform all their required JPMs simultaneously. The facility's lack of JPM scheduling by crews placed the individuals in excessive waiting periods and created extra stress. Similarly, the facility scheduled the dynamic simulator by scenarios, and had all the crews perform the same scenario each day and placed them in holding areas throughout the day to prevent compromise. This lack of scheduling by crews also created needless stress.

C. The facility demonstrated a good conservative evaluation of the facility's candidates. The evaluation team was receptive to the improvements suggested by the NRC relating to requalification material and evaluation techniques. The evaluators were professional throughout the examination, and exhibited unbiased evaluation of the examinees.

6. Examination Results Comparison

A comparison between the NRC and the facility grading on the written and operating portions of the examination was found to be adequately consistent. The comparison of the grading identified very few inconsistencies and was adequate to meet the standards. Overall, the facility demonstrated more rigid evaluative grading. The facility and the NRC evaluations were in agreement on the three crew failures and the four individual operating exam failures. Additionally, the facility failed one SRO and two ROs on the dynamic simulator and one SRO on both the simulator and JPM portions of the examination. In accordance with the criteria of NUREG-1021, Revision 5, Operator Licensing Examiner Standards, ES-601, D.1.c.(2)(c)4, the Duane Arnold Requalification Training Program received an overall rating of unsatisfactory (greater than one third of the crews were determined to be unsatisfactory).

7. Exit Meeting

An exit meeting with the facility Training Department and plant management was conducted at the Training Center of the Duane Arnold Nuclear Power Station on June 29, 1990. The facility representatives that attended the meetings are listed in section 2 of this report.

The following items were discussed during the exit meeting:

a. The observations of the training program made by the examiners during the administration of the requalification examination. (see sections 3 and 5)

b. The concerns relating to the unsatisfactory rating of the Requalification Training Program. (see section 4)

c. The facility's required actions for an unsatisfactory individual and training program evaluation.

(1) Individuals who failed shall be removed from licensed duties until remediation and reexamination has been completed satisfactorily. The NRC will administer the reexamination because the facility's requalification program was judged unsatisfactory.

(2) The facility must identify program deficiencies and corrective actions required to improve operator performance.

d. The scheduling of a management meeting at Region III between the NRC and the facility on July 5, 1990. The meeting was established to discuss audit findings, identified deficiencies, root causes, proposed corrective actions, schedule for corrective action implementation, and follow up inspections and examinations.

The rating of the Duane Arnold Energy Center requalification training program was presented at the exit meeting. The facility was informed that the results will be reviewed by regional management and that they would be documented in this examination report.

8. Management Meeting

On July 5, 1990, a management meeting between the facility and the NRC was held at the Region III office to discuss the facility's unsatisfactory requalification training program. The representatives that attended the meeting are listed in section 2 of this report. The following items were discussed during the management meeting:

a. Review of facility's identified deficiencies, root causes, proposed corrective actions, and schedule for corrective action implementation.

b. NRC's concerns toward the training program and the proposed implementation of an Operational Evaluation. The facility was shut down for a scheduled refueling outage on June 27, 1990 and therefore, an immediate Operational Evaluation was not necessary.

c. Issuance of a Confirmatory Action Letter (CAL) to document the proposed facility corrective actions.

Following the management meeting, the NRC, within the scope of NRC manpower availability, scheduled an Operational Evaluation of the remaining three operating crews along with the re-examination of the requalification exam failures for August 13-17, 1990. The Confirmatory Action Letter was issued on July 13, 1990.

REQUALIFICATION PROGRAM EVALUATION REPORT

Facility: Duane Arnold Engery Center

Examiners: H. Peterson, M. Bielby, T. Bettendorf, J. Muth

Dates of Evaluation: June 25-29, 1990

Areas Evaluated: 16 Written 16 Oral 16 Simulator

Examination Results:

	RO Pass/Fail	SRO Pass/Fail	Total Pass/Fail	Evaluation (S or U)
Written Examination	7/0	9/0	16/0	S
Operating Examination				
Oral (JPM)	6/1	8/1	14/2	S
Simulator	7/0	6/3	13/3	S
Evaluation of facility written examination grading				S

Crew Examination Results:

	Crew 1 Pass/Fail	Crew 2 Pass/Fail	Crew 3 Pass/Fail	Crew 4 Pass/Fail	Evaluation (S or U)
Operating Examination	Fail	Pass	Fail	Fail	U

Overall Program Evaluation

Satisfactory ____ Unsatisfactory X (List major deficiency areas with brief descriptive comments)

Major Deficiencies: (See Section 4 of this report)
- EOP Usage
- Command and Control

Submitted:
H. Peterson 7-27-90
Examiner

Forwarded:
M. Jordan 8/3/90
Section Chief

Approved:
G. Wright
Branch Chief

SIMULATION FACILITY REPORT

Facility Licensee: Duane Arnold

Facility Licensee Docket No. 50-331

Operating Tests Administered At: Palo, Iowa

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

ITEM	DESCRIPTION
Steam Tunnel Room Temperature Monitors	During the simulator verification week, one simulator casualty inserted a steam leak in the steam tunnel room which causes room temperature to exceed 300°F (max. safe temperature). With only the room coolers and the steam leak still present, the room temperature unrealistically decreased to less than the maximum normal set point of 200°F.