U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-254/OL-90-02

Docket No. 50-254 License No. DPR-29

Licensee: Commonwealth Edison Company
1400 Opus Place
Opus West III
Downers Grove, IL 60515

Facility Name: Quad Cities Nuclear Power Station

Examination Administered At: Quad Cities Nuclear Power Station
Cordova, Illinois

Examination Conducted: September 10-19, 1990

RIII Examiner: [signature] for 11-29-90
M. Bielby Date

G. Buckley
D. Draper
L. Larson

Chief Examiner: [signature] 11-29-90
H. Peterson Date

Approved By: [signature] 11/29/90
M. J. Jordan, Chief Date
Operator Licensing Section #1

Examination Summary

Examination administered on September 10-19, 1990
(Report No. 50-254/OL-90-02)(DRS))
Written and operating requalification examinations were administered to thirteen Senior Reactor Operators (SROs) and seven Reactor Operators (ROs). Three operating shift crews and one staff crew (consisting of four SROs and one RO) were evaluated on the simulator portion of the NRC examination.
Results: The staff crew failed the dynamic simulator portion of the NRC requalification examination on competencies. The three operating shift crews performed adequately and passed. Total individual failures consisted of three SROs. The three SROs failed the dynamic simulator portion of the examination. All ROs passed the requalification examination. The facility failed two SROs on the dynamic simulator, of which one of the SROs failed

both the simulator and JPM portions of the examination. The facility initially did not fail the staff crew on the competencies. After discussing the results with the facility, certain weaknesses identified by the facility were not associated with the same competency area as the NRC. Following the resolution of these weaknesses, the facility concurred with the NRC results. Overall, the facility and NRC grading resulted in one disagreement on an SRO failure. Independent grading by the NRC, in accordance with the criteria of NUREG-1021, Revision 5, Operator Licensing Examiner Standards, ES-601, assigned the Quad Cities Requalification Training Program a rating of satisfactory (meets or exceeds an overall 75% pass rate, with one crew failure).

Although the training program was considered satisfactory, certain areas warrant improvement. The training material in the areas of JPMs and simulator scenarios was weak. Utilization of procedures (Quad Cities Emergency Operating Procedures (QGAs) with flowcharts) by Shift Engineers and communications between crew members was weak. Additionally, the evaluations made by the facility evaluators were adequate; however, in some cases weaknesses were identified in the strict application of the acceptance criteria. Specific information concerning the major concerns are listed in Section 4 of this report.

REPORT DETAILS

1. Examiners

+*H. Peterson, Chief Examiner, NRC, Region III
+*M. Bielby, NRC, Region III
G. Buckley, Battelle-Pacific Northwest Laboratories (PNL)
D. Draper, PNL
L. Larson, PNL

2. Persons Contacted

Commonwealth Edison Company (CECo)

*R. L. Bax, Station Manager
*G. Spedl, Production Superintendent
+*J. Hoeller, Training Superintendent
*W. Graham, Simulator Training Supervisor
*J. Wehtington, Nuclear Quality Programs Superintendent
*T. Barber, Regulatory Assurance
*D. Gibson, Regulatory Assurance Supervisor
*R. Stols, Licensing Administrator
*R. Radtke, Licensing Engineer
*J. Sirovy, Services Director
+*J. Kopacz, Operating Engineer
+*C. Simmons, Simulator Instructor (PTC)
+*T. Schares, License Operator Training
+*J. Boyles, Operating Procedures
+*R. Schroeder, License Operator Training
+*C. Swegle, License Operator Training
+*D. Essary, License Operator Training

U. S. Nuclear Regulatory Commission (NRC)

*T. Taylor, Senior Resident Inspector
*R. Bocanegra, Resident Inspector

+Denotes those present at the Training Staff exit meeting on September 19, 1990.

*Denotes those present at the Management exit meeting on September 19, 1990.

3. Requalification Training Program Observations

The utility was adequately attentive to the NRC requalification examination process. The training and operations staff were courteous and professional throughout the preparation and examination weeks. But, it was apparent that the NRC examination period placed a strain on the training staff manning, exhibited by the lack of 100%

participation by all the facility instructors scheduled for the requalification examination during the preparation week. They were involved with continuing classroom training unrelated to the requalification examination. The facility indicated that the training department was understaffed.

The quantity of examination material per the criteria of NUREG-1021, Revision 5, Operator Licensing Examiner Standards, ES-601, was acceptable. However, material quality concerning requalification written questions, scenarios, and the job performance measures (JPM) could be improved. The facility training staff required prompting by the NRC in resolving the deficiencies identified during the development of the requalification examination. Observations were made in the following areas.

a. Written Exam

(1) Better quality assurance in the development of exam questions and answers is warranted. Several questions had answers that were incorrect or the answer would not discriminate between a competent or incompetent operator.

(2) Most of the questions were adequate. 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) To assist in consistent and appropriate grading of individuals, the pertinent steps of the procedures should be included in the scenario. Referencing a procedure number alone is insufficient.

(2) The administrative format of the scenario guides needs improvement. The scenario guides do not adequately identify which individual was responsible for what actions. There were multiple operator positions designated for each action, including critical tasks. This made it difficult to identify who would be responsible for a missed action and to ensure adequacy per the Examiner Standards. At other facilities, a separate listing of all the ISCTs per scenario has expedited the post scenario review.

(3) ISCT selection was adequate after some questioning by the NRC. With Revision 6 of NUREG-1021,

Examiner Standards, more attention will be necessary to adequately identify ISCTs. For example, attention should be placed on identifying ISCTs that are more specific and safety significant. Also, consistency in ISCT designation should be maintained throughout the scenario.

(4) The scenarios used in the examination properly exercised the QGAs. The initially proposed scenarios required enhancements to thoroughly exercise multiple QGAs. Overall, the majority of the scenarios provided were adequate in entering QGAs, but some would terminate the scenarios early in the evolution. For example, several scenarios would enter a QGA and once the control rods were scrammed in an ATWS, or Emergency Depressurization was initiated, the scenario would be terminated. Such scenarios were modified to require utilization of multiple QGAs to restore water level, perform RPV Flooding, or Emergency Depressurize with an ATWS condition still present.

c. Job Performance Measures (JPM)

(1) JPM questions at times were not discriminating enough. An example of this was, "Why are jumpers removed at the end of a job?", with the response of "To restore the system back to normal". There were also several questions that required multiple answers, but the stem of the questions did not clearly stipulate to the candidate how many responses were expected for full credit. If a question has ten responses and only five responses are required, that fact should be stated in the stem of the question and the number of correct responses graded accordingly with the Examiner Standards.

(2) The JPMs require more definitive cues and standards to assure that the candidates understand what is expected of them. This is particularly important for JPMs which are time critical. It is expected that JPMs reflect, to the extent practical, actual plant operations. If it is normal operating practice to find, copy, and review all procedures prior to performance of the task, then the time validation should include those actions. On the other hand, for emergency actions it may be necessary for an individual to

perform actions without procedures, therefore, the time validation would not include time for review. In either case, JPM time should start after the cue is given.

d. Evaluators

Overall, the evaluators were adequate. There were few instances of excessive verbal cuing, but an indirect form of candidate cuing was, on a few occasions, identified during the JPM examination. The evaluators were expedient in providing JPM cues. This continued as long as the examinee followed the JPM "script". As soon as the examinee performed a step incorrectly or deviated from the script, the evaluators would hesitate before responding. This pause or hesitation in the evaluator's response could be interpreted by the examinee that his response was possibly incorrect. Better preparation, including further review and walkdown of the JPMs by the evaluators, would possibly rectify this item. Additionally, during the JPM walkthrough questions, two facility evaluators had a tendency to add clarifying words to the answers given by the examinees when the recorded answer from the examinee was read back.

During the dynamic simulator phase of the requalification examination, the evaluators demonstrated adequate judgment and detection skills. But, their overall evaluation skills could be improved. For example, the facility's post evaluation incorrectly categorized crew compentencies which resulted in an initial discrepancy between NRC and facility grading. After discussions with the NRC, the training staff was more attuned to the level of evaluation and agreed with the NRC grading of the crews.

4. Major Discrepancies and Concerns

The following items are the summary of concerns and discrepancies noted by the NRC on the licensing requalification examination. This information is being provided for the facility to evaluate, consistent with their satisfactory training program.

a. Emergency Operating Procedure (EOP) Utilization

A concern was raised with respect to the tracking/following and transitioning within the Quad Cities Emergency Operating Procedures (QGA). Shift Engineers (SE) were observed to place the QGAs (flowcharts in a small flipchart booklet form) in front of themselves, but they did not systematically follow them. The SEs rarely marked their place in the QGAs nor did they mark parameters (only one SE was observed to mark the flowchart).

In several scenarios, the crews demonstrated some difficulty in following all QGAs correctly as conditions required. In each case, when the SE referred back to the QGAs, he had to completely review each path to locate the proper place within the QGA. Without proper tracking, the SE's performance in following the QGAs were at times hampered. Concurrent steps and step sequences in the QGAs were not always correctly implemented. For example, the SE did not enter QGA-500-7-1 (ATWS/LEVEL Control) as plant conditions and QGA 100-1 (RPV Level Control) required; Emergency Depressurization with an ATWS condition present was performed by QGA 500-2 (Emergency Depressurization without an ATWS) instead of QGA 500-7-2 (ATWS/Emergency Depressurization); and operators did not expeditiously, per QGA 100-3 (RPV Power Control), initiate SBLC when Torus conditions were steadily degrading and when the Torus temperature finally exceeded 110°F.

The present format of the EOP's does not lend itself to timely and efficient EOP implementation. This may have caused the lack of operator reliance and timely implementation of QGA steps. The facility indicated their understanding and actions in improving the usability of the flowchart and further reinforced in training the concept of QGA reliance and the placement of markings for effective casualty mitigation. The facility also indicated that actions were in place to upgrade the Revision 4 QGAs to configure them in larger flowcharts by January 1991 to facilitate better QGA implementation.

b. <u>Action Statement Inconsistencies</u>

The operators demonstrated inconsistencies when interpreting action statements in the QGAs. In QGA 500-7-1 (ATWS/Level Control) it requires the operator to "terminate and prevent all injection into the RPV", except from boron injection and Control Rod Drive (CRD) systems. This was implemented differently by each crew. For example, none of the low pressure injection sources were consistently prevented from injecting, rather only systems currently injecting were secured. Additionally, the HPCI was lowered to the lowest controller output. The operators dialed down the flow controller and relied on the pressure differential across the check valve to prevent injection into the RPV. The other method observed to prevent the start of the HPCI was to open the breaker for the HPCI auxiliary oil pump, thus removing the HPCI from operability status (there is no pull-to-lock switch on the HPCI aux oil pump at the HPCI control board).

Scenarios involving decreasing RPV water level with no high pressure systems available were treated differently by different crews. Most crews waited until "top of active fuel", as directed by EOPs, before depressurizing. While some other crews would anticipate the "scenario" and depressurize early rather than attempting to recover high pressure systems or isolate the leak.

During two other scenarios, crews assumed that the Max Safe radiation limits (3000 to 5000 mr/hr) per QGA 300 (Secondary Containment Control) had been exceeded based on back panel Area Radiation Monitors (ARM) reading full scale (100 mr/hr). In both cases the crew's actions were based upon the full scale readings of the ARMs without any backup readings confirming that radiation conditions were exceeding the maximum safe levels. The facility did indicate that new instruments which adequately covers the span of required radiation level are being procured.

c. Generating Station Emergency Plan (GSEP) Utilization

During several scenarios, the Shift Control Room Engineer (SCRE) and the SE were unable to correctly ascertain the EAL classification using the GSEP. In both cases the operators classified two different casualties as an Alert when they should have been classified as Site Area Emergencies. One of the same operators as the SCRE also classified another scenario, during follow up JPM questioning, as an Alert when the situation was a General Emergency based on GSEP 9j, 2q, or 6zb. This further reemphasizes the weakness in the area of utilizing the GSEP and correctly classifying the casualties.

d. Communications

While crew communications prevented excessive plant degradation, crew members were inconsistent in keeping each other informed on the status and conditions of their responsible systems. For example, crew members had difficulty in maintaining RPV water level because they were not made aware that the Safe Shutdown Pump was started earlier and was injecting. When SRVs were being opened and closed for RPV pressure control, the individual did not inform crew members involved in level control or monitoring Torus/Drywell parameters. And, even when the RHR system was lined up for torus cooling or even drywell sprays, the individual performing the line up did not routinely notify the crew or even the SE when the task was complete, unless requested. Additionally, during several other scenarios, when verbal feedback was provided, the crew member initiating the communication often would fail to listen to the repeatback.

Individuals and crews were inconsistent in making control room and plant announcements. Evolutions or planned changes to plant systems which could perterbate other systems were not consistently announced to the plant via the Public Address (PA) system or vocalized to control room members. The same inconsistency was observed in announcements made to the plant regarding the start up of major equipment such as diesel generators and large motors. Additionally, the crew did not consistently announce a reactor scram. The facility did indicate that the announcement of a reactor scram is not a required practice.

5. Observations

Observations were made in the following areas to assist the facility in identifying items which may require additional attention to avoid difficulties in the future.

a. Plant

(1) Several components throughout the plant were identified to have inadequate labeling. Some had small metal tags which were illegible, some were marked with grease pencil, and some had no labeling at all. In particular, the labeling for the HPCI "Reset" and "Trip" levers had been painted over making the labels almost illegible even after they have been located. In addition, the HPCI handwheel for the MSC and MGU are not adequately labeled (Unit 2 is marked in pencil). The facility has implemented a relabeling program, as identified by several equipment with new plastic bar code labels.

(2) QGA contingency steps, such as installation of jumpers and removal of fuses, are not organized to facilitate expeditious performance. For example, jumpers are loosely contained in one sealed box without adequate instructions delineating which

one is to be used (some jumpers were "alligator" clips and some were open spade connectors for screw on type lugs) and there were no controls for necessary tools such as screw drivers and fuse pullers. The facility was informed that other utilities had incorporated a process where required tools and procedures were organized in separate packages to facilitate timely initiation of emergency procedure contingency steps.

(3) Some controls operate in a direction which is inconsistent with good human factors engineering. This type of inconsistency sets up operators to perform inappropriate plant control operations. Some examples of poor human factors which led to inappropriate operator action during the exam process included: operating the diesel engine speed control requires counter clockwise operation to increase speed which is ergonomically backwards; the Safe Shutdown Pump (SSP) control switch works opposite of the indicating lights (the switch is turned toward the close light to open the injection valve). In at least one scenario the operator was directed to stop injection through the SSP, but actually opened the injection valve to full open thinking he was closing the valve to leave the SSP in the recirculation mode. The SSP continued to inject into the RPV without the knowledge of the crew.

(4) Plant lighting in certain areas needs improvement, for example, the SBLC area and the HPCI room passage way, in particular, the overhead light in the airlock/chamber (passageway) leading to the HPCI room was defective. This light was usually off and whenever it was on, it would turn off without warning, leaving people in the airlock in total darkness. The facility initiated corrective action and the light was subsequently repaired.

(5) Numerous trip hazards were encountered in the plant during the JPM process. Most trip hazards were hoses and cables which had been taped to the floor and through time, traffic and abrasion were no longer adequately secured. In particular, the Unit 1 RCIC room contained a drain hose unsecured and strung all around the floor. This posed a major trip hazard in a contaminated area and the facility management was immediately informed. Additionally, the tape used to originally secure these hoses and cables is colored black rather than the OSHA sanctioned yellow and black

diagonally striped hazard tape.

(6) Water, which poses another slip hazard and can promote the spread of contamination, was present in a contaminated area in front of the bulk-head door leading from the Unit 1 HPCI room to the torus chamber. This was a concern, in that people had to pass through this area to enter the torus room. The facility indicated that this pool of water was apparently ground water and not contaminated and that work was in progress to solve the problem.

(7) Most, but not all, of the Quad-Cities staff (or examinees) were aware of the plant requirement for visitors to wear specially colored anti-contamination hoods when they dressed-out for entry into a radiologically controlled zone. Additionally, two facility workers were observed in the RCIC room with only a surgeons cap when the anti-contamination clothing requirement was for full hoods. This concern was brought up to the facility and appropriate action was taken.

b. Procedures

(1) The Quad Cities Emergency Action Level (EAL) classification (EPIP 200-T1) requires the use of specific criteria to assess the failure of Fission Product Barriers. For example, a cladding failure criterion is only a grab sample activity equivalent to 300 uCi/g dose equivalent of I-131, and a Reactor Coolant System (RCS) failure criterion is containment pressure greater than 2 psig AND reactor vessel level of less than or equal to -59 inches with controlled evolution not in progress. These criteria do not take into account the Main Steam Line (MSL) Radiation as a condition for fuel failure or the unisolatable failure of the RCS outside the primary containment, which would preclude the required 2 psig containment pressure. The criteria used to classify an ALERT, SITE AREA, AND GENERAL EMERGENCY conditions are very limiting. While other areas of the GSEP may deal with related situations (main steam leaks), cross-references would aid the operators in a timely condition evaluation.

The facility training staff and the NRC discussed this question concerning the limitations of the EAL classification of fission product barrier failures. The training staff agreed with the question and indicated that the question will be brought up to the GSEP organization.

(2) Many of the emergency and abnormal procedures require the use of a key to unlock valves (the "S" key), controls (local valve controller cover key) and locked high radiation rooms ("R" key). Not only is there is a limited supply of such keys but the procedures do not specify the needed keys as a prerequisite to start of the job and the keys must be checked out at the operations support (communications) center. This situation could result in delays for mitigation as well as recovery actions when the operator shows up at the job site without the necessary keys. Some of the valve controller covers have glass windows which could be broken, e.g., a fire alarm box but there is no tool to break the glass safety.

(3) The plant does not have a procedure for a rod drifting in. During scenario No. 3, procedure QOP 300-4 (Mispositioned Control Rod) was reviewed by the examinee during the evolution of the scenario, but this procedure applies only to conditions as its name implies; mispositioned control rod. QOA 300-4 (Inability to Latch Control Rod-(Rod Drift) was also reviewed by the examinee. This procedure addresses only rod drift out, not in. Following the scenarios, a review was made of all QOP 300 procedures and none specifically addressed the condition of a rod drifting in.

6. Examination Results Comparison

The facility initially did not fail the staff crew, as did the NRC, on the competencies. After discussing the results with the facility, certain weaknesses identified by the facility were not associated with the same competency area as the NRC. Following a discussion of the weaknesses, the facility concurred with the NRC results. A comparison between the NRC and the facility grading on the written and operating portions of the examination was found to be adequate. The facility and the NRC evaluations were in agreement on all but one SRO operating exam failure. The facility failed only two SROs, one of which failed 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, the Quad Cities Requalification Training Program was deemed adequate and received an overall rating of satisfactory.

7. Exit Meeting

An exit meeting with the facility Training Department and plant management was conducted at the Training Center of the Quad Cities Nuclear Power Station on September 19, 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 major concerns relating to the Requalification Training Program (see Section 4).

c. The facility's required actions for the unsatisfactory individuals who failed the requalification examination.

The rating of the Quad Cities 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.

ENCLOSURE 2

REQUALIFICATION PROGRAM EVALUATION REPORT

Facility: Quad Cities

Examiners: H. Peterson, Chief Examiner
M. Bielby
G. Buckley
D. Draper
L. Larson

Date(s) of Evaluation: September 10-19, 1990

Areas Evaluated: X Written X Oral X Simulator

Examination Results:

	RO Pass/Fail	SRO Pass/Fail	Total Pass/Fail	Evaluation (S or U)
Written Examination	7/0	13/0	20/0	S
Operating Examination Oral	7/0	13/0	20/0	S
Simulator	7/0	10/3	17/3	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	PASS	PASS	FAIL	PASS	S

Overall Program Evaluation

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

Note: Crew 3 was the staff crew.

Submitted:	Forwarded:	Approved:
H. Peterson	M. Jordan	G. Wright
11/7/90	11/14/90	11/21/90

ENCLOSURE 3

SIMULATION FACILITY FIDELITY REPORT

Facility Licensee: Quad Cities Nuclear Station

Facility License Docket Nos.: 50-254; 50-265

Operating Test Administered At: Quad Cities Training Center
Cordova, Illinois

During the requalification preparation week and the conduct of the simulator portion of the operating tests, the following items were observed:

ITEM	DESCRIPTION
1. HPCI	The HPCI auxiliary oil pump control switch has no pull-to-lock position to facilitate shutting down of the HPCI system when directed by QGAs.
2. Back Panel Hardware	Group isolation bypasses and certain actions required in the back panel are not all simulated. These functions are accomplished by the instructor (i.e., -59 inches Group 1 isolation, pulling RPS fuses).
3. Level Instruments	Level indicators are not 100% in agreement, for example, the wide range Yarway and GEMAC have a 3/4 foot difference.
4. Decay Heat Load	During scenario 11 all high pressure feed was lost. From core history of 100% power and end of life decay heat only one SRV was needed to be cycled to maintain 940-1040 psig and very little inventory was lost. In fact, the SRV was left open down to 500 psig and there was no change in level. If this modeling is

not correct (low short term decay heat load) a mindset may result with the operators that there is no urgency for corrective actions.

5. ATWS Malfunction

There is no malfunction which causes a total ATWS. Both of the existing ATWS malfunctions allow rods to insert when corrective actions are initiated. This does not allow scenarios to continue so that the operators can train on contingency procedures in conjunction with the ATWS.

6. SPDS/Temperature Recorder

The drywell temperature for the 280°F emergency depressurization action level is monitored on HPCI panel recorder 1-2340-9 points 9 and 10, return air inlet to drywell coolers. The recorder readings were at 277°F and holding while SPDS and the instructor terminal indicated that the drywell average temperature was actually 289°F; a condition identified in the QGAs which requires the action to emergency depressurize.

7. Torus/Drywell Sprays

The torus sprays were demonstrated to be just as effective as the drywell sprays in maintaining the drywell temperature below 280°F (Scenario 4). Control of the drywell temperature in both cases was accomplished with a 12.5% leak into the drywell. In contrast, during Scenario 10 at 0 power with a 5% leak down stream of the orifice and with torus cooling on, the drywell temperature increased to 298°F.

8. Standby Gas Treatment(SBGT)

With the VENT ISOLATION SIGNAL BYPASS switch in the TORUS

		position the alarm 901-3 A-15, "Drywell/Torus ISOL Valves Auto Bypass", did not trip and valve AO-1601-61 did not open (JPM LS-002-II, QOP 1600-13 - Vent torus through SBGT).
9.	Back Panel Temp Monitors	The room temperature monitor on the back panel did not keep up with the area monitor selected. This is to say that if the operator rapidly switches between the different areas, the reading on the temperature does not change. The operators will need to be instructed to switch channels slower or the modeling needs to be improved. These readings are used for decision blocks in the QGAs.
10.	Core Spray Mimic	The mimic for the Core Spray Pump A suction from the CST has the arrow reversed from the flow direction.
11.	Area Radiation Monitor(ARM)	The placards for the ARMs on the back panel are missing in the simulator; they are in the control room. These are yellow placards displaying QGA ARM operating values. This was corrected before the examination.
12.	Rod Worth Minimizer	During scenario #11, the examinee (as NSO) was required to place a rod out-of-service at the Rod Worth Minimizer. The examinee had excessive difficulty in accomplishing the task even though he appeared knowledgeable of the proper method. A post scenario discussion with the examinee revealed he did know the correct method but was uncertain why it was necessary for him to repeat the task a number of times to establish the out-of-service condition.

Following the post scenario review with the examinee, the simulator operator and training staff (evaluators) stated that this is a common occurrence caused by static and dust on the Rod Worth Minimizer screen. This "common occurrence" and methods to control it are not included in formal training but instead are learned only through on-the-job experience.