



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ENCLOSURE 3

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 205 TO FACILITY OPERATING LICENSE NO. DPR-33

AMENDMENT NO. 178 TO FACILITY OPERATING LICENSE NO. DPR-68

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 1 AND 3

DOCKET NOS. 50-259 AND 50-296

1.0 INTRODUCTION

By letters dated April 6, 1992, and September 28, 1992, the Tennessee Valley Authority (TVA), the licensee for the Browns Ferry Nuclear Plant (BFN), proposed changes to the Technical Specifications (TS) for BFN, Units 1 and 3, associated with the Automatic Depressurization System (ADS) (References 1 and 2). The proposed changes add ADS high drywell pressure bypass timer requirements, revise the ADS timer trip level setting, increase the number of ADS valves required to be operable for startup, revise the limiting conditions for operation with inoperable ADS valves, and revise the corresponding ADS bases. These changes were approved for Unit 2 on January 9, 1991 (Reference 3).

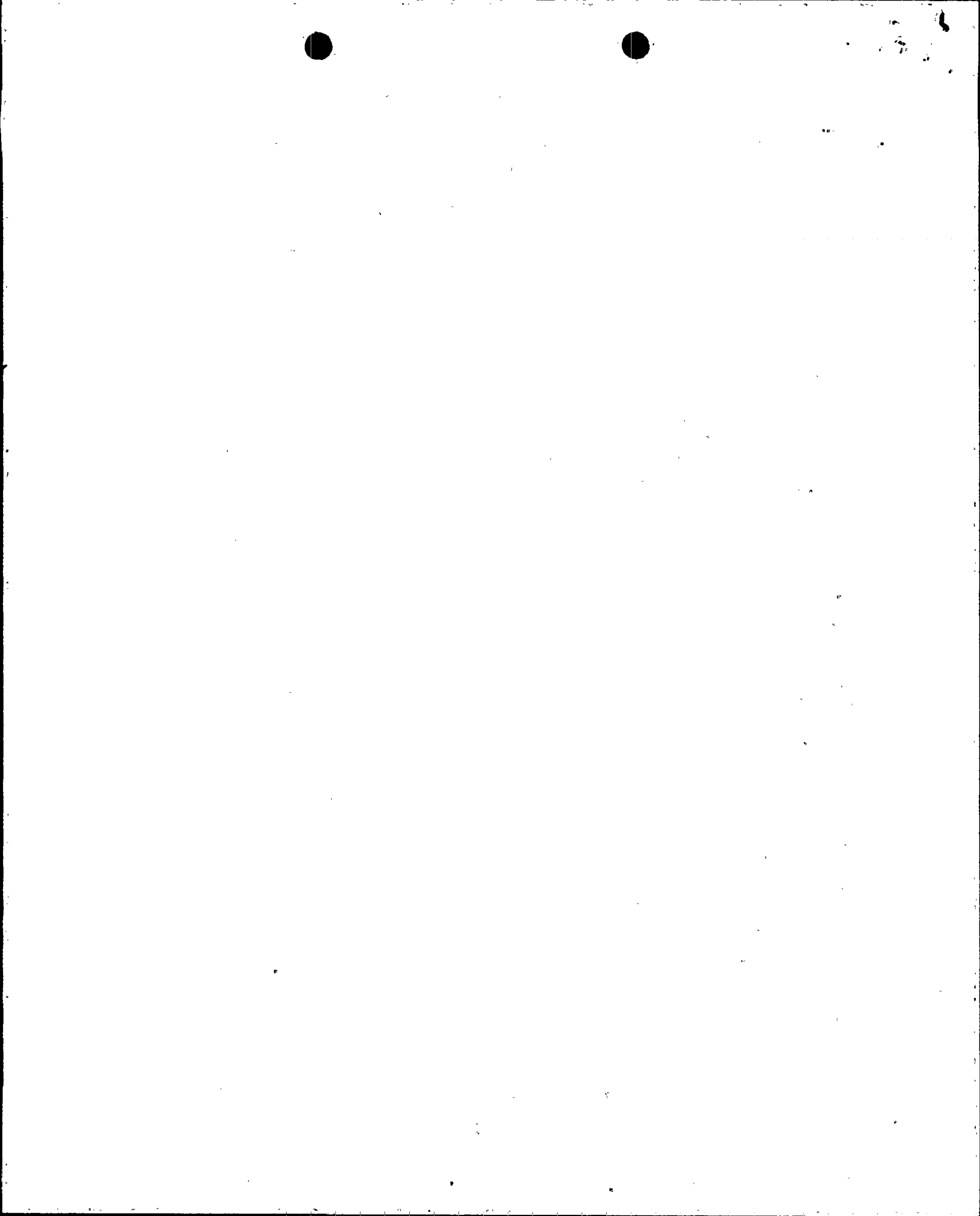
The ADS high drywell pressure bypass timers have been added to Unit 3 and will be added to Unit 1 to meet the requirements of NUREG-0737, Item II.K.3.18. The ADS high drywell pressure bypass timers provide for automatic actuation for ADS for Loss of Coolant Accident (LOCA) events without a resultant high drywell pressure, for example, pipe breaks outside containment. This eliminates the need for manual operator action to assure adequate core cooling. The proposed setpoints for the high drywell pressure bypass timers and the revised setpoints for the ADS timers resulted from review of the calculation for the ADS high drywell pressure timer function and a recalculation of the ADS initiation timer setpoint.

The increase in the required number of operable ADS valves ensures that at least four ADS valves will be available in the event of a single failure of a 250V DC power supply board.

2.0 EVALUATION

The ADS is part of the core standby cooling system (CSCS), which additionally includes: the High Pressure Coolant Injection (HPCI) system, the Core Spray (CS) system, and the Low Pressure Coolant Injection (LPCI) mode of the Residual Heat Removal (RHR) System. ADS provides for automatic nuclear steam system depressurization, if needed, for small breaks in the nuclear steam system to permit LPCI and CS operation to protect the core from overheating. ADS uses six of the thirteen steam pressure relief valves to relieve high pressure steam to the suppression pool. For a large primary system break, ADS

9405240301 940519
PDR ADOCK 05000259
PDR



is not required due to rapid primary depressurization; however, for smaller breaks exceeding the high pressure injection capacity to maintain water level, ADS will reduce pressure to within the CS and LPCI pump discharge heads.

With the ADS high drywell pressure bypass timers installed, ADS will initiate when the following conditions exist: low reactor water level permissive (Level 3), low reactor water (Level 1), high drywell pressure or the ADS high drywell pressure bypass timer timed out, the ADS timer timed out, and at least one RHR pump or two CS pumps running. The ADS timer allows the operator to cancel the ADS signal if control room information indicates that depressurization is not necessary.

2.1 High Drywell Pressure Bypass Timer

The ADS high drywell bypass timer setpoint was estimated by means of a bounding analysis, performed by the General Electric Co. (GE), based on data from all three BFN units and other plants. The analytical limit for ADS high drywell pressure bypass timer actuation was 360 seconds for the peak cladding temperature not to exceed the licensee's established peak clad temperature (PCT) goal of 1500°F (the PCT limit specified in 10 CFR 50.46 is 2200°F). The TS trip level setting limit will be less than or equal to 322 seconds and, accounting for instrument error, the maximum possible delay is 354 seconds. The bounding analytical limit established for the ADS timer is 130 seconds. The TS trip level setting limit for the ADS timer will be less than or equal to 115 seconds, and allowing for instrument error, the maximum time delay for the ADS timer will be 126 seconds.

The staff notes that TVA has not performed a plant specific 10 CFR Part 50, Appendix K, type of calculation for the ADS high drywell bypass timer setting. However, given the ample margins in the generic result (more than 700°F) we find the setting acceptable.

2.2 ADS Valves

The limiting condition for operation (LCO) for the ADS currently requires only four of the six ADS valves to be operable prior to startup from a cold condition or whenever reactor vessel pressure exceeds 105 psig with irradiated fuel in the vessel. The ADS valves are air operated with DC powered solenoid valves, and a single failure of a 250V DC Reactor Motor Operated Valve (MOV) board could render two of the ADS valves inoperable. Analysis has shown that reactor depressurization with only two ADS valves and no high pressure coolant injection could result in fuel clad peak temperatures exceeding 1500°F. The proposed amendment increases the number of ADS valves required to be operable from four to six valves, which ensures that at least four ADS valves will be available in the event of the worst single failure (i.e., failure of a 250V DC MOV board). Analysis has shown that four valves are capable of depressurizing the reactor rapidly enough to maintain PCT within acceptable limits. This change is more conservative and is supported by analysis and is hence acceptable.

The proposed change allows one ADS valve to be inoperable for 14 days if the HPCI, CS, and LPCI systems are operable. This is acceptable, because

(1) operation of five of the ADS valves will provide the required depressurization and (2) an appropriate limitation is imposed upon the length of time allowed for operation at a reduced capability. The proposed bases changes associated with the ADS valves accurately reflect the revised LCOs and hence are acceptable.

2.3 Technical Specification Changes

1. Table 3.2.B, "Instrument Channel - Reactor Low Water Level (Page 3.2/4.2-14 for Units 1 and 3).

Change: "...low water level permissive, 120 seconds. delay timer..."
to: "...low water level permissive, ADS timer timed out..."

Add the following remark: "2. Below trip settings, in conjunction with low reactor level permissive, ADS timer timed out, ADS high drywell pressure bypass timer timed out, CSS or RHR pump running, initiates ADS".

2. Table 3.2.B, "Instrument Channel - Drywell High Pressure" (Page 3.2/4.2-15, Units 1 and 3).

Change: "...low reactor water level, high drywell pressure, 120 seconds. delay timer and CSS..." to: "...low reactor water level permissive, ADS timer timed out, and CSS..."

3. Table 3.2.B (Page 3.2/4.2-17 for Units 1 and 3).

Delete: function "ADS timer".

4. Table 3.2.B (page 3.2/4.2-22 for Unit 1 and page 3.2/4.2-21a for Unit 3)

Add the following:

<u>Minimum No. Operable per Trip Sys(1)</u>	<u>Function</u>	<u>Trip Level Setting</u>	<u>Action</u>	<u>Remarks</u>
1(16)	ADS Timer	$t \leq 115$ sec	A	1. Above trip setting in conjunction with low reactor water level permissive, low reactor water level; high drywell pressure or ADS high drywell pressure bypass timer timed out, and RHR or CSS pumps running, initiates ADS.

<u>Minimum No. Operable per Trip Sys(1)</u>	<u>Function</u>	<u>Trip Level Setting</u>	<u>Action</u>	<u>Remarks</u>
1(16)	ADS High Drywell Pressure Bypass Timer	$t \leq 322$ sec	A	1. Above trip setting, in conjunction with low reactor water level permissive, low reactor water level, ADS timer timed out, and RHR or CSS pumps running, initiates ADS.

4. Table 4.2.B (Page 3.2/4.2-45 for Unit 1 and Page 3.2/4.2-44 for Unit 3).
Add the following function:

<u>Function</u>	<u>Functional Test</u>	<u>Calibration</u>	<u>Instrument Check</u>
ADS High Drywell Pressure bypass timer	(4)	once/operating cycle	none

6. Bases 3.2 (Page 3.2/4.2-66 for Unit 1 and 3.2/4.2-65 for Unit 3).
Add the following:

"ADS provides for automatic nuclear steam system depressurization, if needed, for small breaks in the nuclear system so that the LPCI and the CS System can operate to protect the fuel from overheating. ADS uses six of the 13 MSRVs to relieve the high pressure steam to the suppression pool. ADS initiates when the following conditions exist: low reactor water level permissive (level 3), low reactor water level (level 1), high drywell pressure or the ADS high drywell pressure bypass timer timed out, and the ADS timer timed out. In addition, at least one RHR pump or two core spray pumps must be running.

"The ADS high drywell pressure bypass timer is added to meet the requirements of NUREG-0737, item II.K.3.18. This timer will bypass the high drywell pressure permissive after a sustained low water level. The worst case condition is a main steam line break outside primary containment with HPCI inoperable. With the ADS high drywell pressure bypass timer analytical limit of 360 seconds, a Peak Cladding Temperature (PCT) of 1500°F will not be exceeded for the worst case event. This temperature is well below the limiting PCT of 2200°F."

7. LCO and Bases 3.5.G.1,2, and 3

The current LCO requires only four of the six ADS valves to be operable. The proposed change requires all six ADS valves to be operable. The proposed change allows one ADS valve to be inoperable for 14 days if the HPCI, CS, and LPCI systems are operable. Bases changes are proposed which reflect the revised LCOs.

Based on the discussion above, the proposed TS changes are acceptable.



10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Alabama State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (57 FR 22269 and 57 FR 55593). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

5.0 CONCLUSION

The Commission has concluded, based upon the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and (3) issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: Lambros Lois
David C. Trimble

Date: May 19, 1994



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

6.0 REFERENCES

1. O. J. Zeringue, TVA, letter to USNRC, April 6, 1992.
2. O. J. Zeringue, TVA, letter to USNRC, September 28, 1992.
3. T. Ross, USNRC, letter to O. D. Kingsley, Jr., TVA, January 9, 1991.



1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

Mr. Oliver D. Kingsley, Jr.
Tennessee Valley Authority

cc:

Mr. Craven Crowell, Chairman
Tennessee Valley Authority
ET 12A
400 West Summit Hill Drive
Knoxville, TN 37902

Mr. W. H. Kennoy, Director
Tennessee Valley Authority
ET 12A
400 West Summit Hill Drive
Knoxville, TN 37902

Mr. Johnny H. Hayes, Director
Tennessee Valley Authority
ET 12A
400 West Summit Hill Drive
Knoxville, TN 37902

Mr. O. J. Zeringue, Sr. Vice President
Nuclear Operations
Tennessee Valley Authority
3B Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Dr. Mark O. Medford, Vice President
Technical Support
Tennessee Valley Authority
3B Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. D. E. Nunn, Vice President
Nuclear Projects
Tennessee Valley Authority
3B Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. R. D. Machon, Site Vice President
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35602

General Counsel
Tennessee Valley Authority
ET 11H
400 West Summit Hill Drive
Knoxville, TN 37902

BROWNS FERRY NUCLEAR PLANT

Mr. B. S. Schofield, Manager
Nuclear Licensing and Regulatory
Affairs
Tennessee Valley Authority
4G Blue Ridge
1101 Market Street
Chattanooga, TN 37402-2801

Mr. T. D. Shriver
Nuclear Assurance and Licensing
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35602

Mr. Pedro Salas
Site Licensing Manager
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35602

Mr. Roger W. Huston
Tennessee Valley Authority
11921 Rockville Pike, Suite 402
Rockville, MD 20852

Regional Administrator
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW., Suite 2900
Atlanta, GA 30323

Mr. Charles Patterson
Senior Resident Inspector
Browns Ferry Nuclear Plant
U.S. Nuclear Regulatory Commission
Route 12, Box 637
Athens, AL 35611

Chairman
Limestone County Commission
P.O. Box 188
Athens, AL 35611

State Health Officer
Alabama Department of Public Health
434 Monroe Street
Montgomery, AL 36130-1701



1950
1951
1952
1953
1954
1955
1956
1957
1958
1959
1960

AMENDMENT NO. 205 FOR BROWNS FERRY UNIT 1 - DOCKET NO. 50-259
AMENDMENT NO. 178 FOR BROWNS FERRY UNIT 3 - DOCKET NO. 50-296
DATED: May 19, 1994

Distribution

Docket File

NRC & Local PDRs

BFN Reading

S. Varga

F. Hebdon

B. Clayton

D. Trimble

J. Williams

OGC

15-B-18

D. Hagan

MNBB-3206

G. Hill (2)

P1 37

C. Grimes

11-E-22

ACRS (10)

OPA

OC/LFDCB

R. Jones

L. Lois

J. Johnson, Acting RII

M. Lesser RII

C. Patterson RII

cc: Plant Service list

