POWER AUTHORITY OF THE STATE OF NEW YORK

INDIAN POINT NO. 3 NUCLEAR POWER PLANT

R.A.-7 Rev. 0

STARTUP PHYSICS TEST PROGRAM

Written by: M. Passman

Reviewed by: A Zulla

PORC Review M. Passman Date 8/8/78

Approved by: J. D. Bayne Date 8/8/78

Effective Date 8/8/78

1.0 PURPOSE

To specify those additional administrative controls which are applicable during the startup physics testing of Unit 3 Cycle 2.

2.0 REFERENCES

2.1 Cycle 2 Startup Physics Test Program Description (Attachment No. 1).

2.2 Cycle 2 - Zero Power Startup Physics Testing Sequence (Attachment No. 2).

2.3 Cycle 2 - Power Ascension Program Sequence (Attachment No. 3).

2.4 WCAP-9244, The Nuclear Design and Core Management of the Indian Point Plant No. 3, Cycle 2.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 A power level increase above that required to perform low power testing (approximately 5%) is contingent upon receiving approval from the Reactor Analyst.

3.2 A power level increase above 90% power is contingent upon receiving approval from the Reactor Analyst having completed recalibration of the power range channels using the revised incore-excore curves and having satisfied the target band requirements (T.S. 3.10).

4.0 INITIAL CONDITIONS

4.1 The procedures applicable to the startup physics testing program have received necessary approval.

4.2 Conditions necessary for the performance of each phase of the testing program are as specified in the initial conditions section of each separate procedure.

5.0 INSTRUCTIONS

5.1 The Startup Physics Test Program Description (Attachment NO. 1) establishes the test program for Cycle 2. Testing will be performed using the indicated Reactor Analysis procedures.

5.2 The sequence of Zero Power Startup Physics Testing and Power Ascension (Attachments Nos. 2 and 3) are provided for guidance.

5.3 The test program will be implemented by Operations and Westinghouse personnel under the technical direction of the Reactor Analyst and his representatives.

5.4 Plant operation during the test program will be controlled by the plant operating procedures except for operations specifically required by the Startup physics test procedures and for deviations permitted by the Technical Specifications for physics testing.

5.5 Test results will be reviewed and acceptance criteria signed off by a representative of Operations, Westinghouse and the Reactor Analyst. This provides an independent verification of the testings and results.

5.6 The Reactor Analyst shall be responsible for resolving discrepancies between test results and acceptance criteria.

This will include a determination of whether the discrepancy involves a violation of Technical Specifications or an unreviewed safety question, and the requirement for additional testing or analysis if a violation or unreviewed safety question exists.

ATTACHMENT 1

Cycle 2 - Startup Physics Test Program

Indian Point Unit No. 3

1. Precriticality Measurements (Procedure R.A.-1

(a) Description - To develop correction factors for incore thermocouples and to verify the calibration of RTD's.

(b) Condition - Reactor coolant temperatures from approximately 300°F to hot shutdown.

2. Criticality and Hot Zero Power (HZP) Tests

2.1 Boron Endpoints (Procedure R.A.-2, R.A.-4 and R.A.-5)

(a) Description - To determine the critical boron concentration for control rod configurations given below.

(b) Condition - Reactor at HZP

(i) All rods out (initial criticality)
(ii) Control Bank D in
(iii) Control Banks D & C in
(iv) (N-1) configuration (See note 1)

2.2 Isothermal Temperature Coefficients (Procedure R.A.-3)

(a) Description - To determine isothermal temperature coefficient at control rod configurations given below

(b) Conditions - Reactor at HZP

(i) All rods out
(ii) Control Bank D in
(iii) Control Banks D & C in
(iv) (N-1) Configuration (See note 1)

2.3 Control Rod Worth Measurements (Procedure R.A.-4)

(a) Description - To measure integral and differential worths of the following control rods

(i) Control Bank D
(ii) Control Bank C with Control Bank D in
(iii) Control Bank B, with C and D in
(iv) Control Bank A, with B, C and D in

(b) Condition - Reactor at HZP

2.4 Movable Incore Detector Flux Map (Procedure AP-25.4-2, See Note 2)

(a) Description - To obtain flux map for power distribution and hot channel factor determinations with the movable incore detectors

(b) Condition - Reactor at approximately 3% to 5% power and approximately all rods out

3.0 Power Ascension Tests

3.1 Power Coefficients Measurements (Procedure R.A.-6)

(a) Description - To measure power coefficients at following conditions

(b) Conditions - (i) Equilibrium xenon at start of test
(ii) Power changes between 80% and 90%

3.2 Excore/Incore Calibration (Procedure AP-25.4-3)

(a) Description - To calibrate excore power range channels using the movable incore detectors

(b) Condition - Equilibrium xenon and reactor power at 90%

3.3 Movable Incore Detector Flux Maps (Procedure AP-25.4-2)

(a) Description - To obtain flux maps for power distribution and hot channel factor determinations at elevated power levels using the movable incore detectors at following conditions.

(b) Condition - (i) Any reactor power levels as required by The Reactor Analyst
(ii) Reactor power at approximately 90%.
(iii) Reactor power at approximately 100%.

4.0 Plant Data Acquisition (procedure R.A.-8)

(a) Description - To obtain operating plant data for the purpose of instrument calibrations and coolant flow determination.

(b) Condition - Reactor Power levels stable at approximately:

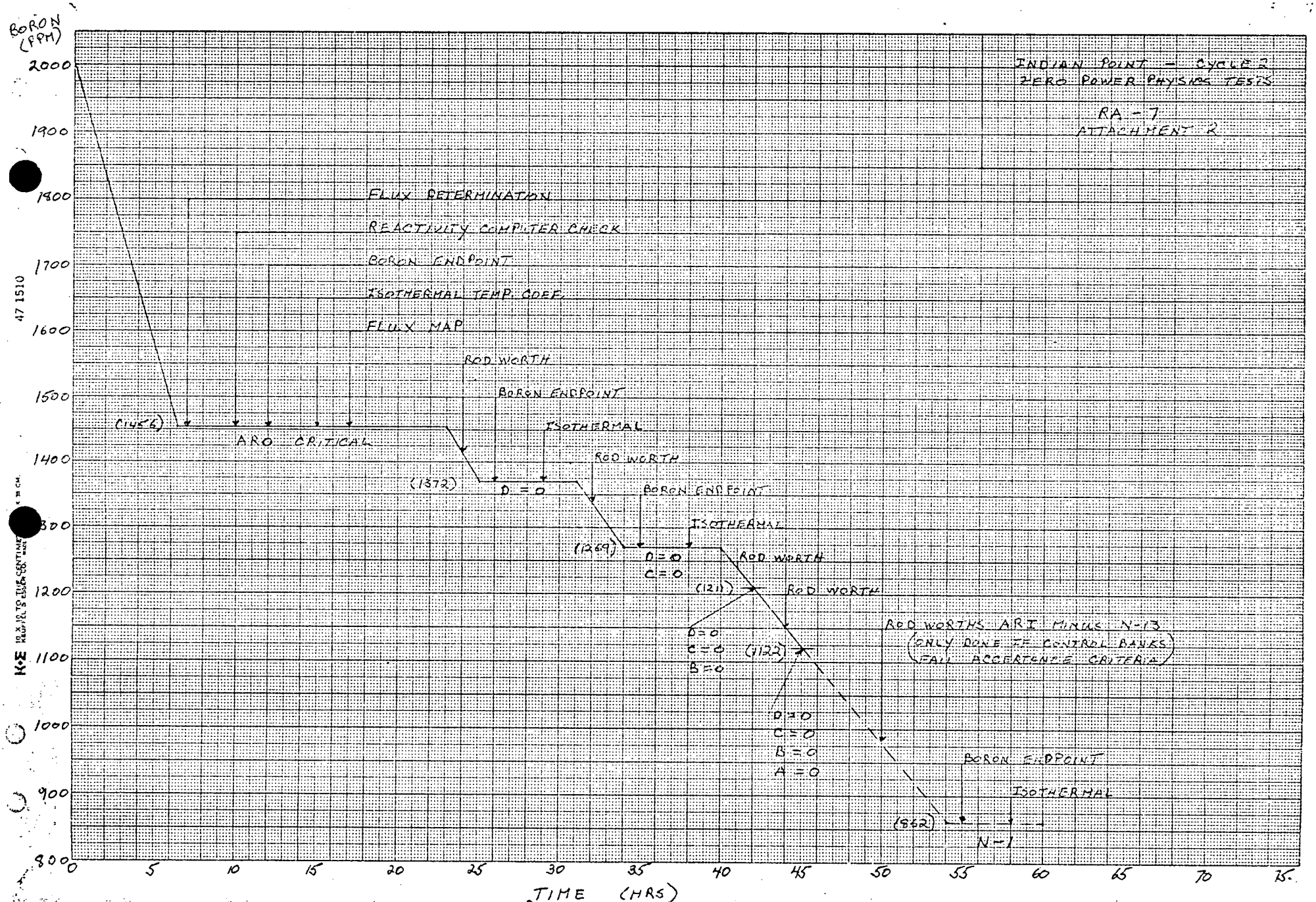
(i)	Hot Shutdown
(ii)	35%
(iii)	50%
(iv)	60%
(v)	70%
(vi)	80%
(vii)	90%
(viii)	100%

NOTES

1 - Minimum shutdown verification (boron end point at N-1 rod configuration) needs not be done if the measured integral rod worths of Banks A, B, C and D are within ± 15% of the design values and the sum of the worths is within ± 10% of the design value.

2 - Procedural requirement of AP-25.4-2 for equilibrium xenon may not be met for all maps performed as part of the Low Power and Power Ascension testing. Moveable detector potentiometers will have to be adjusted for low power conditions. The requirement for thermocouple maps and heat balance is not applicable to the low power map. Specific conditions and measurements to be made will be determined by the Test Supervisor.

3 - The power levels and rod positions mentioned above are approximate values. Exact values will be determined by the Test Supervisor within the limitations of the appropriate test procedure.


INDIAN POINT – CYCLE 2
ZERO POWER PHYSICS TESTS
RA-7
ATTACHMENT R
BORON (PPM)
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
TIME (HRS)
FLUX DETERMINATION
REACTIVITY COMPUTER CHECK
BORON ENDPOINT
ISOTHERMAL TEMP. COEF.
FLUX MAP
ROD WORTH
BORON ENDPOINT
ISOTHERMAL
ROD WORTH
BORON ENDPOINT
ISOTHERMAL
ROD WORTH
ROD WORTH
(1456)
ARO CRITICAL
(1372)
D = 0
(1269)
D = 0
C = 0
(1211)
D = 0
C = 0
B = 0
(1122)
D = 0
C = 0
B = 0
A = 0
(842)
BORON ENDPOINT
ISOTHERMAL
N-1
ROD WORTHS ARI MINUS N-13
(ONLY DONE IF CONTROL BANKS
FAIL ACCEPTANCE CRITERIA)
47 1510
K&E

R/A-7
INDIAN POINT - UNIT 3
CYCLE 2
POWER ASCENSION TESTS
ATTACHMENT 2

POWER ASCENSION AND DATA COLLECTION

POSSIBLE 24-48 HOUR DELAY DUE TO TARGET FLUX CONSIDERATIONS

POWER ASCENSION AND DATA COLLECTION

XENON STABILIZATION PERIOD

INCORE - EXCORE CALIBRATION (DATA COLLECTION)

POWER COAST

HOLD AT ~99% UNTIL INCORE EXCORE CALIBRATION COMPLETED

FULL POWER FLUX MAP

100
90
80
70
60
50
40
30
20
10

0 1 2 3 4 5 6 7 8 9 10 11 12

TIME (DAYS)