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AEP
INDIANA
MICHIGAN
POWER

April 8, 1996

AEP:NRC:1249

Docket Nos.: 50-315
50-316

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Donald C. Cook Nuclear Plant Units 1 and 2
NRC BULLETIN 96-01: CONTROL ROD INSERTION PROBLEMS

The purpose of this letter is to provide information requested in NRC Bulletin 96-01. NRC Bulletin 96-01 was sent to all holders of pressurized water reactor (PWR) operating licenses to alert them to problems encountered during recent events in which control rods failed to completely insert upon a scram signal and to request an assessment of the operability of control rods, particularly in high burnup fuel assemblies.

Donald C. Cook Nuclear Plant Unit 1 is currently operating in its fifteenth fuel cycle, and Unit 2 is shut down for refueling after its tenth fuel cycle. Our response to the NRC Bulletin is contained in the attachments.

Our response to NRC Bulletin 96-01 was requested to be made under oath or affirmation according to the provisions of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f). As such, an oath statement is included with this letter.

Sincerely,

E. E. Fitzpatrick
Vice President

CFM

Attachments

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 8th DAY OF April 1996

Rita M Price
Notary Public

My Commission Expires: 6-28-99

IE57
1/1

cc: A. A. Blind
G. Charnoff
H. J. Miller - Region III Administrator
NFEM Section Chief
NRC Resident Inspector - Bridgman
J. R. Padgett

ATTACHMENT 1 TO AEP:NRC:1249

REQUESTED ACTIONS AND INFORMATION IN

NRC BULLETIN 96-01

Bulletin 96-01
Requested Actions and Information

To ensure that the required shutdown margin is maintained during a reactor trip, all licensees of Westinghouse-designed plants were requested to take the following actions.

(1) Promptly inform operators of recent events in which control rods did not fully insert and subsequently provide necessary training, including simulator drills, utilizing the required procedures for responding to an event in which the control rods do not fully insert upon reactor trip.

(2) Promptly determine the continued operability of control rods based on current information.

(3) Measure and evaluate at each outage of sufficient duration during calendar year 1996, the control rod drop times and rod recoil data for all control rods. If appropriate plant conditions exist where the vessel head is removed, measure and evaluate drag forces for all rodded fuel assemblies.

(4) For each reactor trip during calendar year 1996, verify that all control rods have promptly fully inserted and obtain other available information to assess the operability and any performance trend of the rods. In the event that all rods do not fully insert promptly, conduct tests to measure and evaluate rod drop times and rod recoil.

This Bulletin required Westinghouse-designed plants to submit the following written information.

(1) Within 30 days of the date of this Bulletin, a report certifying that control rods are determined to be operable; actions taken for Requested Actions (1) and (2) above; and the plans for implementing Requested Action (3) and (4).

This information is contained in Attachment 2.

(2) Within 30 days of the date of this Bulletin, a core map of rodded fuel assemblies indicating fuel type (materials, grids, spacers, guide tube inner diameter) and current and projected end of cycle burnup of each rodded assembly for the current cycle; when available, provide the same information for the next cycle.

This information is contained in Attachment 3.

(3) Within 30 days after completing Requested Action (3) for each outage, a report that summarizes the data and that documents the results obtained.

This information is contained in Attachment 4.

ATTACHMENT 2 TO AEP:NRC:1249

NRC BULLETIN 96-01

RESPONSE NO. 1

Response No. 1

Action 1 - Training

Cook Nuclear Plant training department personnel met with shift supervisors on March 20, 1996, to discuss the subject Bulletin's Action Item 1. The shift supervisors indicated that all licensed operators were aware of the most recent issues related to rod drop problems with Westinghouse fuel. They further indicated that operators were capable of taking the appropriate actions set forth in our existing emergency operating procedures for a multiple stuck rod situation.

As far as simulator training is concerned, a scenario will be developed by April 15, 1996. This will provide the operators the opportunity to practice post-trip stuck rod events. The training is scheduled to be completed by the end of the current Unit 2 refueling outage.

Action 2 - Operability Determination

A control rod operability determination was performed on March 21, 1996. This review concluded that, based on available information, the control rods for Cook Nuclear Plant Units 1 and 2 are operable and can perform their intended functions of shutting down the reactor from 100% power and keeping the reactor subcritical at hot conditions. This conclusion was based on the following points that apply to both units:

(1) excess Shutdown Margin is available to accommodate a number of RCCAs not fully inserting;
(2) control rod operability testing, as required by the technical specifications, assures that the CRDMs are performing properly;
(3) past trips indicate full insertion of rods based on Analog Rod Position Indication (ARPI) system readings and rod bottom lights (some initial indications of incomplete insertion have occured in the past but have all been resolved after further investigation);
(4) beginning of cycle rod drop and drag test data have shown no abnormalities in rod insertion;
(5) the CVCS boron injection system is available as a backup for negative reactivity insertion; and
(6) data gathered by Westinghouse show no control rod problems in the majority of plants.

Action 3 - Control Rod Tests

Cook Nuclear Plant Unit 2 was shut down for refueling on March 23, 1996. Shut down was accomplished by tripping from approximately 20% Rated Thermal Power. All rods fully inserted as expected during the trip. Rod drop tests were conducted at hot conditions to determine the behavior of the RCCAs in a simulated trip. A plot of induced voltage, due to rod movement, and rod drop time was obtained for each RCCA. The traces also show any "bounce" due to an RCCA hub assembly hitting the top of the fuel assembly and any subsequent RCCA bounce due to the spring in the RCCA assembly. It should be noted that the technique used on March 23 for measuring rod drop time was changed from that used at the beginning of cycle test to allow for multiple rod drop. The trip breaker served as the initiation signal in the new system as compared to pulling the stationary gripper coil fuse in the old system. Due to this, the rod drop times are slightly increased (0.1 sec. - 0.15 sec.) for all RCCAs from the previous beginning of cycle results.

Analysis of the traces indicated that all rods inserted completely and the drop times were well within the technical specification limit of 2.7 seconds. The slowest measured rod was in core location H-14 at 1.589 seconds and the fastest was in core location M-12 at 1.395 seconds. All rods exhibited similar traces as the beginning of cycle traces including the "bounce".

Since the rod drop test did not show any abnormality, drag testing was not conducted. This had been previously discussed with the NRC staff on March 18, 1996.

Based on the information from the Unit 1 trip that is described in Action 4 below and the Unit 2 rod drop test, it is our conclusion that the phenomena that have occurred at South Texas and Wolf Creek are not being seen at Cook Nuclear Plant. As a result we will perform rod drop testing for pre-planned outages (where the reactor is shutdown) of five days or longer during calendar year 1996. We believe that a five day outage is an "outage of sufficient duration" considering the time to establish the proper system conditions and set up the necessary equipment without adversely affecting critical path for restart. Also, regarding the minimum interval between testing, data will be collected for trips that occur after a burnup interval of greater than 2500 MWD/MTU since the previous trip unless the trip data indicates abnormal control rod behavior. This is consistent with a verbal NRC staff agreement during a meeting with the Westinghouse Owners Group Issues Review Group on March 25, 1996. As usual, the beginning of cycle rod drop test and drag test will be performed before the Unit 2 cycle start-up. It should be noted that no other refueling outages are scheduled for the remainder of 1996.

We will continue to follow industry experience in this area and the Westinghouse root cause analysis and will modify our plans as necessary.

Action 4 - Reactor Trip

Cook Nuclear Plant Unit 1 tripped on March 17, 1996. Control room operators confirmed immediate rod bottom light activation and full insertion of the RCCAs.

As is our practice, verification will continue to be performed for each reactor trip to assure that all rods insert fully without delay. In the event that all rods do not fully insert promptly, tests will be conducted to measure and evaluate rod drop time and rod "bounces."

ATTACHMENT 3 TO AEP:NRC:1249

NRC BULLETIN 96-01

RESPONSE NO. 2

Response 2

Fuel type information and a core map indicating the rodded assemblies are provided on the following pages for Units 1 and 2. Also, burnup information for the following is provided:

(1) Unit 1, Cycle 15 : beginning of cycle burnup
(2) Unit 1, Cycle 15 : current burnup as of March 27, 1996
(3) Unit 1, Cycle 15 : projected end-of-cycle burnup
(4) Unit 2, Cycle 10 : beginning of cycle burnup
(5) Unit 2, Cycle 10 : end-of-cycle burnup

Assembly burnup information for Unit 2, Cycle 11 will be transmitted at a later time.

Donald C. Cook Nuclear Plant
Unit 1
Fuel Type Information

Fuel Type	:	15 x 15 OFA
Core Power	:	3250 MW_t
Cycle 15 Length	:	425 EFPD

I Fuel Rod Data

Fuel Material	:	UO_2
Clad Material	:	Zircaloy-4
Clad Outer Diameter	:	0.422"

II. RCCA Data

RCCA Absorber Material	:	Ag-In-Cd
RCCA Clad Material	:	SS-304
RCCA Clad Outer Diameter	:	0.439"

III. Guide Thimble (GT) Data

GT Material		:	Zircaloy-4
GT Inner Diameter	(above dashpot)	:	0.499"
	(at dashpot)	:	0.455"

IV. Grid Data

Grid Material	(mid-span grids)	:	Zircaloy-4
	(top/bottom grid)	:	Inconel-718
No. of Grids	(inactive length)	:	6
	(Total)	:	7

V. Intermediate Flow Mixing Grid Data
(only in 8 fuel assemblies)

Grid Material	:	Zircaloy-4
No. of Grids	:	3

Donald C. Cook Nuclear Plant
Unit 2
Fuel Type Information

Fuel Type	:	17 x 17 VANTAGE 5
Core Power	:	3411 MW_t
Cycle 10 Length	:	427 EFPD

I. Fuel Rod Data

Fuel Material	:	UO_2
Clad Material	:	Zircaloy-4
Clad Outer Material	:	0.360"

II. RCCA Data

RCCA Absorber Material	:	Ag-In-Cd
RCCA Clad Material	:	SS-304
RCCA Clad Outer Diameter	:	0.381"

III. Guide Thimble (GT) Data

GT Material	:	Zircaloy-4
GT Inner Diameter (above dashpot)	:	0.442"
(at dashpot)	:	0.397"

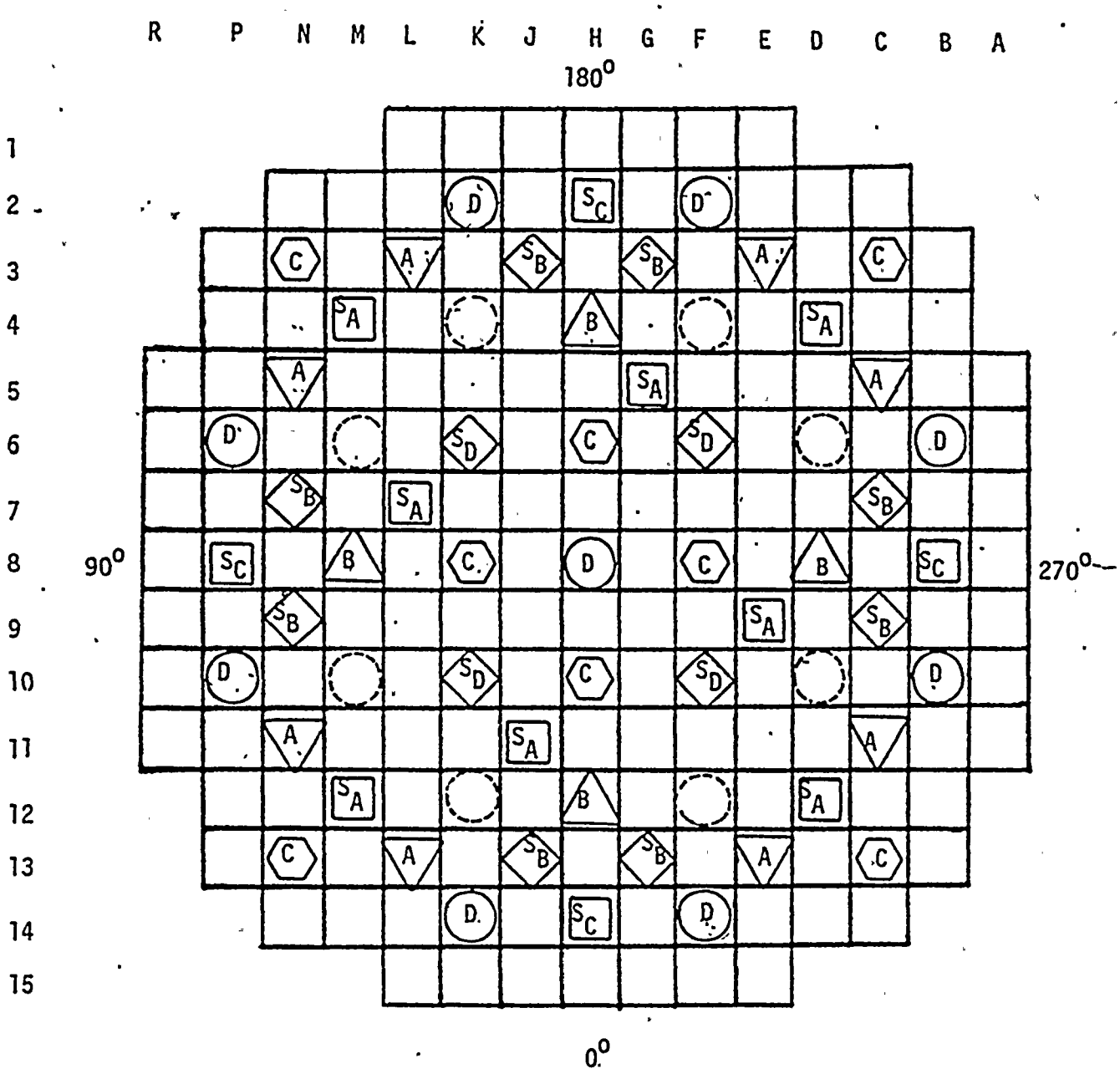
IV. Grid Data

Grid Material (mid-span grids)	:	Zircaloy-4
(top/bottom grid)	:	Inconel-718
No. of grids (in-active length)	:	7
(total)	:	8

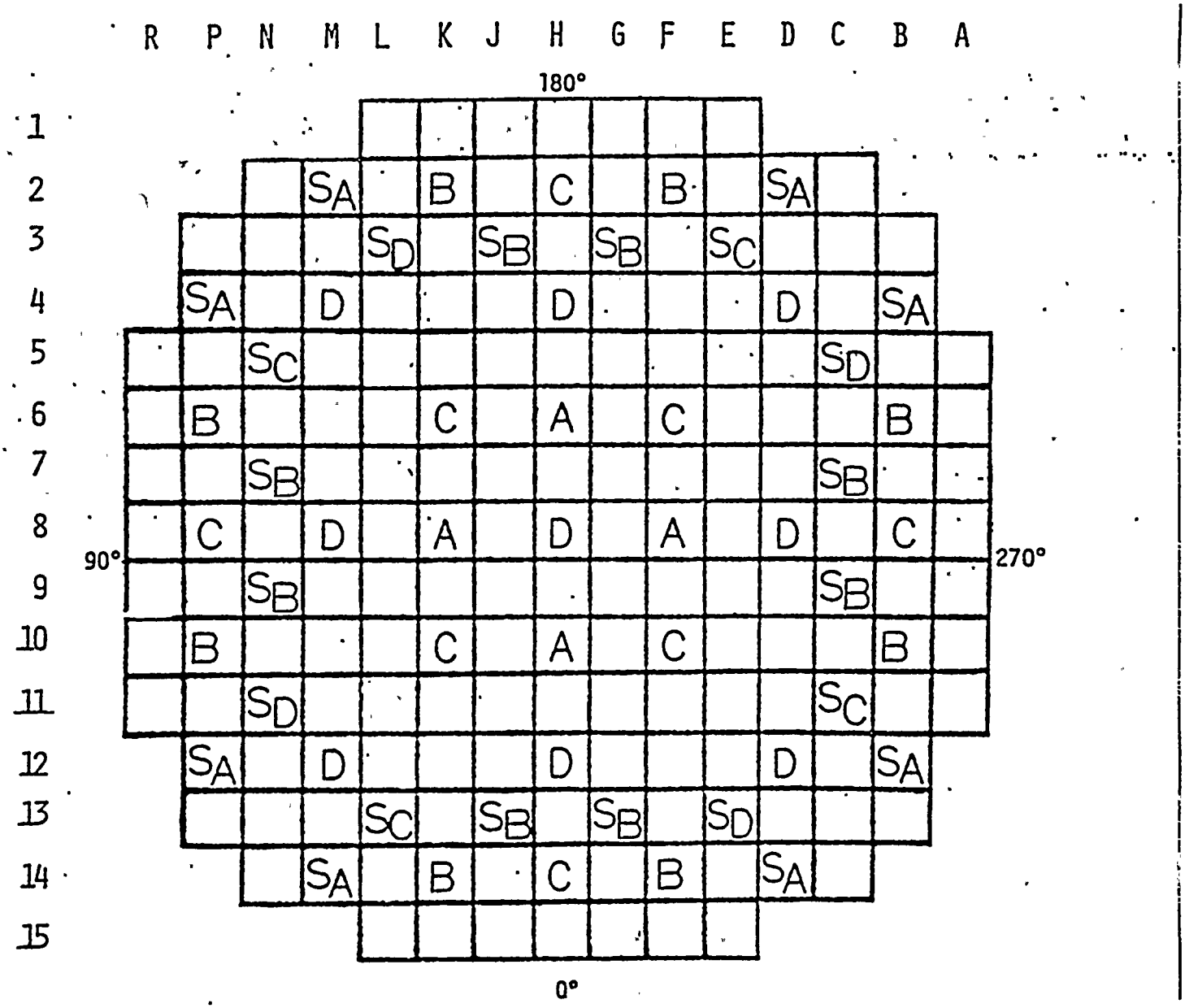
V. Intermediate Flow Mixing Grid Data

Grid Material	:	Zircaloy-4
No. of Grids	:	3

UNIT 1 CONTROL ROD PATTERN



UNIT 2 CONTROL ROD PATTERN



Beginning of Cycle Assembly Burnup
Unit 1, Cycle 15

Assembly ID	RCCA ID	Core Location	Cycle	Burnup
EE17	R28_	H10	15	27821
EE20	R39_	H12	15	28648
EE21	R501_	H04	15	28688
EE23	R46_	H06	15	27683
EE27	R509_	M08	15	28878
EE28	R16_	F08	15	27825
EE31	R26_	K10	15	27660
EE35	R51_	F10	15	27750
EE36	R52_	K06	15	27800
EE37	R44_	H08	15	30569
EE44	R10_	D08	15	28726
EE45	R510_	K08	15	27550
EE48	R07_	F06	15	28092
FF13	R520_	G05	15	18543
FF21	R41_	L07	15	18481
FF33	R55_	E09	15	18546
FF34	R503_	J11	15	18494
FF59	R37_	J13	15	17649
FF60	R40_	C07	15	17598
FF62	R21_	N09	15	17350
FF66	R504_	G13	15	17447
FF69	R09_	G03	15	17362
FF70	R15_	N07	15	17383
FF74	R511_	C09	15	17481
FF80	R17_	J03	15	17465
GG09	R14_	P08	15	0
GG15	R30_	H14	15	0
GG18	R521_	H02	15	0
GG20	R38_	B08	15	0
GG21	R56B_	M04	15	0

Assembly ID	RCCA ID	Core Location	Cycle	Burnup
GG22	R08_	D04	15	0
GG23	R56A_	M12	15	0
GG24	R505_	D12	15	0
GG25	R18_	C11	15	0
GG26	R508_	L03	15	0
GG27	R05_	E13	15	0
GG28	R506_	E03	15	0
GG29	R42_	N05	15	0
GG30	R13_	C05	15	0
GG31	R25_	N11	15	0
GG32	R35_	L13	15	0
GG49	R36_	B06	15	0
GG50	R502_	K02	15	0
GG51	R03_	B10	15	0
GG52	R32_	F02	15	0
GG53	R24_	N03	15	0
GG54	R47_	K14	15	0
GG55	R519_	F14	15	0
GG56	R02_	N13	15	0
GG57	R11_	C13	15	0
GG58	R29_	C03	15	0
GG59	R20_	P06	15	0
GG60	R01_	P10	15	0

Current Assembly Burnup
Unit 1, Cycle 15

Assembly ID	RCCA ID	Core Location	Cycle	Burnup
EE17	R28_	H10	15	31884
EE20	R39_	H12	15	32704
EE21	R501_	H04	15	32767
EE23	R46_	H06	15	31753
EE27	R509_	M08	15	32933
EE28	R16_	F08	15	31881
EE31	R26_	K10	15	31709
EE35	R51_	F10	15	31809
EE36	R52_	K06	15	31886
EE37	R44_	H08	15	34343
EE44	R10_	D08	15	32792
EE45	R510_	K08	15	31615
EE48	R07_	F06	15	32151
FF13	R520_	G05	15	23215
FF21	R41_	L07	15	23132
FF33	R55_	E09	15	23227
FF34	R503_	J11	15	23140
FF59	R37_	J13	15	22571
FF60	R40_	C07	15	22527
FF62	R21_	N09	15	22291
FF66	R504_	G13	15	22381
FF69	R09_	G03	15	22333
FF70	R15_	N07	15	22293
FF74	R511_	C09	15	22411
FF80	R17_	J03	15	22464
GG09	R14_	P08	15	5271
GG15	R30_	H14	15	5220
GG18	R521_	H02	15	5385
GG20	R38_	B08	15	5210
GG21	R56B_	M04	15	5796

Assembly ID	RCCA ID	Core Location	Cycle	Burnup
GG22	R08_	D04	15	5697
GG23	R56A_	M12	15	5690
GG24	R505_	D12	15	5680
GG25	R18_	C11	15	5581
GG26	R508_	L03	15	5714
GG27	R05_	E13	15	5611
GG28	R506_	E03	15	5609
GG29	R42_	N05	15	5557
GG30	R13_	C05	15	5583
GG31	R25_	N11	15	5600
GG32	R35_	L13	15	5603
GG49	R36_	B06	15	5515
GG50	R502_	K02	15	5639
GG51	R03_	B10	15	5522
GG52	R32_	F02	15	5562
GG53	R24_	N03	15	4986
GG54	R47_	K14	15	5515
GG55	R519_	F14	15	5605
GG56	R02_	N13	15	4971
GG57	R11_	C13	15	4873
GG58	R29_	C03	15	4964
GG59	R20_	P06	15	5447
GG60	R01_	P10	15	5546

End of Cycle Assembly Burnup
Unit 1, Cycle 15

Assembly ID	RCCA ID	Core Location	Cycle	Burnup
EE17	R28_	H10	15	41642
EE20	R39_	H12	15	42947
EE21	R501_	H04	15	42970
EE23	R46_	H06	15	41627
EE27	R509_	M08	15	42935
EE28	R16_	F08	15	41643
EE31	R26_	K10	15	41814
EE35	R51_	F10	15	41828
EE36	R52_	K06	15	41786
EE37	R44_	H08	15	43750
EE44	R10_	D08	15	42945
EE45	R510_	K08	15	41590
EE48	R07_	F06	15	41808
FF13	R520_	G05	15	34766
FF21	R41_	L07	15	34682
FF33	R55_	E09	15	34766
FF34	R503_	J11	15	34765
FF59	R37_	J13	15	34492
FF60	R40_	C07	15	34503
FF62	R21_	N09	15	34534
FF66	R504_	G13	15	34506
FF69	R09_	G03	15	34539
FF70	R15_	N07	15	34450
FF74	R511_	C09	15	34502
FF80	R17_	J03	15	34570
GG09	R14_	P08	15	18451
GG15	R30_	H14	15	18287
GG18	R521_	H02	15	18489
GG20	R38_	B08	15	18421
GG21	R56B_	M04	15	19470

Assembly ID	RCCA ID	Core Location	Cycle	Burnup
GG22	R08_	D04	15	19351
GG23	R56A_	M12	15	19358
GG24	R505_	D12	15	19317
GG25	R18_	C11	15	19321
GG26	R508_	L03	15	19482
GG27	R05_	E13	15	19378
GG28	R506_	E03	15	19344
GG29	R42_	N05	15	19215
GG30	R13_	C05	15	19341
GG31	R25_	N11	15	19351
GG32	R35_	L13	15	19336
GG49	R36_	B06	15	19430
GG50	R502_	K02	15	19487
GG51	R03_	B10	15	19423
GG52	R32_	F02	15	19444
GG53	R24_	N03	15	16683
GG54	R47_	K14	15	19390
GG55	R519_	F14	15	19601
GG56	R02_	N13	15	16678
GG57	R11_	C13	15	16430
GG58	R29_	C03	15	16674
GG59	R20_	P06	15	19206
GG60	R01_	P10	15	19448

Beginning of Cycle Assembly Burnup
Unit 2, Cycle 10

Assembly ID	RCCA ID	Core Location	Cycle	Burnup
W61	R131_	H08	10	32513
X01	R116_	K10	10	24584
X02	R122_	F06	10	24668
X03	R111_	C05	10	24790
X06	R141_	C11	10	24814
X09	R146_	E03	10	24831
X11	R127_	F10	10	24650
X14	R134_	K06	10	24765
X15	R120_	L03	10	24698
X16	R123_	N05	10	25001
X17	R154_	E13	10	24814
X18	R140_	N11	10	24842
X20	R101_	L13	10	24909
X37	R144_	M08	10	23254
X40	R107_	H04	10	23249
X42	R103_	H12	10	23345
X48	R124_	D08	10	23326
X50	R128_	J03	10	23248
X51	R108_	N09	10	23646
X53	R117_	N07	10	23125
X57	R147_	G13	10	23726
X58	R01_	J13	10	23698
X61	R118_	C07	10	23448
X62	R129_	C09	10	23631
X63	R112_	G03	10	23639
X65	R125_	M12	10	24683
X67	R130_	D12	10	24766
X68	R135_	H06	10	23496
X71	R150_	H10	10	22852
X72	R133_	K08	10	23407

Assembly ID	RCCA ID	Core Location	Cycle	Burnup
X73	R114_	F08	10	22893
X75	R126_	M04	10	24829
X76	R139_	D04	10	24675
Y01	R105	B12	10	0
Y02	R113_	M02	10	0
Y03	R106_	D14	10	0
Y04	R145_	D02	10	0
Y05	R109_	P04	10	0
Y06	R142_	B04	10	0
Y07	R138_	P12	10	0
Y08	R143_	M14	10	0
Y47	R121_	K02	10	0
Y48	R136_	P06	10	0
Y49	R153_	K14	10	0
Y51	R104_	B10	10	0
Y52	R137_	H02	10	0
Y54	R18_	F02	10	0
Y55	R110_	B08	10	0
Y56	R102_	P10	10	0
Y57	R119_	B06	10	0
Y58	R155	P08	10	0
Y62	R115_	F14	10	0
Y63	R40_	H14	10	0

End of Cycle Assembly Burnup
Unit 2, Cycle 10

Assembly ID	RCCA ID	Core Location	Cycle	Burnup
W61	R131_	H08	10	49823
X01	R116_	K10	10	42372
X02	R122_	F06	10	42389
X03	R111_	C05	10	43348
X06	R141_	C11	10	43198
X09	R146_	E03	10	43403
X11	R127_	F10	10	42390
X14	R134_	K06	10	42599
X15	R120_	L03	10	43451
X16	R123_	N05	10	43680
X17	R154_	E13	10	43460
X18	R140_	N11	10	43344
X20	R101_	L13	10	43410
X37	R144_	M08	10	43528
X40	R107_	H04	10	43380
X42	R103_	H12	10	43417
X48	R124_	D08	10	43144
X50	R128_	J03	10	43169
X51	R108_	N09	10	43718
X53	R117_	N07	10	43217
X57	R147_	G13	10	43641
X58	R01_	J13	10	43454
X61	R118_	C07	10	43274
X62	R129_	C09	10	43485
X63	R112_	G03	10	43492
X65	R125_	M12	10	44392
X67	R130_	D12	10	44502
X68	R135_	H06	10	42124
X71	R150_	H10	10	41589
X72	R133_	K08	10	42253

Assembly ID	RCCA ID	Core Location	Cycle	Burnup
X73	R114_	F08	10	41550
X75	R126_	M04	10	44743
X76	R139_	D04	10	44511
Y01	R105	B12	10	16172
Y02	R113_	M02	10	15415
Y03	R106_	D14	10	15617
Y04	R145_	D02	10	15514
Y05	R109_	P04	10	15516
Y06	R142_	B04	10	15517
Y07	R138_	P12	10	15360
Y08	R143_	M14	10	15416
Y47	R121_	K02	10	22069
Y48	R136_	P06	10	21850
Y49	R153_	K14	10	21896
Y51	R104_	B10	10	22260
Y52	R137_	H02	10	22240
Y54	R18_	F02	10	21688
Y55	R110_	B08	10	22400
Y56	R102_	P10	10	21972
Y57	R119_	B06	10	22111
Y58	R155	P08	10	22218
Y62	R115_	F14	10	22059
Y63	R40_	H14	10	21962

ATTACHMENT 4 TO AEP:NRC:1249

NRC BULLETIN 96-01

RESPONSE NO. 3

Response 3

This attachment contains results of recent rod drop tests performed at Cook Nuclear Plant.

(1) Unit 1, Beginning of Cycle 15
(2) Unit 2, Beginning of Cycle 10
(3) Unit 2, End of Cycle 10

It should be noted that a new methodology for rod drop testing (multiple rod drop technique) was employed for the beginning of Unit 1, Cycle 15 and the end of Unit 2, Cycle 10 tests. Since the trip breaker serves as the initiation signal in the new system, the rod drop time is slightly increased (0.1 sec. - 0.15 sec).

To assure the rods inserted completely, the traces obtained from the Unit 2 end of cycle 10 rod drop tests were studied. All traces exhibited similar characteristics to the beginning of cycle traces including the "bounces". This means that all RCCAs entered the dashpot region without delay.

If additional tests are performed, the data from these tests will be transmitted as well.

Summary of Rod Drop Times
Unit 1 Cycle 15

Beginning of Cycle

Bank Group	Rod Location	Time to Dashpot (T1)	Total Drop Time (T2)	Bank-Group	Rod Location	Time to Dashpot (T1)	Total Drop Time (T2)
SBA-1	D4	1.354	2.079	CBA-1	E3	1.358	2.014
SBA-1	D12	1.349	1.998	CBA-1	C11	1.379	2.031
SBA-1	M12	1.366	1.960	CBA-1	L13	1.364	2.120
SBA-1	M4	1.377	1.951	CBA-1	N5	1.450	2.197
SBA-2	G5	1.449	2.105	CBA-2	C5	1.389	2.008
SBA-2	E9	1.413	2.163	CBA-2	E13	1.365	2.100
SBA-2	J11	1.412	2.008	CBA-2	N11	1.403	2.046
SBA-2	L7	1.418	2.088	CBA-2	L3	1.391	2.044
SBB-1	G3	1.389	2.093	CBB-1	D8	1.426	2.126
SBB-1	C9	1.450	2.049	CBB-1	M8	1.434	2.078
SBB-1	J13	1.381	2.046	CBB-2	H4	1.381	2.031
SBB-1	N7	1.413	2.098	CBB-2	H12	1.426	2.098
SBB-2	C7	1.410	2.180	CBC-1	C3	1.351	1.978
SBB-2	G13	1.415	2.034	CBC-1	C13	1.371	2.017
SBB-2	N9	1.410	2.179	CBC-1	N13	1.366	2.073
SBB-2	J3	1.359	2.056	CBC-1	N3	1.369	2.035
SBC-1	H2	1.377	2.075	CBC-2	H6	1.392	2.082
SBC-1	B8	1.371	2.043	CBC-2	F8	1.407	2.154
SBC-1	H14	1.369	1.987	CBC-2	H10	1.403	2.184
SBC-1	P8	1.428	2.169	CBC-2	K8	1.434	2.083
SBD-1	F6	1.410	2.184	CBD-2	H8	1.481	2.280
SBD-1	F10	1.392	2.045	CBD-1	F2	1.385	1.976
SBD-1	K10	1.428	2.092	CBD-1	B10	1.424	2.054
SBD-1	K6	1.396	2.133	CBD-1	K14	1.390	1.985
				CBD-1	P6	1.391	2.145
				CBD-2	B6	1.463	2.072
				CBD-2	F14	1.498	2.151
				CBD-2	P10	1.458	2.130
				CBD-2	K2	1.462	2.092

Summary of Rod Drop Times
Unit 2 Cycle 10

Beginning of Cycle

Bank Group	Rod Location	Time to Dashpot (T1)	Total Drop Time (T2)	Bank-Group	Rod Location	Time to Dashpot (T1)	Total Drop Time (T2)
CBA-1	H6	1.36	1.79	CBD-1	M4	1.38	1.81
CBA-1	H10	1.37	1.83	CBD-2	H4	1.36	1.75
CBA-2	F8	1.36	1.80	CBD-2	D8	1.35	1.78
CBA-2	K8	1.36	1.95	CBD-2	H12	1.38	1.82
CBB-1	F2	1.38	1.93	CBD-2.	M8	1.50	1.96
CBB-1	B10	1.42	1.88	SBA-1	D2	1.41	1.90
CBB-1	K14	1.39	1.89	SBA-1	B12	1.36	1.85
CBB-1	P6	1.40	1.92	SBA-1	M14	1.40	1.96
CBB-2	B6	1.39	1.88	SBA-1	P4	1.38	1.86
CBB-2	F14	1.39	1.82	SBA-2	B4	1.37	1.90
CBB-2	P10	1.38	1.86	SBA-2	D14	1.43	1.94
CBB-2	K2	1.40	1.89	SBA-2	P12	1.37	1.85
CBC-1	H2	1.36	1.84	SBA-2	M2	1.42	2.00
CBC-1	B8	1.39	1.87	SBB-1	G3	1.38	1.96
CBC-1	H14	1.53	2.19	SBB-1	C9	1.37	1:78
CBC-1	P8	1.37	1.86	SBB-1	J13	1.36	1.83
CBC-2	F6	1.37	1.84	SBB-1	N7	1.37	1.93
CBC-2	F10	1.40	1.83	SBB-2	C7	1.38	1.77
CBC-2	K10	1.37	1.79	SBB-2	G13	1.37	1.77
CBC-2	K6	1.37	1.79	SBB-2	N9	1.38	1.77
CBD-2	H8	1.39	1.80	SBB-2	J3	1.40	1.82
CBD-1	D4	1.39	1.86	SBC-1	E3	1.39	1.83
CBD-1	D12	1.37	1.86	SBC-1	C11	1.41	1.89
CBD-1	M12	1.35	1.79	SBC-1	L13	1.39	1.83
				SBC-1.	N5	1.41	1.85
				SBD-1	C5	1.37	1.78
				SBD-1	E13	1.41	1.82
				SBD-1	N11	1.40	1.89
				SBD-1	L3	1.40	1.84

Summary of Rod Drop Times
Unit 2 Cycle 10

End of Cycle

Bank Group	Rod Location	Time to Dashpot (T1)	Total Drop Time (T2)	Bank-Group	Rod Location	Time to Dashpot (T1)	Total Drop Time (T2)
CBA-1	H6	1.416	1.881	CBD-1	M4	1.422	1.857
CBA-1	H10	1.456	1.957	CBD-2	H4	1.406	1.812
CBA-2	F8	1.468	1.950	CBD-2	D8	1.434	1.906
CBA-2	K8	1.462	2.107	CBD-2	H12	1.436	1.914
CBB-1	F2	1.473	2.030	CBD-2	M8	1.534	2.032
CBB-1	B10	1.516	2.006	SBA-1	D2	1.528	2.040
CBB-1	K14	1.452	1.942	SBA-1	B12	1.478	1.970
CBB-1	P6	1.450	1.988	SBA-1	M14	1.443	1.994
CBB-2	B6	1.503	2.039	SBA-1	P4	1.444	1.922
CBB-2	F14	1.449	1.892	SBA-2	B4	1.550	2.069
CBB-2	P10	1.434	1.919	SBA-2	D14	1.589	2.109
CBB-2	K2	1.450	1.937	SBA-2	P12	1.503	1.996
CBC-1	H2	1.426	1.911	SBA-2	M2	1.539	2.114
CBC-1	B8	1.473	1.970	SBB-1	G3	1.445	2.076
CBC-1	H14	1.589	2.259	SBB-1	C9	1.453	1.901
CBC-1	P8	1.412	1.904	SBB-1	J13	1.458	1.946
CBC-2	F6	1.427	1.966	SBB-1	N7	1.419	2.004
CBC-2	F10	1.458	1.988	SBB-2	C7	1.513	1.915
CBC-2	K10	1.436	1.921	SBB-2	G13	1.541	1.951
CBC-2	K6	1.448	1.885	SBB-2	N9	1.507	1.919
CBD-2	H8	1.434	1.863	SBB-2	J3	1.487	1.908
CBD-1	D4	1.440	1.982	SBC-1	E3	1.457	1.887
CBD-1	D12	1.433	1.959	SBC-1	C11	1.478	2.048
CBD-1	M12	1.395	1.830	SBC-1	L13	1.477	1.915
				SBC-1	N5	1.451	1.911
				SBD-1	C5	1.463	1.893
				SBD-1	E13	1.459	1.886
				SBD-1	N11	1.473	1.983
				SBD-1	L3	1.455	1.882