Attachment 1

SRO WRITTEN EXAM W/ANSWER KEY

Con Edison
Consolidated Edison
Indian Point Station
Simulator/Energy Education Center
Buchanan, New York 10511

To: Mr. Paul Bissett, USNRC

From: Earl Libby, Consolidated Edison Company

Date: 07/13/2001

Re: Indian Point Unit 2 Initial Operating Exam - Post Exam Activities

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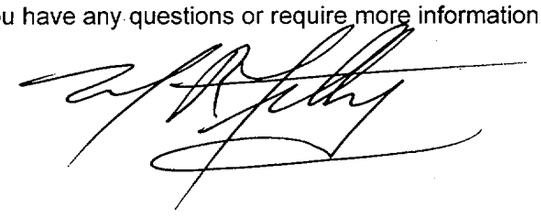
In accordance with the guidance provided in NUREG 1021, "Operating Licensing Examination Standards for Power Reactors" (revision 8 supplement 1) ES-501 "Initial Post-Examination Activities" the following materials are submitted in support of the Indian Point Unit 2 Initial Licensing Examination that concluded on July 13, 2001.

1. The graded, ORIGINAL, written examinations
2. Clean copies of each applicant's answer sheet.
3. The MASTER examination and answer key. (no changes to the MASTER were necessary during the administration of the examination, question 44 was deleted)
4. All questions asked by the applicants during the administration of the examination and the proctor's responses to those questions.
5. The written examination seating chart
6. Form ES-403-1 "Written Examination Grading Quality Checklist"
7. Corrections to the Written Examination answer key, with supporting documentation. (Attachment 1)

After the written examination was completed, an exam analysis was performed, and the applicant's participated in a review session to determine if enhancements to the questions were necessary. Results of this analysis/review indicate two written questions (Q # 64 and 68) that should be enhanced prior to re-use. Additionally, three generic weaknesses in the training program were identified with questions 3, 87, and 88. Correcting the generic weaknesses and enhancing these questions will be tracked by the corrective action program.

All individuals signed onto Form ES-201-3 " Examination Security Agreement" have not yet completed the post- examination signature. When Form ES-201-3 " Examination Security Agreement" has been completed, it will be forwarded to you, thus completing the necessary documentation for this Indian Point Unit 2 Initial Licensing Examination.

If you have any questions or require more information, please contact me at 914-271-7209.



ATTACHMENT 1 "CORRECTIONS TO WRITTEN EXAM ANSWER KEY"

Question #44 (Attached)

Comment:

The question asks the candidate to predict the final rod position following a dilution. In order to obtain the correct answer, the candidate needs to reference the Bank Overlap Remaining Rod Worth (RV-1) and Differential Boron Worth (RV-3) graphs. Two problems exist that result in this question having no correct answer. **First**, the question was designed for an initial rod height of 200 steps on Bank D. All numbers were calculated based on this initial rod height, and the answer should have been 190 steps. However, the actual initial rod height for the question was incorrectly stated as 220 steps on Bank D. With this initial rod height, and the actual curves given in the reference package, the answer should be between 206 and 207 steps on Bank D. The nearest choices would be either 200 or 210 steps on Bank D. **Second**, the candidates were given an incorrect curve in the reference package. The candidates were given one cycle 14 curve (RV-1) and one cycle 15 curve (RV-3). The numbers from the incorrect curve also leads to no correct answer. The question is recommended for deletion from the exam. Therefore, the key answer "190 steps" is incorrect.

Curves used to construct and validate the question are attached and marked as Curves "A"; the actual curves given in the reference package are attached and marked Curves "B".

Question # 044

Given the following conditions:

- Reactor power is 80%
- Rod control is in AUTO
- A dilution is being performed to reduce RCS boron concentration by 11 ppm
- Tave is equal toTref
- Control Bank D is at 220 steps
- RCS Boron concentration is 1125 ppm

After the dilution is complete and Tave is again equal to Tref, what will be the height of Control Bank D? (Graphs RV-3 and RV-7 provided)

A. 180 steps.
B. 190 steps.
C. 200 steps.
D. 210 steps.

Answer: B

Explanation/Justification:

A. Incorrect, if candidate makes a math error, could arrive at 180 steps
B. Correct, 11ppm x 8.37 pcm/ppm=92 pcm, from graph RV-7 190 steps
C. Incorrect. If candidate thinks dilution will raise power, then this choice would be made
D. Incorrect, using same math as B above but candidate thinks rods should move out.i

Exam Outline Cross Reference:	Level	RO	SRO	
	Tier #		2	
	Group #		1	
	K/A #		001.A3.07	
	Importance		3.7	
Technical References:	Graph RV-3, RV-7, and applied fundamentals.			
References to be provided:	Graph RV-3, RV-7			
Learning Objective:	EO 7184			
Question Source: (check one):	☒ New			
	☐ Bank:	Facility:		Question #:
	☐ NRC Exam:	Facility:		Year:
Question Cognitive Level:	Memory or Fundamental Knowledge:		☐	
	Comprehension or Analysis:		☒	

Question # 044

10 CFR Part 55 Content: 55.41 ☒

55.43 ☐

INDIAN POINT STATION
UNIT NO. 2 - CYCLE 14

Bank Overlap Remaining Rod Worth

D - Bank Steps	Worth PCM
223	0
220	12
210	52
200	143
190	237
180	329
170	408
160	477
150	537
140	590
130	638
120	683
110	722
100	765
90	816
80	885
70	965
60	1052
50	1144
40	1240
30	1338
20	1436
10	1523
0	1591
C-Bank Steps	
113	1637
103	1669

Curves used for Question Construction "A"

RE APPROVED

11/18/99
EFFECTIVE DATE

Ref. Cycle 14 NuPOP Tables 7.7-18 and 7.7-20 (455 to 512 EFPD) RV-1
Rev. 28

INDIAN POINT STATION
UNIT NO. 2 - CYCLE 14
Differential Boron Worth (Hot Zero Power)

Boron Concentration (PPM)	Differential Boron Worth (PCM/PPM)
0	9.43
75	9.39
150	9.32
225	9.25
300	9.17
375	9.10
450	9.03
525	8.95
600	8.88
675	8.81
750	8.73
825	8.66
900	8.59
975	8.51
1050	8.44
1125	8.37
1200	8.29
1275	8.22
1350	8.15
1425	8.07
1500	8.00
1575	7.93
1650	7.85
1725	7.78
1800	7.71

RE- Approved

7/14/99
Effective Date

Ref. Cycle 14 NuPOP Table 7.7-15 (MOL/EOL - 18000 MWD/MTU
Rev. 24

INDIAN POINT STATION
UNIT NO. 2 - CYCLE 14
Xenon/Samarium (Xe/Sm) Correction Factors

Boron Concentration (PPM)	Differential Boron Worth (PCM/PPM)
0	1.000
75	0.991
150	0.983
225	0.974
300	0.965
375	0.957
450	0.948
525	0.940
600	0.932
675	0.924
750	0.915
825	0.907
900	0.899
975	0.891
1050	0.883
1125	**0.876**
1200	0.868
1275	0.860
1350	0.853
1425	0.845
1500	0.838
1575	0.830
1650	0.823
1725	0.816
1800	0.808

Distractor!

CONTROLLED

RE - Approved
7/14/99
Effective Date

Ref. Cycle 14 NuPOP Table 7.7-15 (MOL/EOL - 18000 MWD/MTU) and Fig. 7.4-7
Rev. 26

INDIAN POINT STATION
UNIT NO. 2 - CYCLE 14

Bank Overlap Remaining Rod Worth

D - Bank Steps	Worth PCM
223	0
220	12
210	52
200	143
190	237
180	329
170	408
160	477
150	537
140	590
130	638
120	683
110	722
100	765
90	816
80	885
70	965
60	1052
50	1144
40	1240
30	1338
20	1436
10	1523
0	1591
C-Bank Steps	
113	1637
103	1669

Actual curves used by candidates During Exam "B"

RE APPROVED

11/18/99
EFFECTIVE DATE

Ref. Cycle 14 NuPOP Tables 7.7-18 and 7.7-20 (455 to 512 EFPD) RV-1
Rev. 28

INDIAN POINT STATION
UNIT NO. 2 - CYCLE 14
Differential Boron Worth (Hot Zero Power)

Boron Concentration (PPM)	Differential Boron Worth (PCM/PPM)
0	7.76
75	7.73
150	7.68
225	7.62
300	7.56
375	7.51
450	7.45
525	7.39
600	7.33
675	7.28
750	7.22
825	7.16
900	7.11
975	7.05
1050	6.99
1125	6.93
1200	6.88
1275	6.82
1350	6.76
1425	6.71
1500	6.65
1575	6.59
1650	6.53
1725	6.48
1800	6.42

RE- Approved

6/24/2000
Effective Date

Ref. Cycle 15 NuPOP Table 7.7-12 - BOL
Rev. 25

INDIAN POINT STATION
UNIT NO. 2 - CYCLE 15
Xenon/Samarium (Xe/Sm) Correction Factors

Boron Concentration (PPM)	Xe/Sm Correction Factor
0	1.000
75	0.993
150	0.985
225	0.978
300	0.971
375	0.963
450	0.956
525	0.949
600	0.942
675	0.935
750	0.928
825	0.921
900	0.914
975	0.907
1050	0.901
1125	0.894
1200	0.887
1275	0.881
1350	0.874
1425	0.868
1500	0.861
1575	0.855
1650	0.849
1725	0.842
1800	0.836

DISTRACTOR!

RE - Approved
6/29/2000
Effective Date

Ref. Cycle 15 NuPOP Table 7.7-12 (BOL) and Fig. 7.4-7
Rev. 27

Attachment 2

LICENSEE POST-EXAMINATION COMMENTS AND NRC RESOLUTION

Question # 44

Comment: The question asks the candidate to predict the final rod position following a dilution. In order to obtain the correct answer, the candidate needs to reference the Bank Overlap Remaining Rod Worth (RV-1) and Differential Boron Worth (RV-3) graphs. Two problems exist that result in this question having no correct answer. **First**, the question was designed for an initial rod height of 200 steps on Bank D. All numbers were calculated based on this initial rod height for the question was incorrectly stated as 220 steps on Bank D. **Second**, the candidates were given an incorrect curve in the reference package. The candidates were given one cycle 14 curve (RV-1) and one cycle 15 curve (RV-3). The numbers from the incorrect curve also leads to no correct answer. Therefore, the answer "190 steps" is incorrect. **The question is recommended for deletion from the exam.**

NRC Resolution: Agree with licensee comment. Question #44 is deleted.