December 10, 2001

Mr. Oliver D. Kingsley, President
Exelon Nuclear
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BYRON STATION
INITIAL LICENSE EXAMINATION REPORT 50-454/01-301(DRS);
50-455/01-301(DRS)

Dear Mr. Kingsley:

On November 9, 2001, the NRC completed initial operator licensing examinations at your Byron Station. The enclosed report presents the results of the examination.

Byron Station Training Department personnel administered the written examination on October 29, 2001, and NRC examiners administered the operating test during the week of November 5, 2001. Three Reactor Operator and four Senior Reactor Operator applicants were administered license examinations. The results of the examinations were finalized on December 6, 2001. All applicants passed all sections of their respective examinations. Three Reactor Operator and four Senior Reactor Operator applicants were issued applicable operator licenses.

This initial license examination was developed by your staff. There were a total of ten post-examination changes made to the written examination. This was a higher number of post-examination changes than would normally be expected. We understand that your staff has entered this issue into your Corrective Actions Program.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document control system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/NRC/ADQAMS/index.html (the Public Electronic Reading Room).

We will gladly discuss any questions you have concerning this examination.

Sincerely,

/RA/

David E. Hills, Chief
Operations Branch
Division of Reactor Safety

Docket Nos. 50-454; 50-455
License Nos. NPF-37; NPF-66

Enclosures:
1. Operator Licensing Examination Report
   50-454/01-301(DRS); 50-455/01-301(DRS)
2. Simulation Facility Report
3. Written Examination Review
4. Written Examinations and Answer Keys (RO & SRO)

cc w/encls 1, 2 & 3:
J. Skolds, Chief Operating Officer
C. Crane, Senior Vice President, Midwest ROG
J. Benjamin, Vice President Licensing
H. Stanley, Vice President, Midwest ROG Operations
R. Krich, Licensing Director, Midwest ROG
R. Helfrich, Senior Counsel, Nuclear
DCD - Licensing
R. Lopriore, Site Vice President
S. Kuczynski, Station Manager
P. Reister, Regulatory Assurance Manager
M. Aguilar, Assistant Attorney General
Illinois Department of Nuclear Safety
State Liaison Officer
State Liaison Officer, State of Wisconsin
Chairman, Illinois Commerce Commission

cc w/encl 4: Dale E. Spoerry, Station Training Manager

We will gladly discuss any questions you have concerning this examination.

Sincerely,

/RA/

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P. Reister, Regulatory Assurance Manager
M. Aguilar, Assistant Attorney General
Illinois Department of Nuclear Safety
State Liaison Officer
State Liaison Officer, State of Wisconsin
Chairman, Illinois Commerce Commission

cc w/encl 4: Dale E. Spoerry, Station Training Manager

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REGION III

Docket Nos.	50-454; 50-455
License Nos.	NPF-37; NPF-66
Report Nos:	50-454/01-301(DRS); 50-455/01-301(DRS)
Licensee:	Exelon Generation Company, LLC
Facility:	Byron Station, Units 1 and 2
Location:	4450 N. German Church Road Byron, IL 61010
Dates:	October 29, 2001 (written) November 5 through November 9, 2001 (operating)
Examiners:	David L. Pelton, Chief Examiner Jay A. Hopkins, Examiner George A. Wilson, Examiner
Approved by:	David E. Hills, Chief Operations Branch Division of Reactor Safety

SUMMARY OF FINDINGS

ER 05000454/01-301, ER 05000455/01-301, on 10/29/2001 and 11/05-11/09/2001, Exelon Generation Company, LLC, Byron Station, Units 1 & 2. Initial License Examination Report.

The announced operator licensing initial examination was conducted by regional examiners in accordance with the guidance of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 8, Supplement 1.

Examination Summary:

- Three Reactor Operator applicants and four Senior Reactor Operator applicants were administered written examinations and operating tests for initial operator licensing. All applicants passed all portions of their respective examinations. Three Reactor Operator applicants and Four Senior Reactor Operator applicants were issued applicable licenses.

- There were a total of ten post-examination changes made to the initial license written examination which was a higher number than would have normally been expected.

Report Details

4. OTHER ACTIVITIES (OA)

4OA5 Other

.1 Initial Licensing Examinations

a. Examination Scope:

The NRC examiners conducted announced operator licensing initial examinations during the weeks of October 29, 2001, and November 5, 2001. The facility's training staff used the guidance established in NUREG-1021, “Operator Licensing Examination Standards for Power Reactors,” Revision 8, Supplement 1, to prepare the examination outline and to develop the written examination and operating test. The NRC examiners administered the operating test during the week of November 5, 2001. The facility's training staff administered the written examination on October 29, 2001. Three Reactor Operator applicants and four Senior Reactor Operator applicants were examined.

b. Findings

Written Examination:

During their initial review, the examiners determined that the examination, as submitted by the licensee, was within the range of acceptability expected for a proposed examination. Examination changes, agreed upon between the NRC and the licensee, were made according to NUREG-1021.

The licensee opted not to formally submit any post-examination changes. However, during their post-examination review, the examiners identified a total of ten questions on the written examination that required either modification or deletion. This number of post-examination changes was higher than would normally be expected. The examiners validated these changes with facility personnel. The licensee has subsequently entered this issue into their Corrective Actions Program for further evaluation and action. The changes resulting from the examiner’s post-examination review are documented in Enclosure 3, Written Examination Review.

Operating Test:

The NRC examiners determined that the operating test, as originally submitted by the licensee, was within the range of acceptability expected for a proposed examination. Examination changes, agreed upon between the NRC and the licensee, were made according to NUREG-1021.

Examination Results:

Three Reactor Operator applicants and four Senior Reactor Operator applicants were administered written examinations and operating tests for initial operator licensing. All applicants passed all portions of their respective examinations. Three Reactor Operator applicants and Four Senior Reactor Operator applicants were issued applicable licenses.

.2 Examination Security

a. Inspection Scope:

The examiners reviewed and observed the licensee's implementation of examination security requirements during the examination preparation and administration.

b. Findings:

The NRC examiners determined that the licensee's examination security practices associated with the development and administration of the operator license examinations were satisfactory.

4OA6 Meetings

Exit Meeting

The chief examiner presented the examination team's preliminary observations and findings to Mr. Lopriore and other members of the licensee management on December 5, 2001. The licensee acknowledged the observations and findings presented.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

B. Grundmann, Regulatory Assurance Manager
D. Hoots, Operations Manager
P. Knarr, Operations Training Supervisor
S. Kuczynski, Station Manager
R. Lopriore, Site Vice President
D. Myers, Braidwood Training Manager
S. Russell, Excelon Mid-West Regional Operating Group Exam Coordinator
D. Spoerry, Training Manager
G. Stauffer, Regulatory Assurance
G. Wolfe, Exam Lead

NRC

R. Skokowski, Senior Resident Inspector
B. Kemker, Resident Inspector

ITEMS OPENED, CLOSED AND DISCUSSED

Opened

None

Closed

None

Discussed

None

LIST OF ACRONYMS

ADAMS	Agency-Wide Document Access and Management System
CETC	Core Exit Thermocouple
DRS	Division of Reactor Safety
NRC	Nuclear Regulatory Commission
NSO	Nuclear Station Operator
PARS	Publicly Available Records
PSIG	Pounds Per Square Inch
RCS	Reactor Coolant System
RO	Reactor Operator
SRO	Senior Reactor Operator
TEDE	Total Effective Dose Equivalent

Enclosure 2

SIMULATION FACILITY REPORT

Facility Licensee: Byron Station

Facility Docket No.: 50-454; 50-455

Operating Tests Administered: November 5 - 9, 2001

The following documents observations made by the NRC examination team during the initial operator license examination. These observations do not constitute audit or inspection findings and are not, without further verification and review, indicative of non-compliance with 10 CFR 55.45(b). These observations do not affect NRC certification or approval of the simulation facility other than to provide information which may be used in future evaluations. No licensee action is required in response to these observations.

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

ITEM	DESCRIPTION
None	

Enclosure 3

Written Examination Review

Written Examination Record Number 1 (SRO Examination Question Number 1):

Comment: The question asked for the applicant to determine the Technical Specification Minimum staffing for both units at power. The original correct answer provided for the question was answer "c " (one unit supervisor and three nuclear station operators). Upon further review, it appeared that answer "a" (two unit supervisors and three nuclear station operators) would also have been correct, in that, a shift staffing of two unit supervisors and three NSOs was consistent with Byron Technical Specification requirements for minimum shift staffing.

NRC Resolution: The Byron Technical Specifications, Section 5.2.2.b. stated that minimum shift crew composition requirements are in accordance with 10 CFR 50.54(m)(2)(i). Paragraph (m)(2)(i) of 10 CFR 50.54 stated that for a site that consists of two units, both units operating, and one main control room (such as Byron), the minimum licensed operator staffing is two SRO licensed individuals and three RO licensed individuals. In accordance Byron Procedure BAP 320-1, "Shift Staffing," this Technical Specification requirement is satisfied by having a shift staffing consisting of one shift manager (SRO licensed individual), one unit supervisor (SRO licensed individual), and three nuclear station operators (RO licensed operators). Therefore, answer "c" was a correct answer when only considering the unit supervisor and nuclear station operator positions. However, having a shift staffing that consisted of two unit supervisors and three nuclear station operators would have also met Technical Specifications requirements. Therefore, answer "a" was also considered a correct answer.

Written Examination Record Number 12 (SRO Examination Question Number 11):

Comment: The question asked the applicant to determine who would be required to sign approving a non-licensed operator, who had accrued 2000 milliRem TEDE (Total Effective Dose Equivalent) during the current year, to receive an additional 50 milliRem of exposure. The original correct answer provided for the question was answer "b" (Operations Manager and the Radiation Protection Manager). Upon further review, it appeared that answer "d" (Station Manager and Radiation Protection Manager) would also have been correct, in that, the Station Manager had direct line authority over all other Department Managers and the Station Manager had signature authority for authorizing exposure extensions in accordance with station procedures.

NRC Resolution: Byron Procedure RP-AA-203, "Annual Administrative Exposure Control Level Extension Approval," Attachment 2 states that for an individual to receive exposure between 2000 and 3000 milliRem, the Department Manager and Radiation Protection Manager are required to sign for

approval. RP-AA-203, Attachment 2 also states that for an individual to receive exposure between 3000 and 4000 milliRem, the Station Manager's signature would have to be obtained in addition to the Department Manager and Radiation Protection Manager. Since RP-AA-203 provided signature authority to the Station Manager in matters of exposure, and since the Station Manager had direct line authority over all other Department Managers (including the Operations Manager) obtaining the Station Manager and Radiation Protection Manager signatures, answer "d" would be considered a correct answer.

Written Examination Record Number 34 (RO Examination Question 24, SRO Examination Question Number 24):

Comment: The applicant was given a set of plant conditions and asked what must then be accomplished prior to drawing a pressurizer bubble. The original correct answer provided for the question was "b" (drain the pressurizer relief tank to 70-79%). Upon further review, it appeared that answer "d" (pressurize the reactor coolant system (RCS) to 200-275 psig) would also be a correct answer, in that, the RCS would be pressurized to at least 275 pounds, in accordance with station procedure, prior to drawing a pressurizer bubble.

NRC Resolution: Byron Procedure BOP RY-5, "Drawing a Pressurizer Bubble," Prerequisite Step C.1 requires the RCS to be pressurized to between 375 and 400 psig prior to drawing a pressurizer bubble. In order to pressurize the RCS to between 375 and 400 psig, the system must first be pressurized to between 200 and 275 psig. Therefore, answer "d" would also be a correct answer.

Written Examination Record Number 47 (RO Examination Question Number 37):

Comment: The stem of the question stated that train "A" of core exit thermal couples (CETCs) had lost power. The applicant was then asked to determine the actions required to have current, correct, CETC temperatures displayed once power was restored. The original correct answer was "d" (must depress SYSTEM RESET pushbutton only). Upon further review, it appears that answer "a" (no action is required) may actually be the correct answer, in that, once the system is reenergized, the temperature values will be flashing but will indicate current, correct values.

NRC Resolution: Based on discussions with CETC system engineer, and based on observations made by operators during energization of the CETC system, answer "a" (no action is required) is the actual correct answer. Once the CETC system is energized, the temperature values immediately displayed will be "flashing" but will be correct, current values. Answer "a" was considered the correct answer to the question.

Written Examination Record Number 49 (RO Examination Question Number 38, SRO Examination Question Number 35):

Comment: The question asked the applicant to determine which CETC problem (from a list of four) would cause an indication of degrading natural circulation conditions (i.e., displayed CETC temperature increasing). The original correct answer provided for the question was "c" (corrosion develops at the head connection). Upon further review, it appeared there may have been no correct answer provided, in that, the potential problems listed may not cause increasing CETC indication.

NRC Resolution: The four potential problems with the CETCs provided to the applicant were a "short" developing at the head connection, an "open" developing at the head connection, corrosion developing at the head connection and finally, a loss of power occurs. The following is a discussion of the effect that each problem would have on the CETC values displayed on the main control board based on a review of Byron Training Lesson Plan, "Inadequate Core Cooling System":

If a short were to develop at the head connection, the resultant individual CETC value would be driven to less than 35^0F. Since the display on the main control board is the average of the ten highest CETC values, the CETC with the short would be eliminated from display and have little or no impact on CETC temperature indication;

If an open were to develop at the head connection, the resultant individual CETC value would be driven to greater than 2300^0F. The CETC display system would sense this error and remove the failed CETC from scan. This problem would have little or no impact on CETC temperature indication;

The development of corrosion at the head connection *may* cause an increase in resistence thus an increase in the temperature indicated by an individual CETC. However, as previously discussed, the CETC value displayed on the main control board is the average of the ten highest CETC values. Because the magnitude of the change in CETC value due to the development of corrosion is an unknown quantity, and due to the fact that the CETC value displayed is the average of the ten highest CETC values, it would not be reasonable to expect an operator to be able to evaluate this condition and to be absolutely certain that this problem would cause the displayed CETC temperature to increase; and

If a loss of power to the CETC display unit were to occur, there would be no indication of CETC values on the main control board. However, individual CETC values would still be available by using a resistence meter to read the individual CETC values (thermocouples need no external power source to function).

Based on a review of Byron Training Lesson Plan, "Inadequate Core Cooling System" and the above discussion, there was no correct answer provided for this question. The question was deleted from the examination.

Written Examination Record Number 58 (RO Examination Question Number 47, SRO Examination Question Number 43):

Comment: The question stated that a turbine runback had occurred reducing power from 100% to 60%. The question then asked the applicant to determine the initial plant response, if the effects of shrink and swell were ignored. The original correct answer provided for the question was "d" (feed reg valves throttle close to reduce steam generator levels). Upon further review, it appeared that answer "a" (steam dumps arm and open to return T_{ave} to the program value) was also correct, in that, the steam dump system would respond to such a load reduction and reduce RCS temperature to within the steam dump system program band.

NRC Resolution: In accordance with Byron Training Lesson Plan, "Steam Dumps," and Byron Training Notes MS-4, "Main Steam Dumps," if the steam dump system senses a 10% decrease in turbine impulse pressure within a two minute period, interlock C-7 would be satisfied. Once interlock C-7 is satisfied and RCS average temperature differed from the steam dump system reference temperature by greater than three degrees, the steam dump system would be armed and the steam dumps would open resulting in the system dumping steam from the steam generators to the main condenser cooling the RCS to within the steam dump system program band. A turbine runback results in a rapid power reduction (in this case from 100% to 60%). This reduction in power (and turbine load) would have satisfied interlock C-7, armed the steam dumps, caused RCS average temperature to differ from the steam dump system reference temperature by greater than three degrees, and caused the steam dump system to respond returning RCS average temperature to the system's program value. Therefore answer "a" was also considered correct.

Written Examination Record Number 100 (RO Examination Question Number 80, SRO Examination Question Number 78):

Comment: The question asked the applicant to determine how the ICONIC display indicated the value of subcooling if it were "unacceptable" (i.e., what color would the value be displayed as). The original correct answer was "d" (magenta). Upon further review, it appeared that answer "c" (yellow) may have been the correct answer, in that, observations made by the applicants during simulator training and by licensed operators in the main control room indicated that the displayed value of subcooling was normally white but would change to yellow if the value of subcooling was low (i.e., unacceptable).

NRC Resolution: The operation of the ICONIC display was discussed with the licensee engineer responsible for the computer program that drives the ICONIC

display. The engineer performed a review of the computer code and determined that the color of the value of subcooling displayed would normally be white, would change to yellow if subcooling were reduced below a preestablished limit, and would change to cyan if the value were suspect (i.e., input errors).

Byron Training Lesson Plan, "Plant Computer," states that the color of the value of subcooling will be white when containment conditions are normal and yellow when containment conditions are "adverse." Regardless of containment conditions, the lesson plan states that if subcooling is "unacceptable" (i.e., less than established setpoints), the color of the value of subcooling will be magenta.

The question asked how the ICONIC display would indicate the value of subcooling if it were "unacceptable." Based on the review of the computer code, the correct answer would have been "c" (yellow). However, based on the training given to the applicants, the correct answer would have been "d" (magenta). Because of the discrepancy between training and the actual operation of the ICONIC display, both answers "c" and "d" were considered correct.

Written Examination Record Number 106 (RO Examination Question Number 84, SRO Examination Question Number 83):

Comment: The question stated that a small spill of reactor coolant escaped onto the floor and was quickly covered, contained, and cleaned up using a mop. The question also stated that there was no airborne contamination present. The applicant was then asked to determine if the exposure from this type of work was primarily a threat to the whole body, the skin, the extremities, or the lens of the eye. The original correct answer provided for the question was "a" (whole body). Upon further review, it appeared that all of the answers were correct, in that, radiation encountered during this type of work would be an equal threat to the whole body, the skin, the extremities, and the lens of the eyes.

NRC Resolution: Due to the nature of reactor coolant water, it contains corrosion products that are primarily a beta/gamma radiation source. Beta radiation would not constitute a legitimate threat to the whole body, the skin, the extremities, or the lens of the eye because Beta radiation does not easily penetrate clothing or gloves and does not travel far in air (approximately two feet). However, gamma radiation is a high energy photon and as such, passes easily through air as well as gloves and other clothing worn during spill recovery work. The whole body, skin, extremities, and lens of the eyes would be equally threatened by gamma radiation exposure. As a result, there were considered to be four correct answers to this question. NUREG-1021, ES-403, Section D.1.b required the deletion of any question that had three or more answers that were considered to be correct. In accordance with NUREG-1021, the question was deleted.

Written Examination Record Number 126 (RO Examination Question Number 99):

Comment: The question described an on-going event, including the fact that heavy radio traffic was limiting access to an available channel, and asked the applicant to determine how to report the event. The original correct answer provided for the question was "a" (use the orange emergency call button on the top of the portable radio to call the control room). Upon further review, it appeared that answer "a" was not completely correct, in that, using the orange emergency call button would only contact the control room. The operator would still be required to transmit his/her report of the event.

NRC Resolution: The question asked the applicant to determine how the event would be *reported*. Based on discussion with licensee Operations Department personnel, answer "a" was only partially correct, in that, use of the orange emergency call button would only result in *contacting* the main control room. The operator would still be required to transmit information in order to *report* the event. Because no answer provided for the question was completely correct, this question was deleted from the examination.

Enclosure 4

WRITTEN EXAMINATIONS AND ANSWER KEYS (RO/SRO)

RO Initial Examination ADAMS Accession # ML013450160
SRO Initial Examination ADAMS Accession # ML013450231