

DIMENSIONS ARE IN INCHES (NOMINAL)

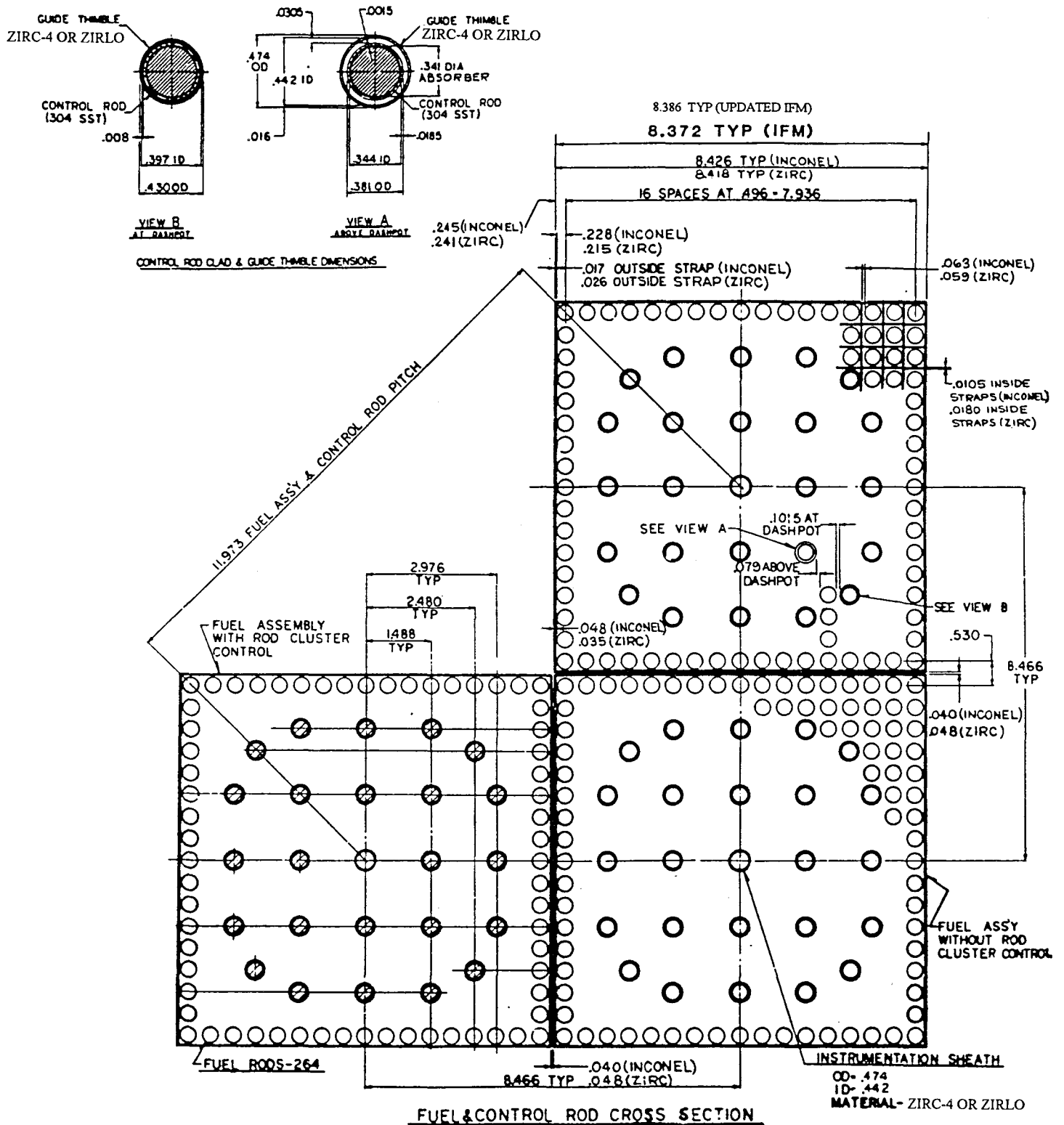
CALLAWAY PLANT

FIGURE 4.2-1

FUEL ASSEMBLY CROSS SECTION
17 X 17 VANTAGE 5/V+

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SHEET 1



CALLAWAY PLANT

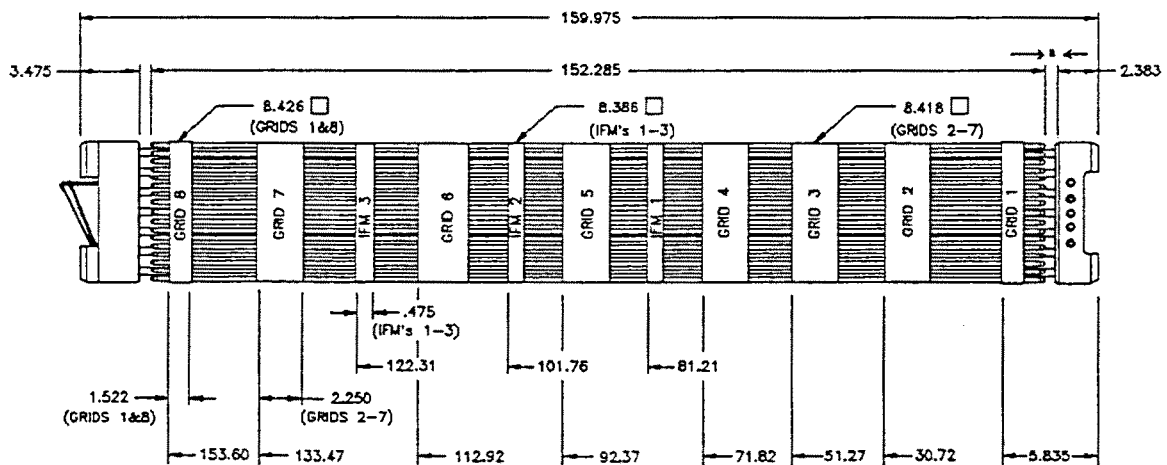
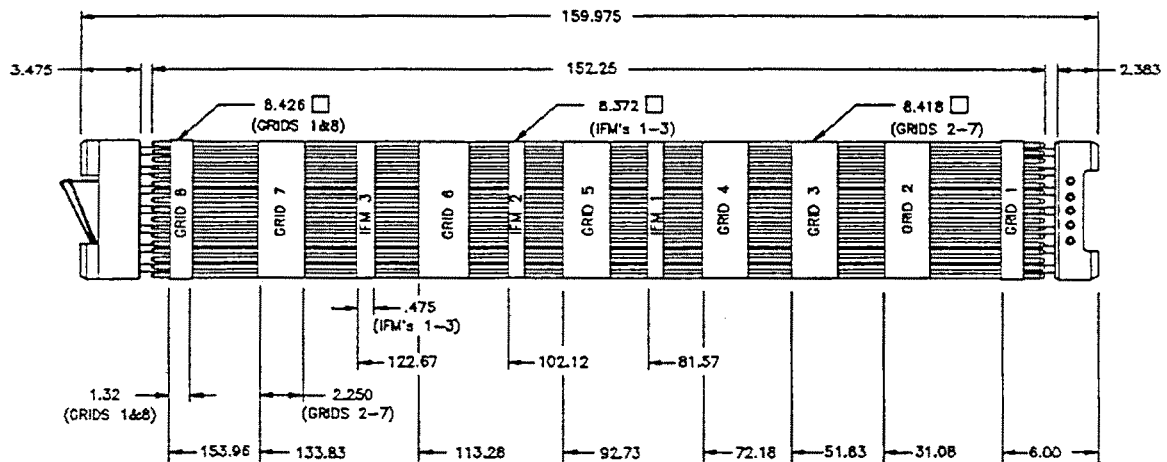
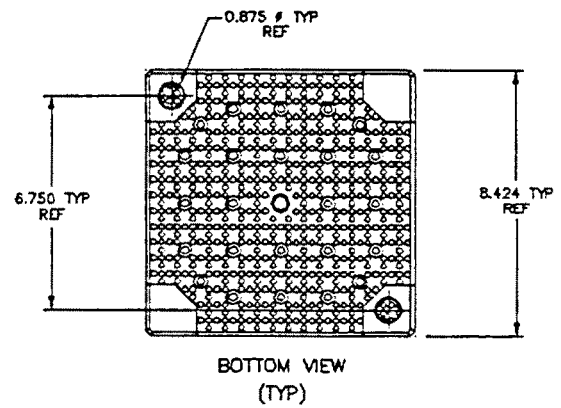
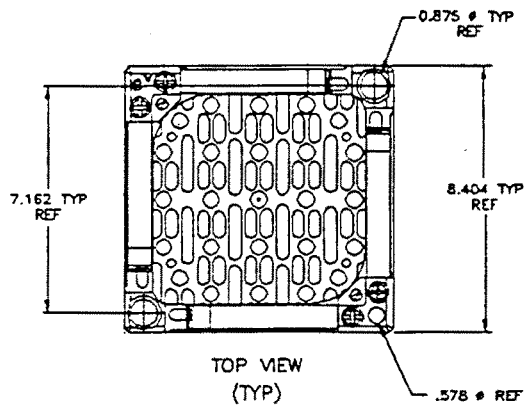
FIGURE 4.2-1

FUEL ASSEMBLY CROSS SECTION
17 X 17 VANTAGE 5/V+

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SHEET 2

Figure 4.2-1A has been deleted.

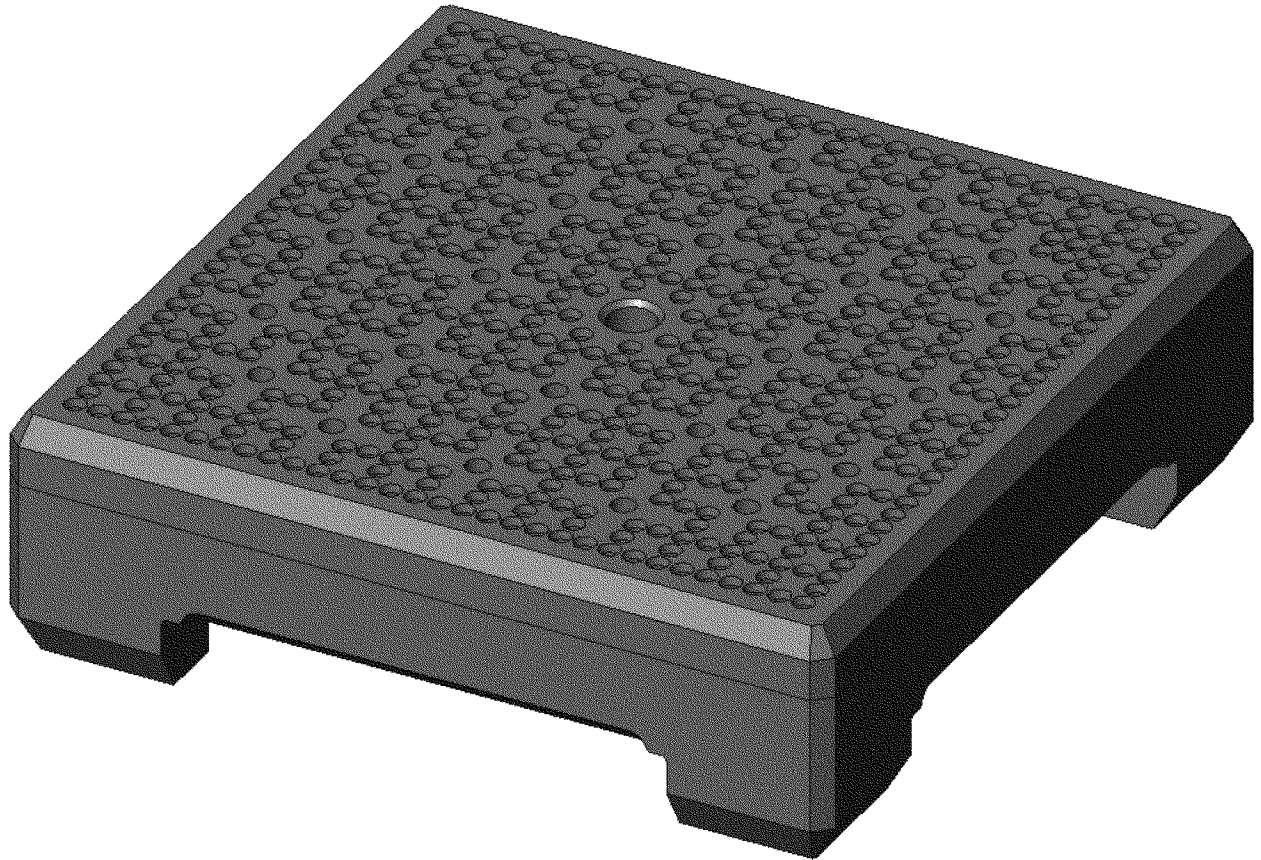


(A) Gap reduced from 1.10 inches to 0.465 inches.

DIMENSIONS ARE IN INCHES (NOMINAL)

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CALLAWAY PLANT
FUEL ASSEMBLY OUTLINE
17x17 VANTAGE 5
FIGURE 4.2-2

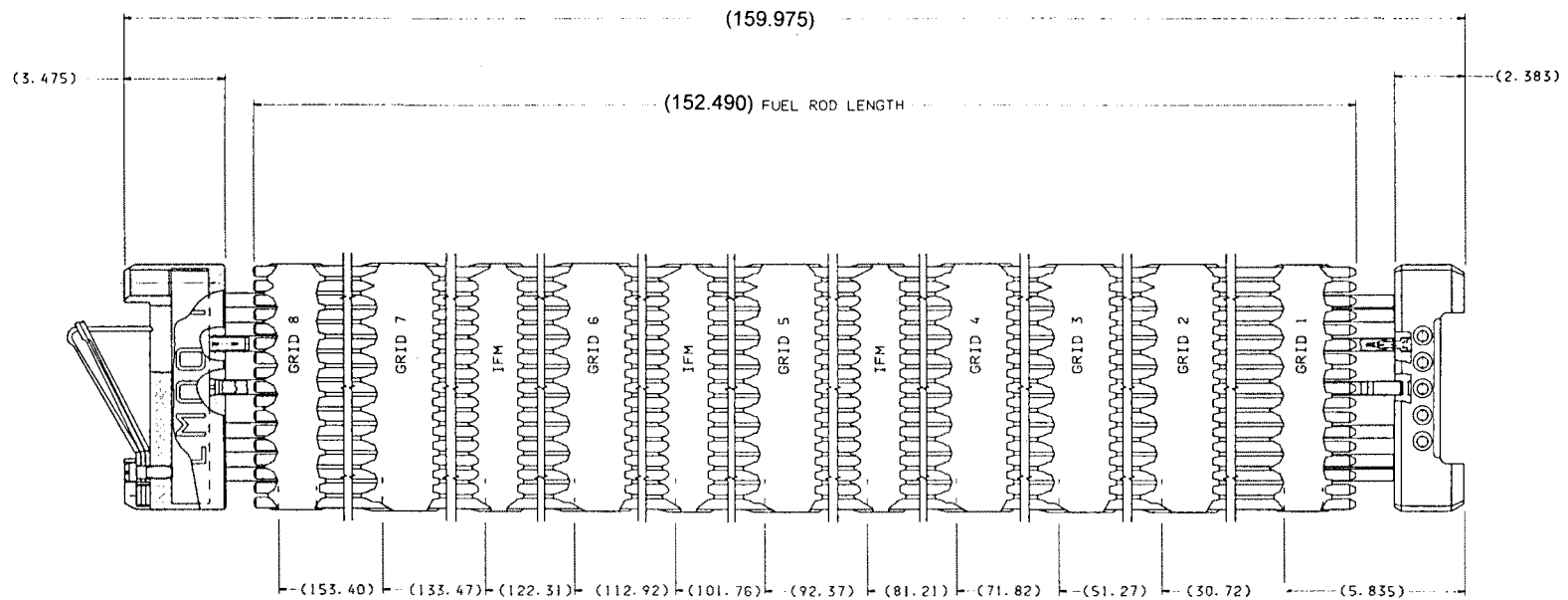
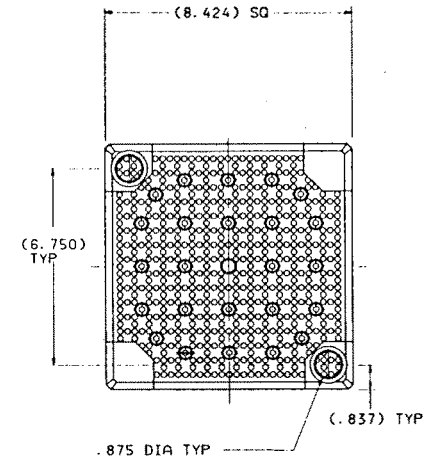
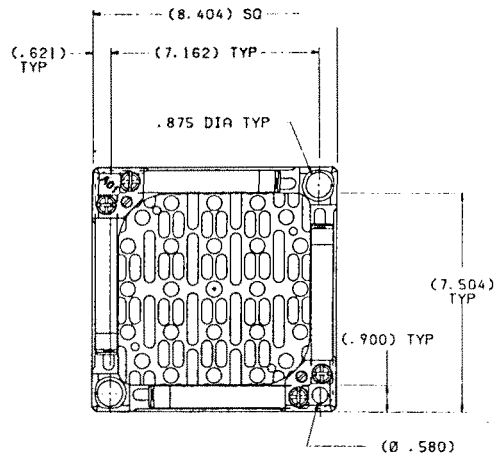


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FIGURE 4.2-2A

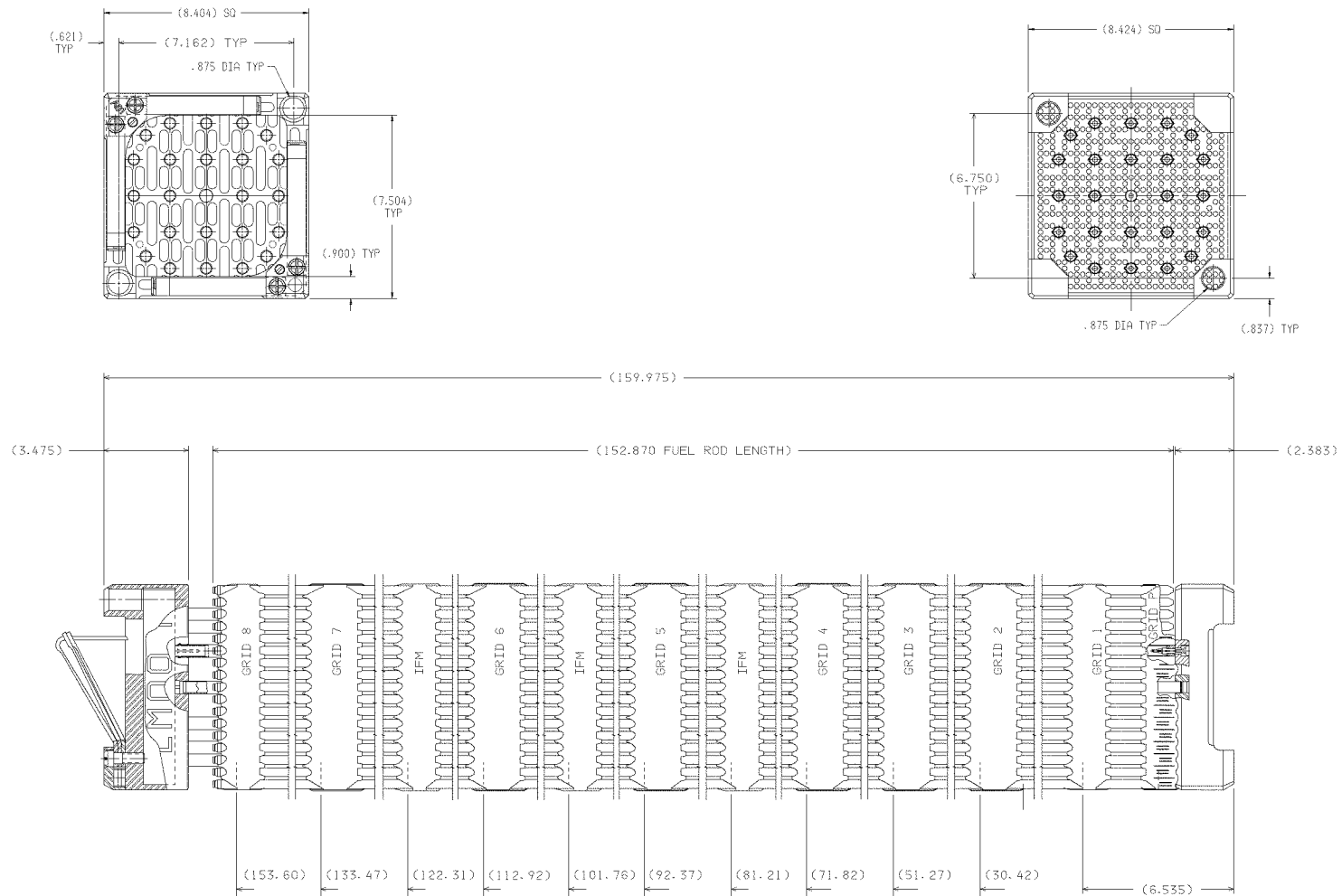
STANDARDIZED BOTTOM NOZZLE
PICTURE OF 17 X 17 SDFBN

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CALLAWAY PLANT
17X17 VANTAGE + FUEL ASSEMBLY (ZIRLO) FIGURE 4.2-2B

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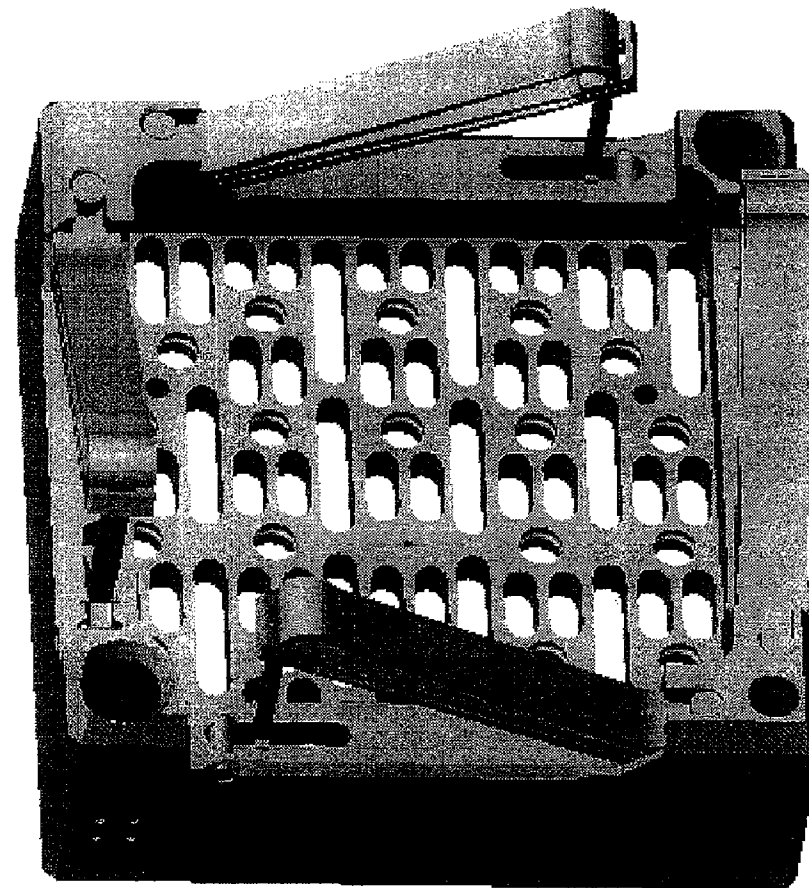
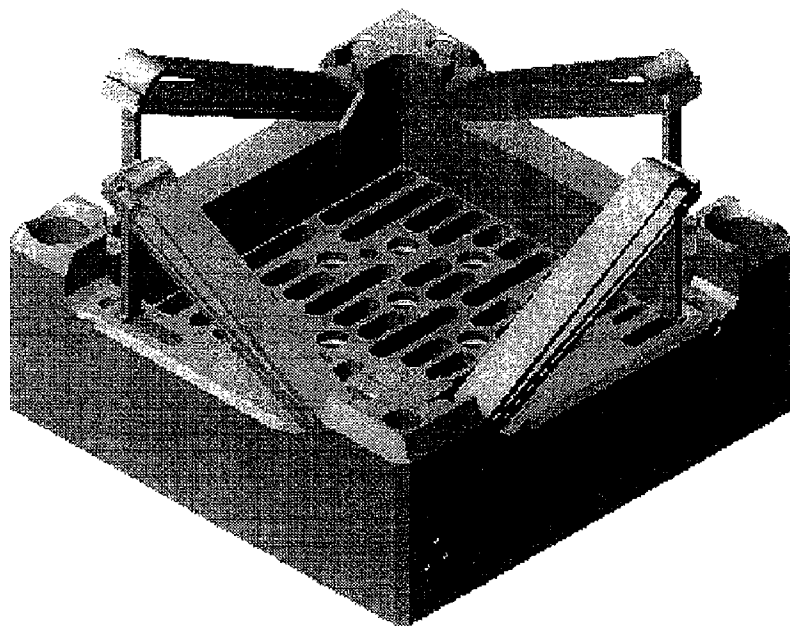


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FIGURE 4.2-2C

17X17 PERFORMANCE+
FUEL ASSEMBLY

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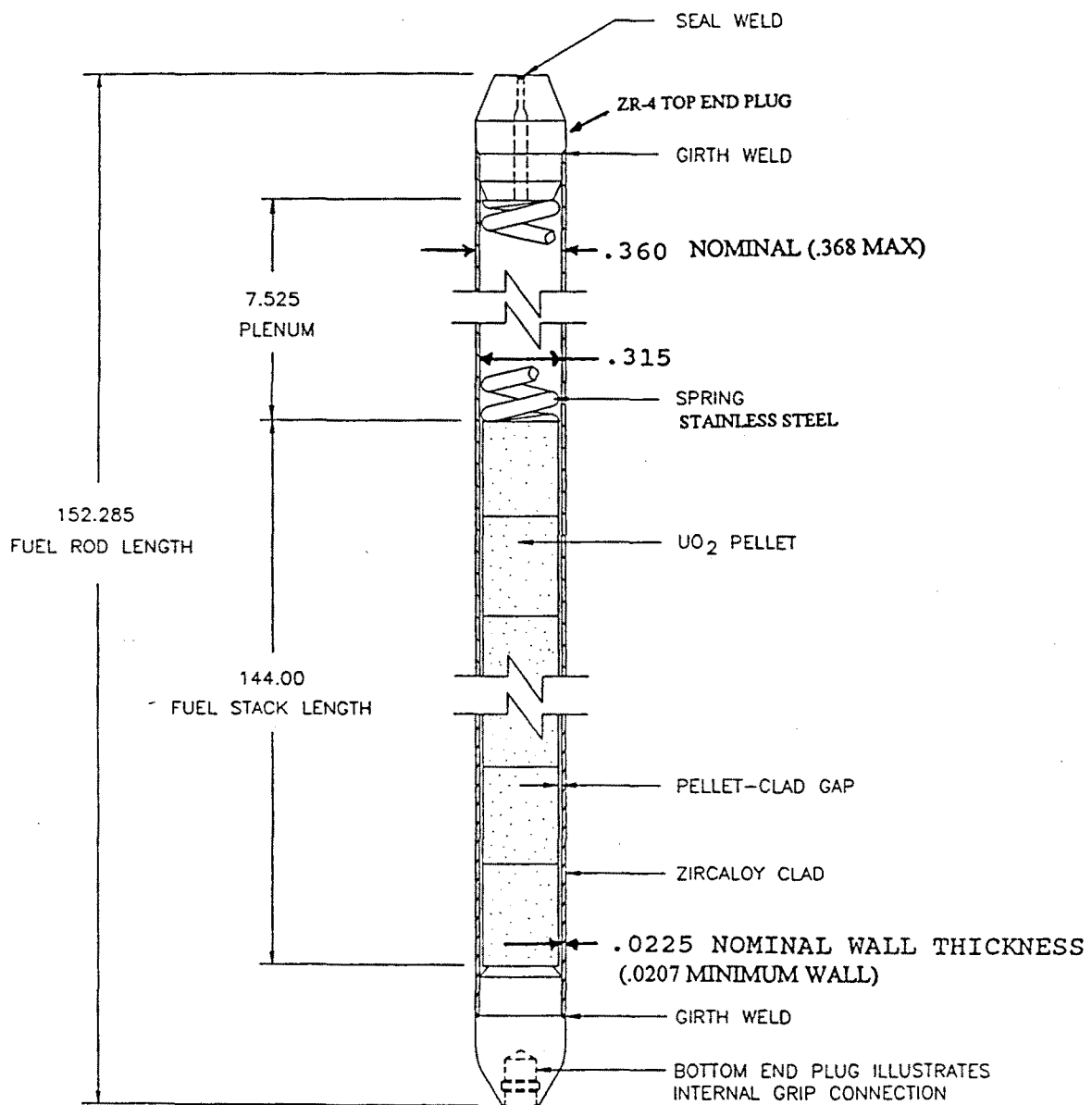


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FIGURE 4.2-2D

**WESTINGHOUSE INTEGRATED
NOZZLE PICTURE OF WIN TOP
NOZZLE**

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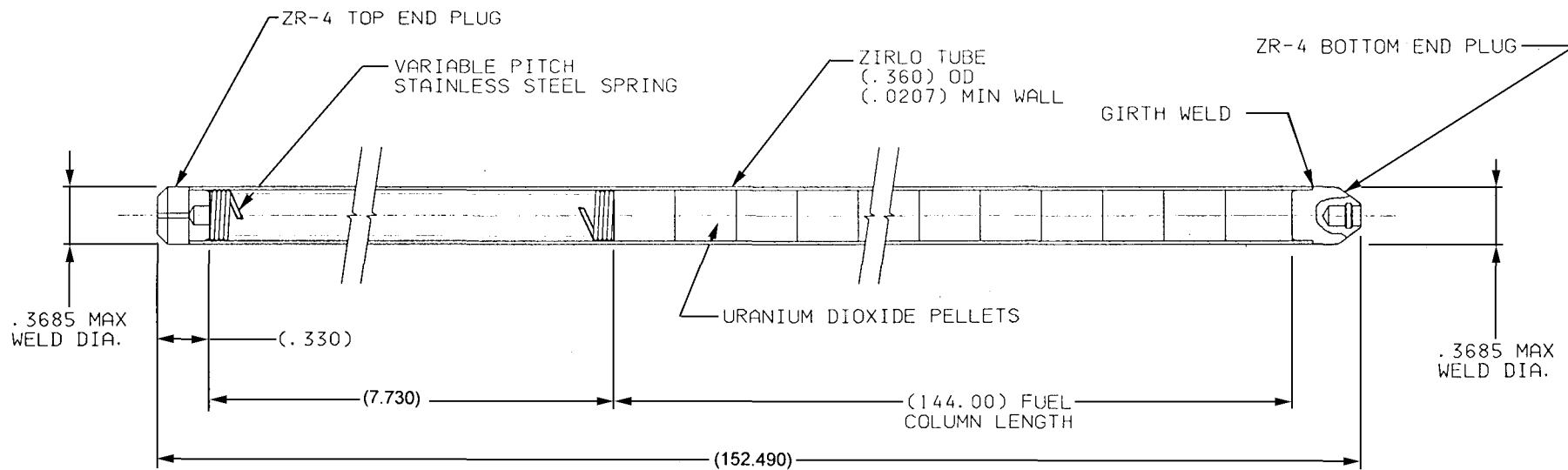
17x17 VANTAGE 5 UPDATE FUEL ROD ASSEMBLY

SPECIFIC DIMENSIONS DEPEND ON DESIGN VARIABLE SUCH AS PREPRESSURIZATION, POWER HISTORY, AND DISCHARGE BURNUP (SEE ALSO FIGURES 4.2-3B AND 4.2-3C)

DIMENSIONS ARE IN INCHES (NOMINAL)

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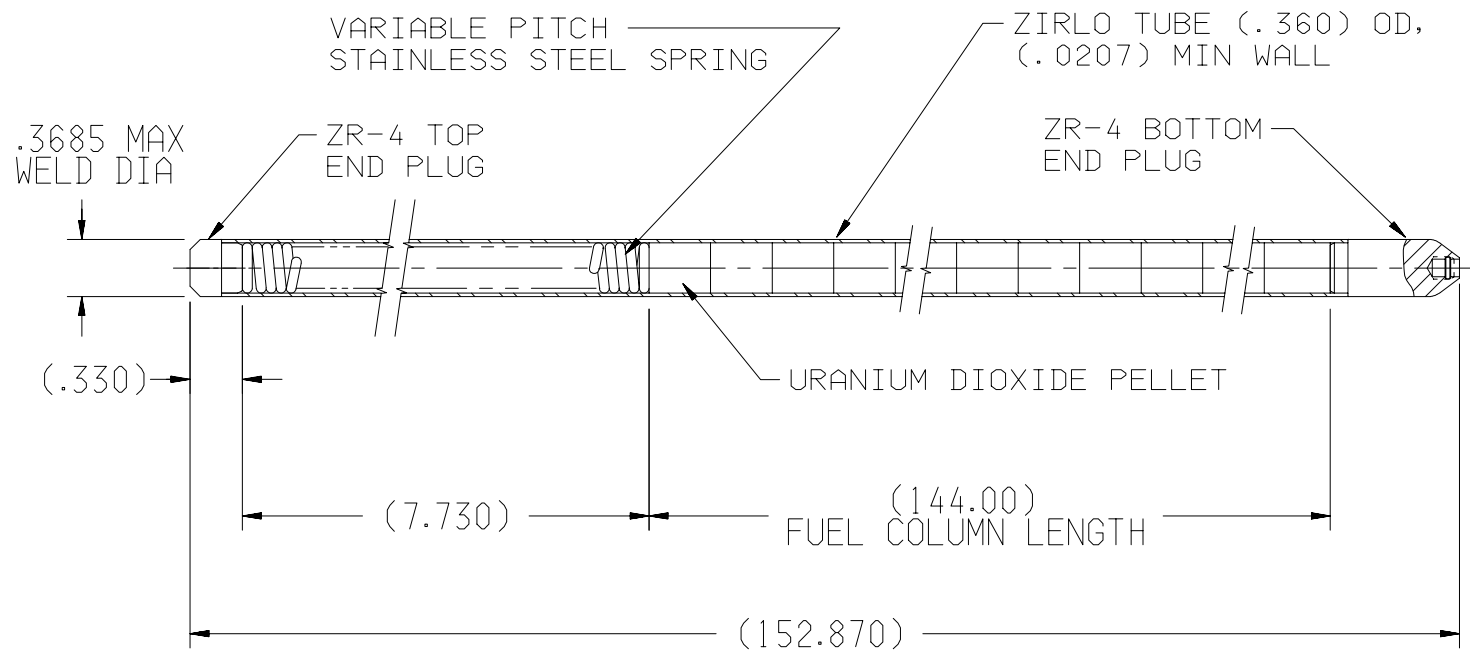
CALLAWAY PLANT
FUEL ROD SCHEMATIC
FIGURE 4.2-3



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CALLAWAY PLANT

17X17 VANTAGE +
 FUEL ROD
 ZIRLO™
 FIGURE 4.2-3A

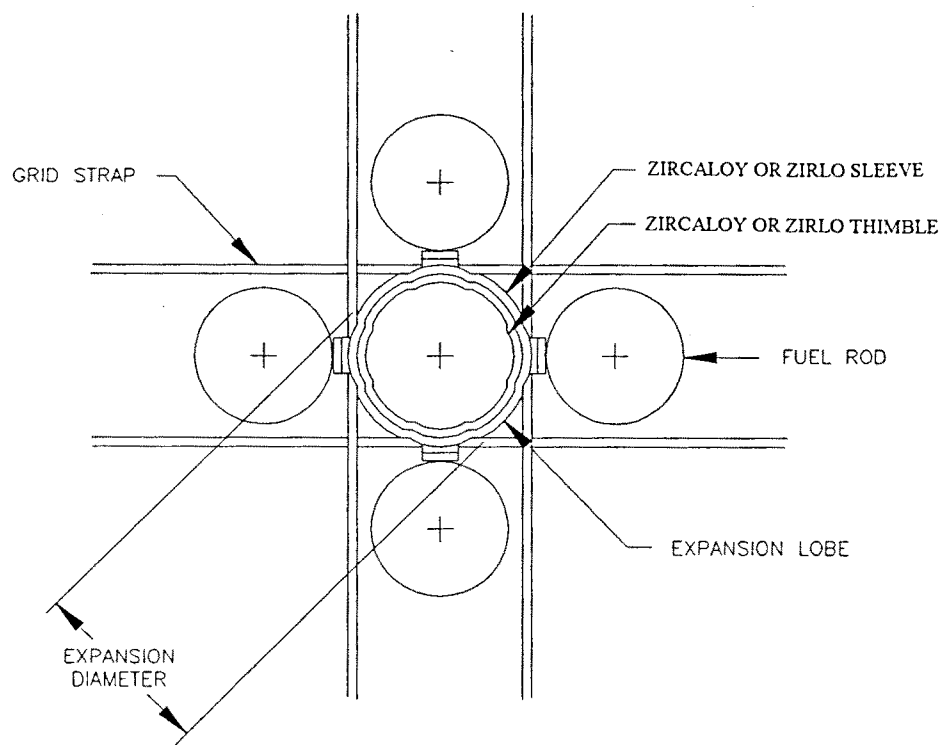


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CALLAWAY PLANT

**17X17 PERFORMANCE+
FUEL ASSEMBLY**

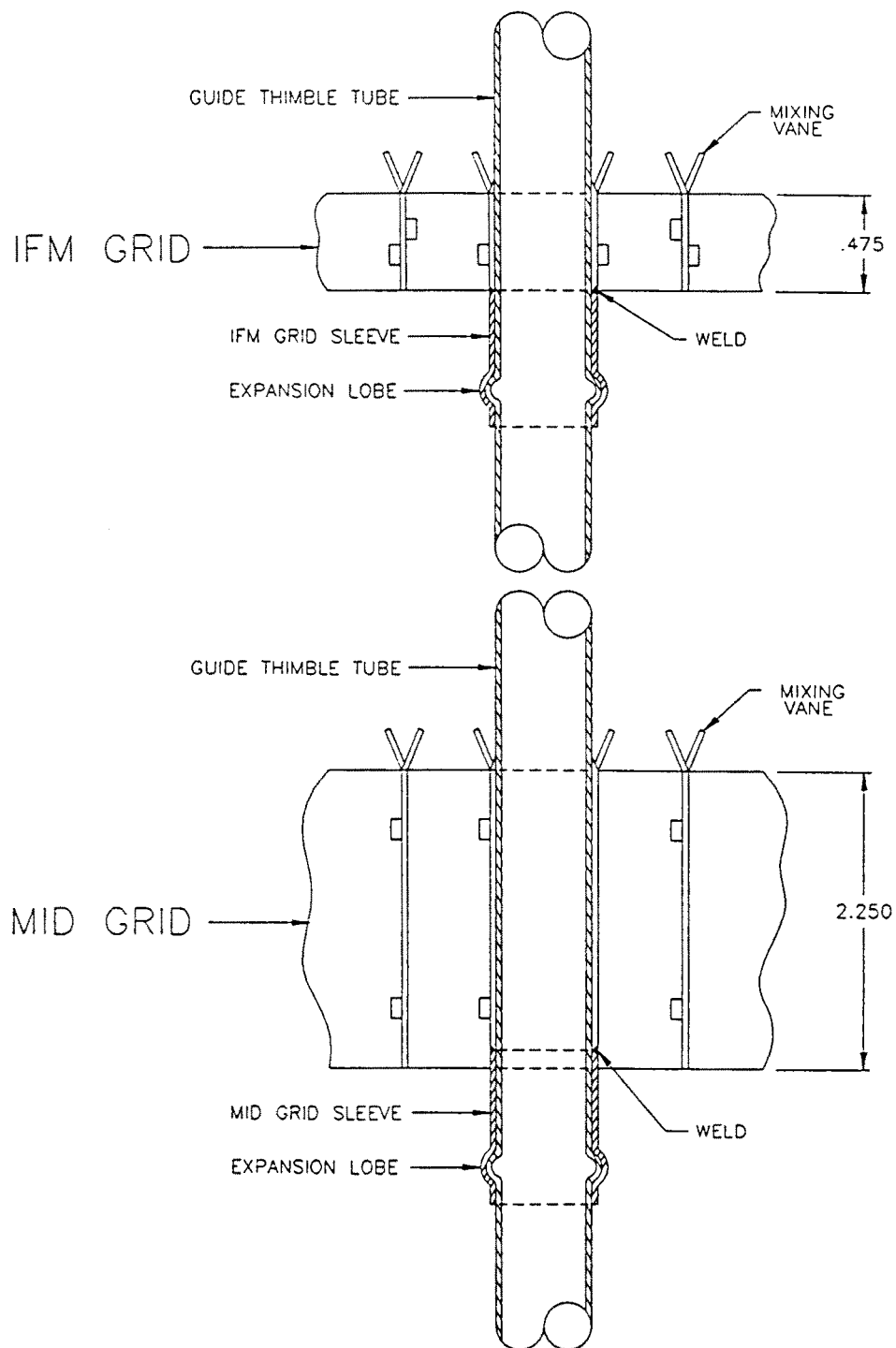
FIGURE 4.2-3B



IFM AND MID GRID EXPANSION JOINT DESIGN

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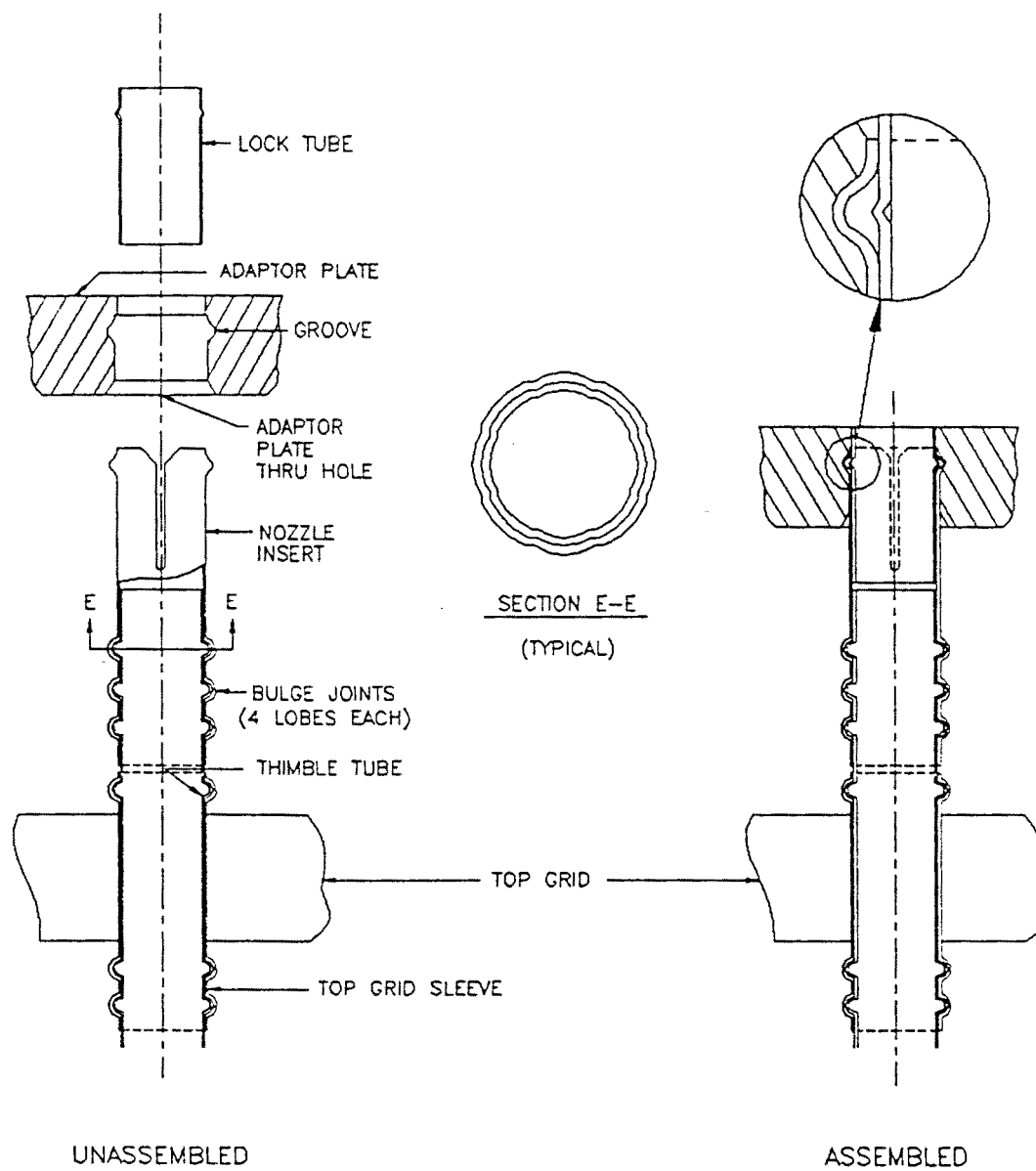
CALLAWAY PLANT
PLAN VIEW
FIGURE 4.2-4



DIMENSIONS ARE IN INCHES (NOMINAL)

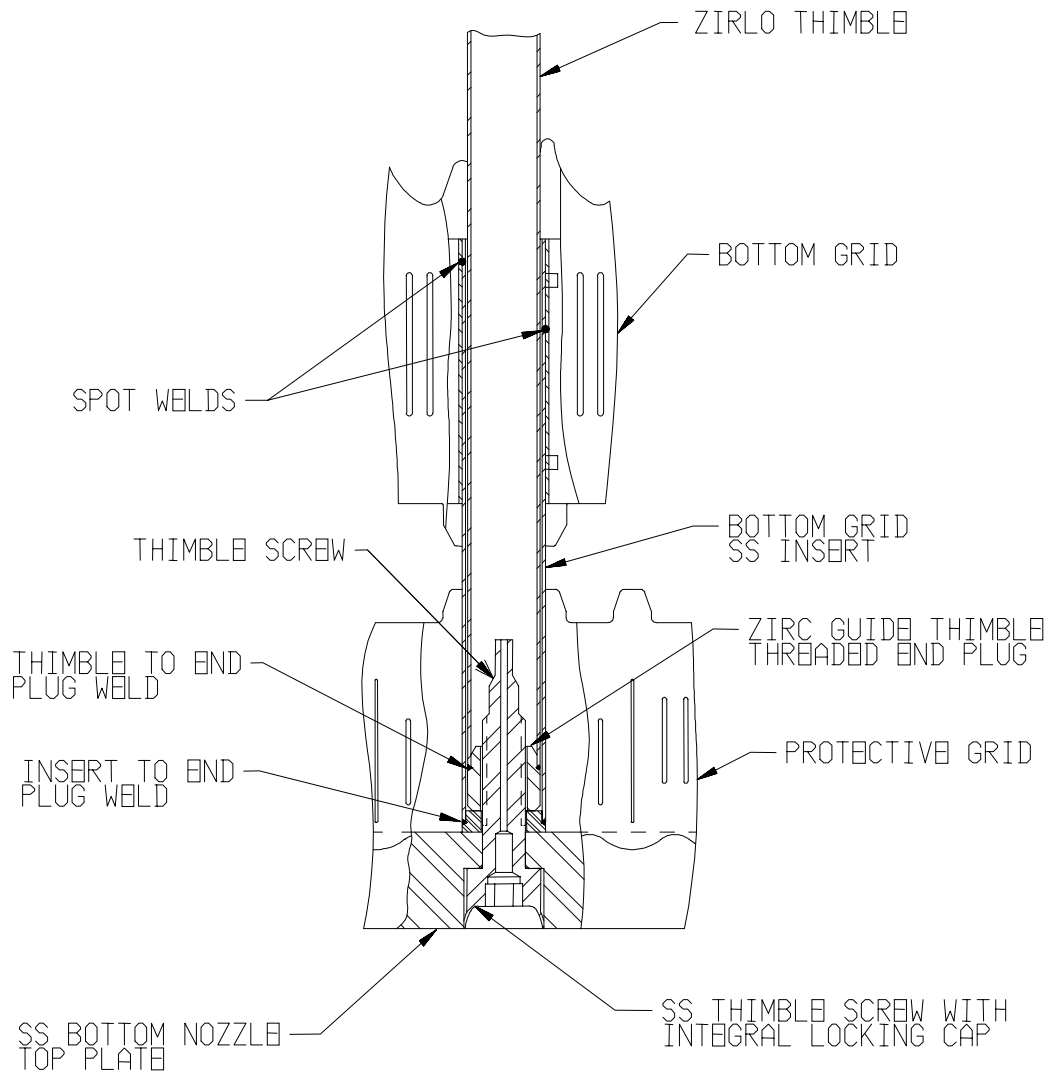
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CALLAWAY PLANT
GRID TO THIMBLE ATTACHMENT JOINTS
FIGURE 4.2-5



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CALLAWAY PLANT
THIMBLE/INSERT/TOP GRID SLEEVE
BULGE JOINT GEOMETRY
FIGURE 4.2-6

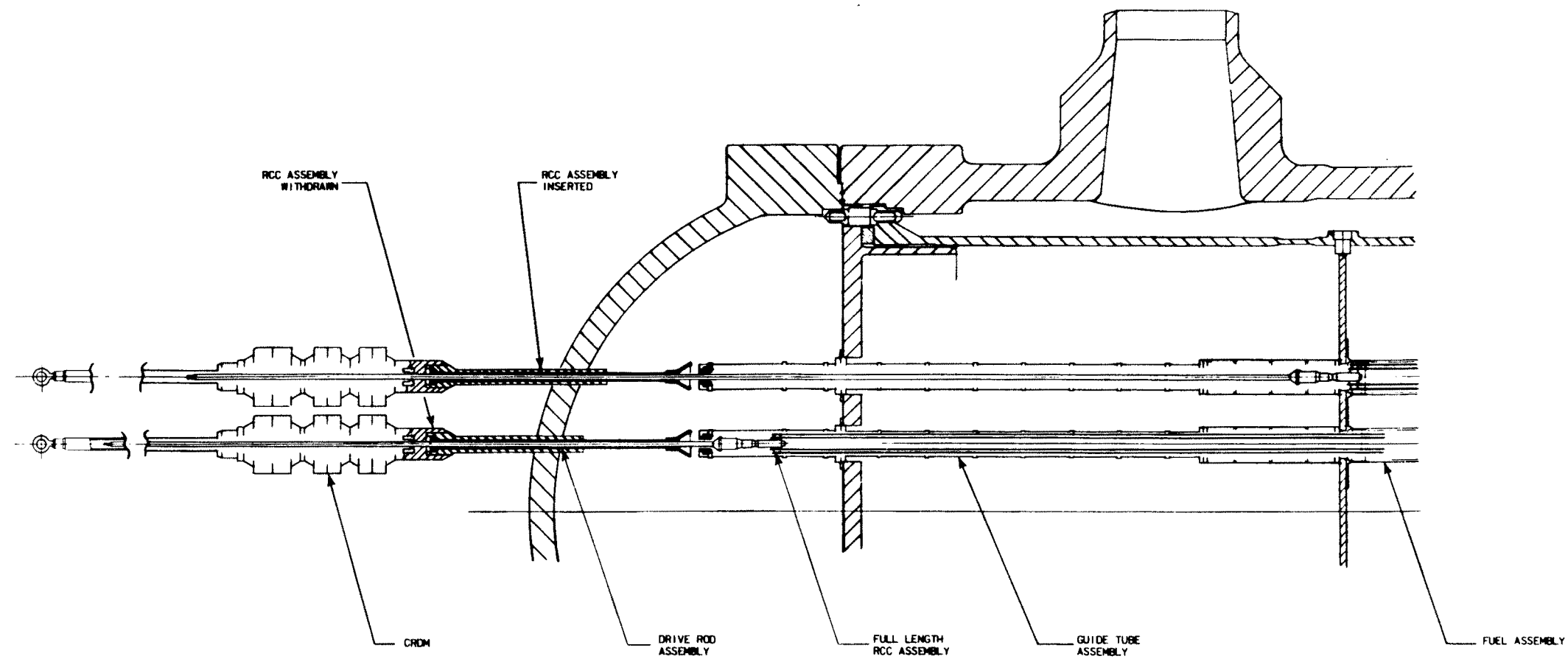


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CALLAWAY PLANT

**GUIDE THIMBLE TO
BOTTOM NOZZLE JOINT**

FIGURE 4.2-7

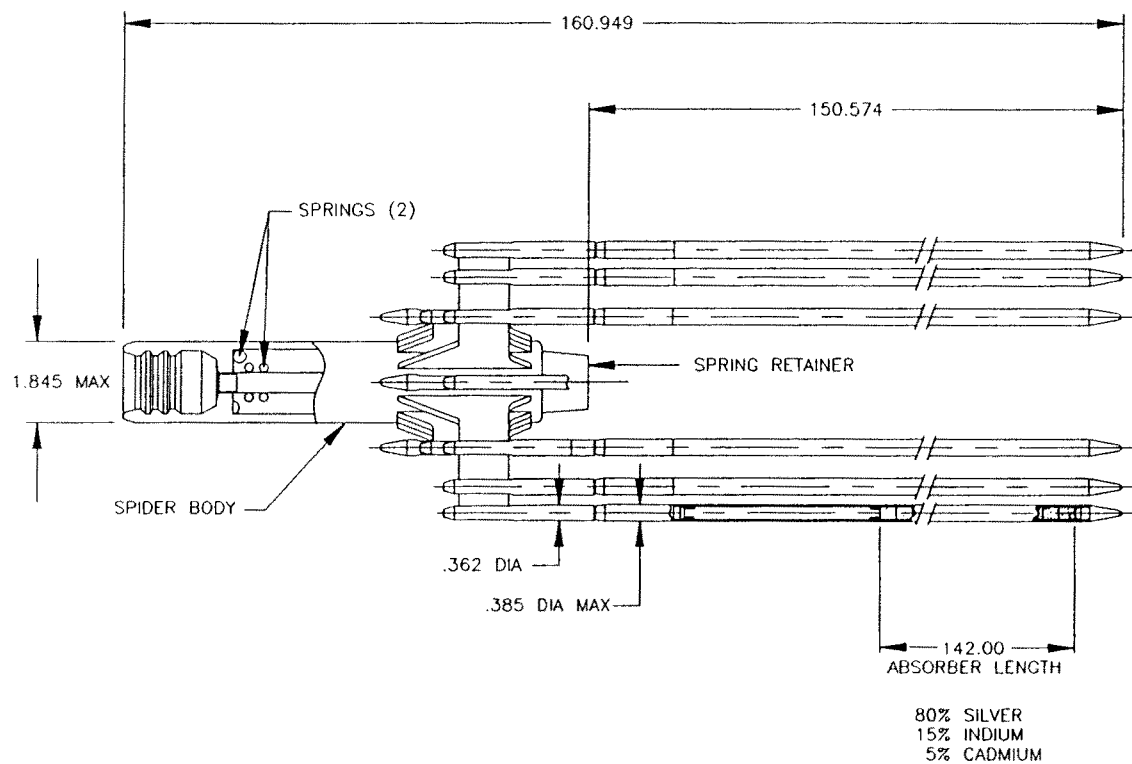
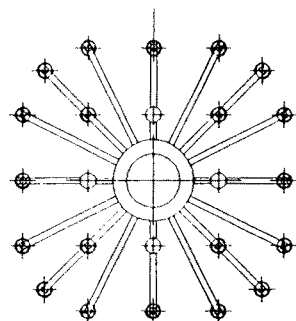


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FIGURE 4.2-8

ROD CLUSTER
CONTROL AND DRIVE ROD ASSEMBLY
WITH INTERFACING COMPONENTS

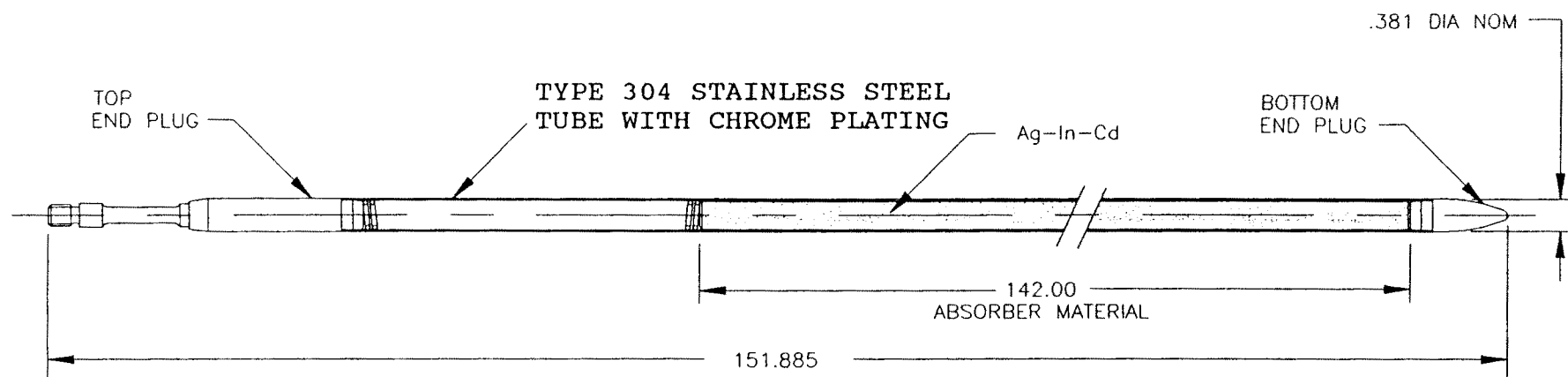


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CALLAWAY PLANT

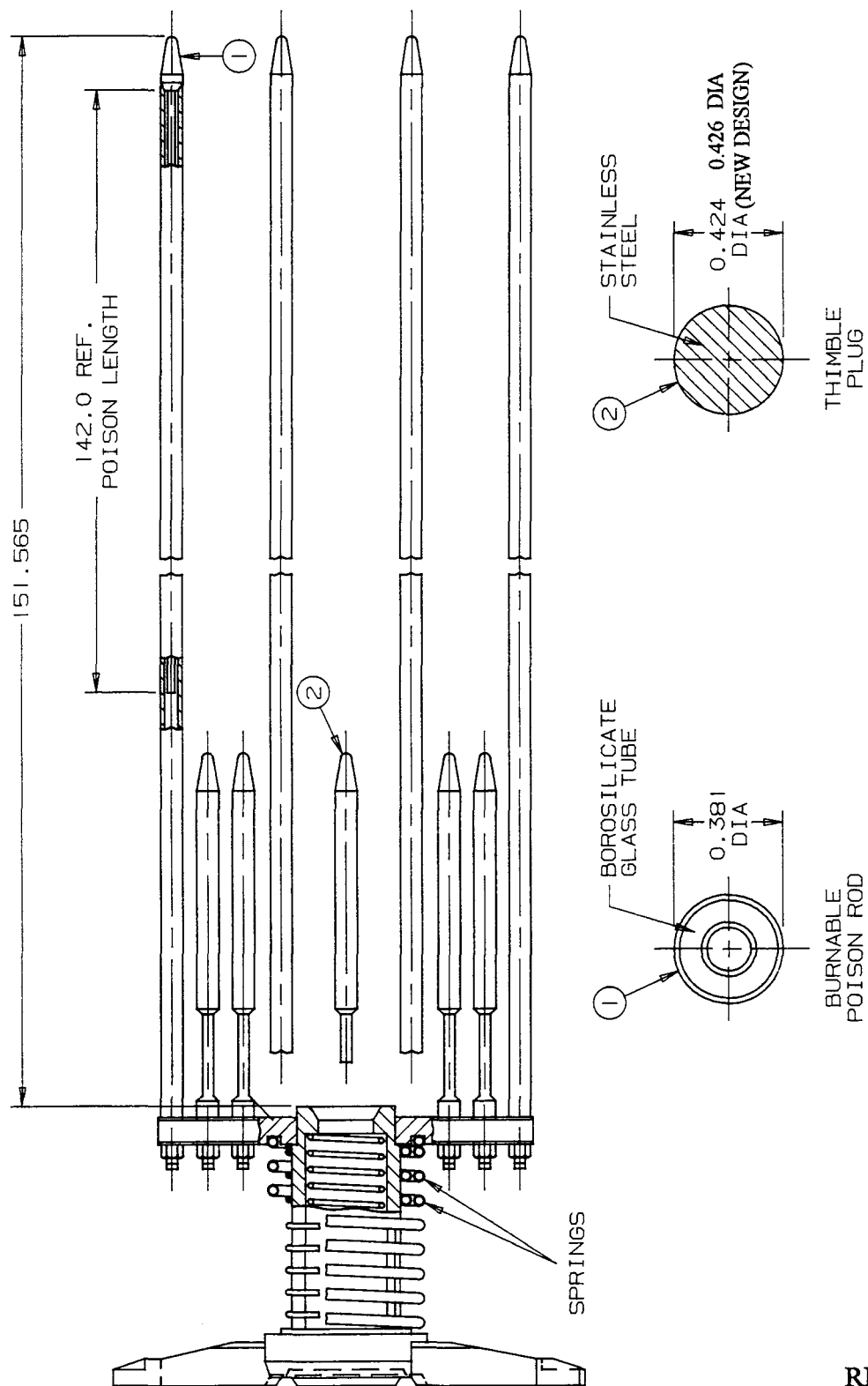
FULL-LENGTH RCCA OUTLINE

FIGURE 4.2-9



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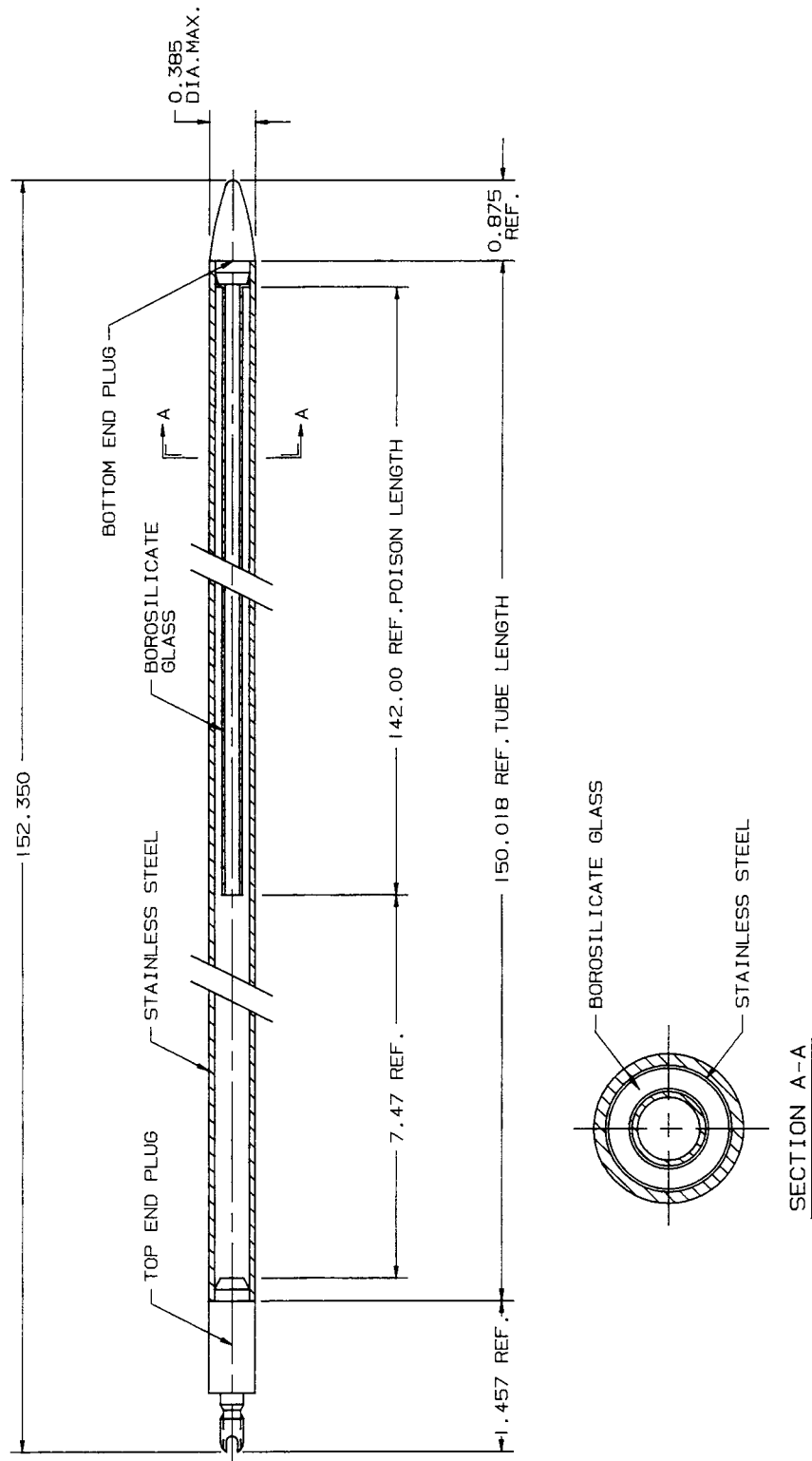
CALLAWAY PLANT
ABSORBER ROD
FIGURE 4.2-10



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CALLAWAY PLANT

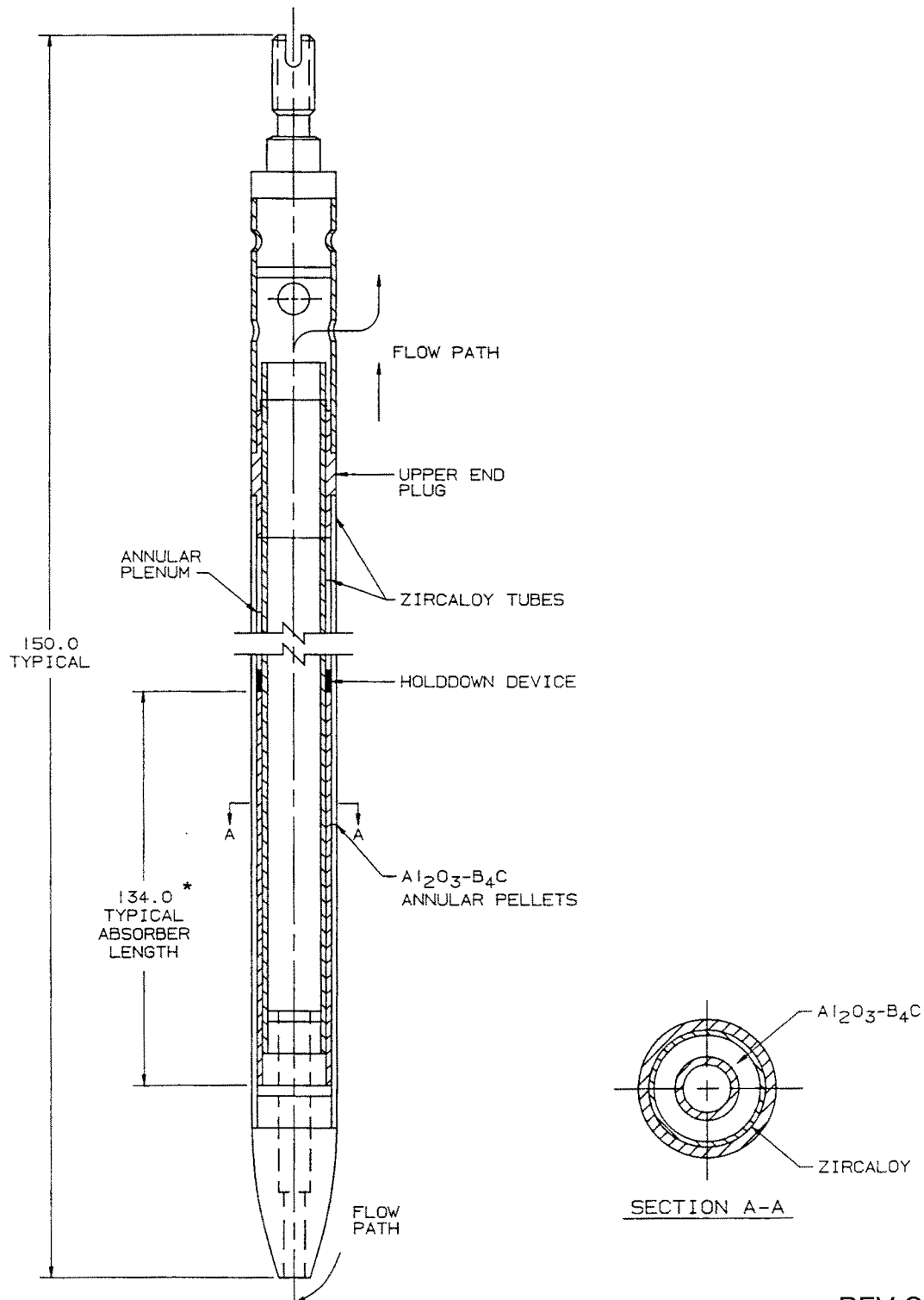
FIGURE 4.2-11
BURNABLE ABSORBER
ASSEMBLY 17X17



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FIGURE 4.2-12
BURNABLE ABSORBER ROD
CROSS SECTION
17X17



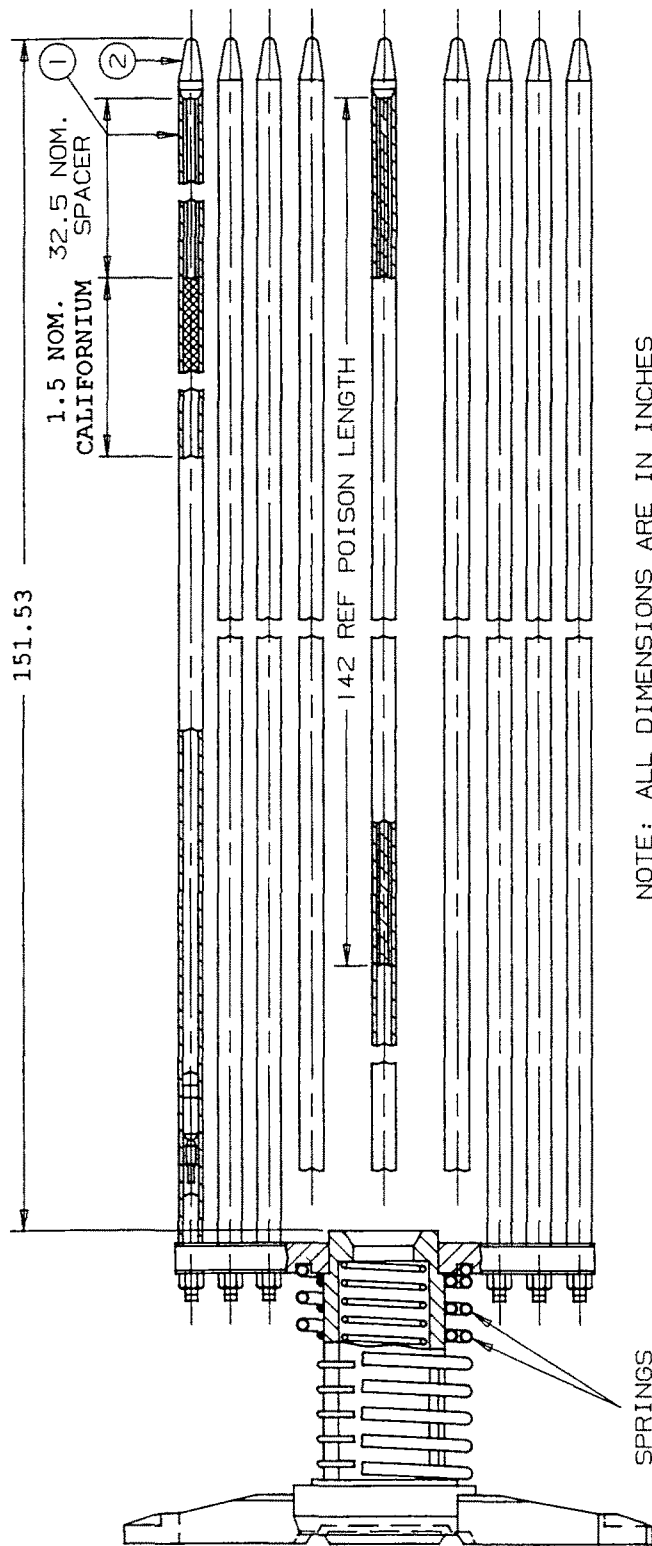
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Note: See Figure 4.2-15A
for new spring design.

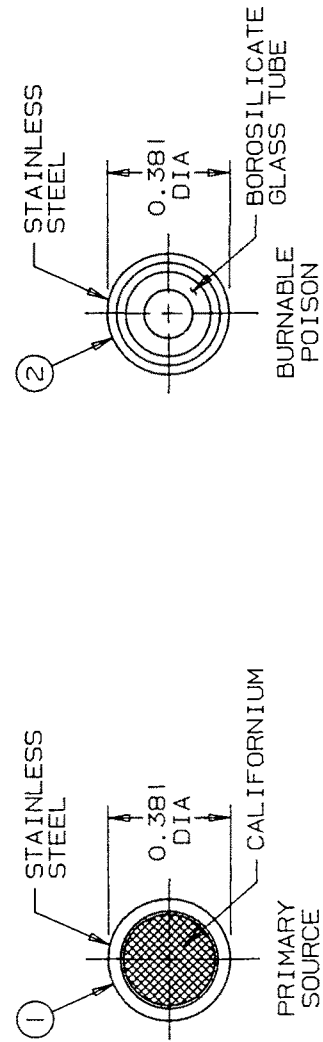
* 132.0 inches in Current
feed assemblies

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FIGURE 4.2-12a
BURNABLE ABSORBER ROD
CROSS-SECTION (ALUMINUM OXIDE
BORON CARBIDE ABSORBER)



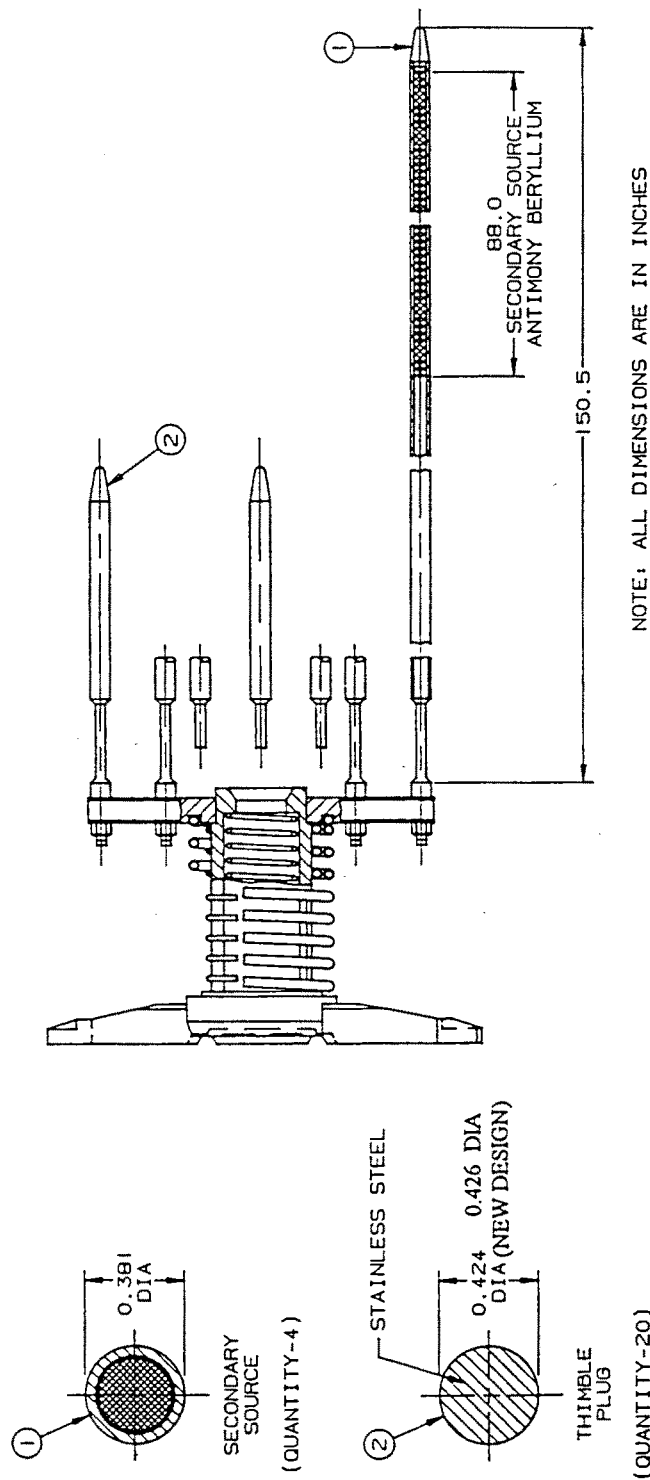
NOTE: ALL DIMENSIONS ARE IN INCHES



NOTE: See Figure 4.2-15A
for new spring design

CALLAWAY PLANT

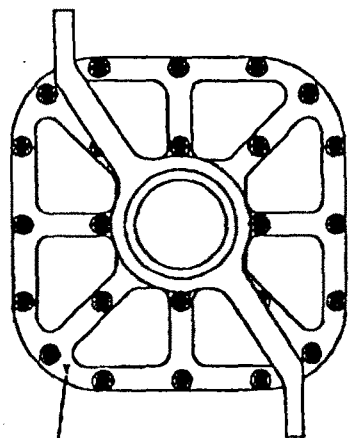
FIGURE 4.2-13
PRIMARY SOURCE ASSEMBLY
17X17



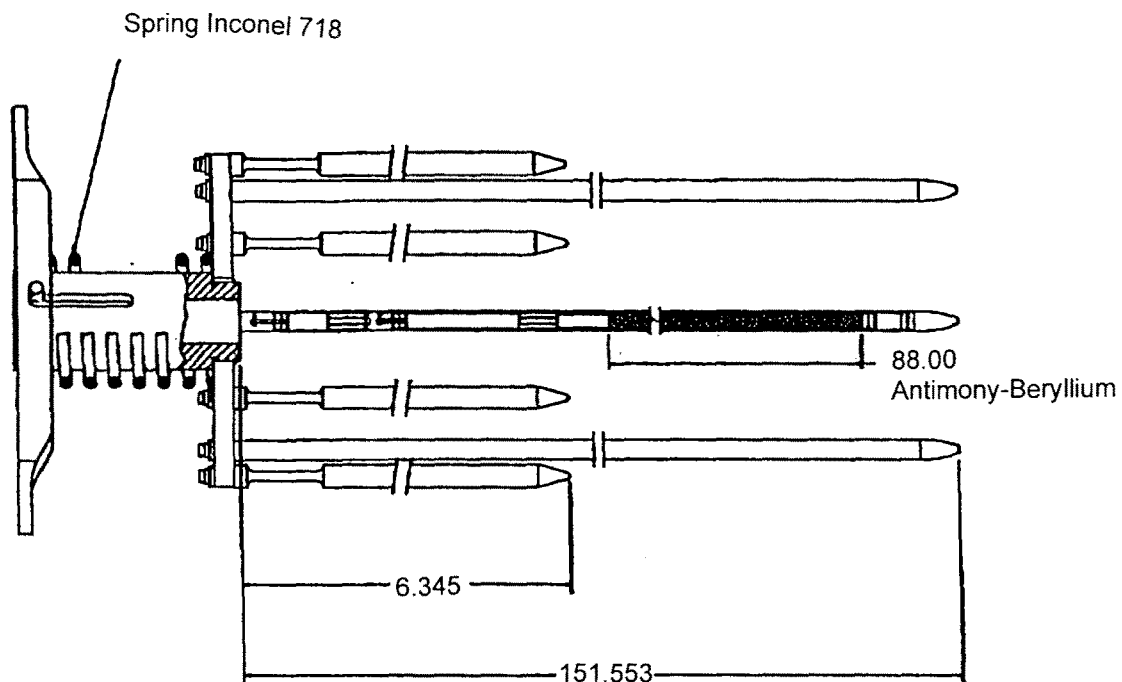
REV. OL-7
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NOTE: See Figure 4.2-15A
for new spring design

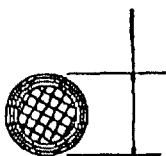
CALLAWAY PLANT
<p>FIGURE 4.2-14 SECONDARY SOURCE ASSEMBLY 17X17</p>



"Y" Corner Orientation



(0.381 Diameter Nominal)
(0.385 Max at End Plug Weld)



DOUBLE ENCAPSULATED
SECONDARY SOURCE ROD

(0.426 Dia)

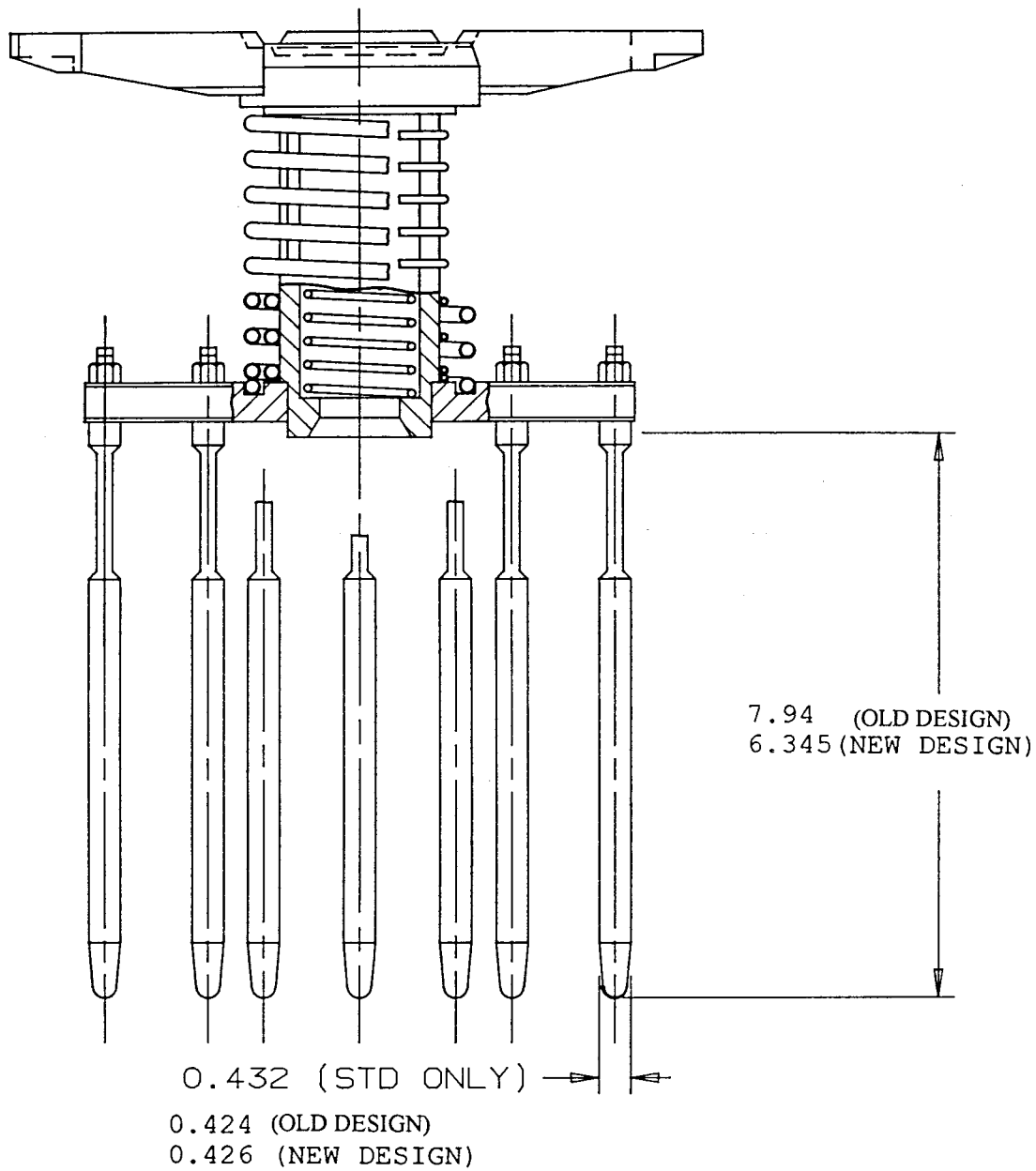


THIMBLE PLUG

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FIGURE 4.2-14A
ENCAPSULATED SECONDARY
SOURCE ASSEMBLY 17X17



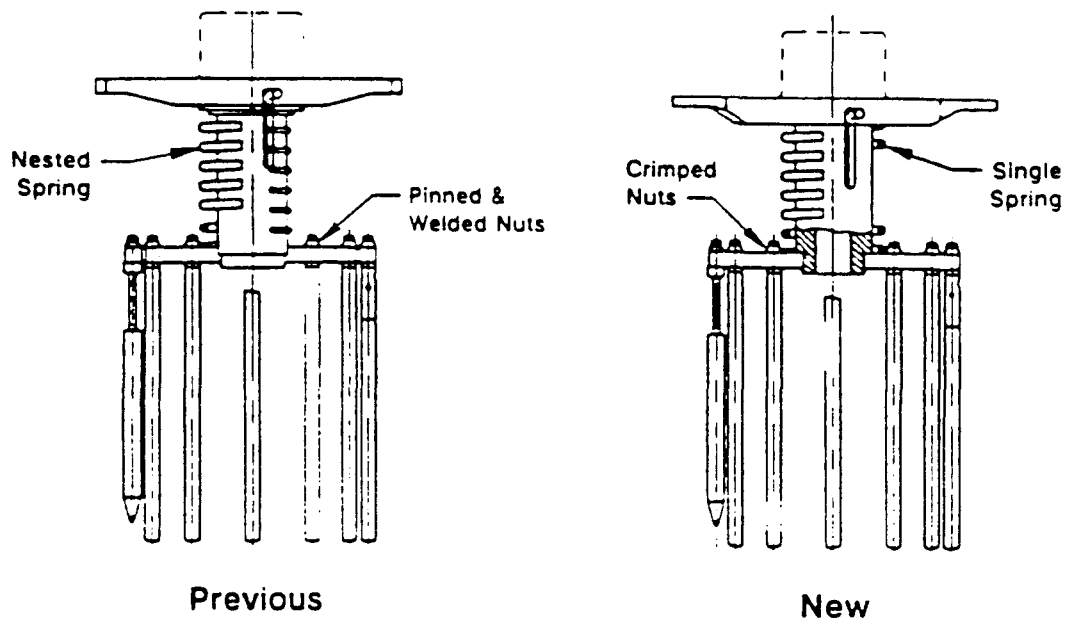
NOTE: See Figure 4.2-15A
for new spring design

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FIGURE 4.2-15
THIMBLE PLUG ASSEMBLY

17 X 17



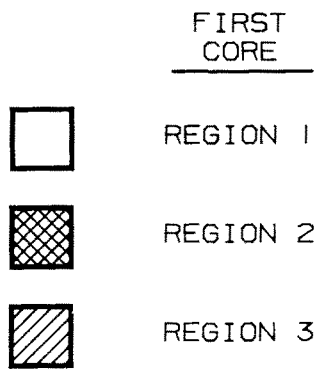
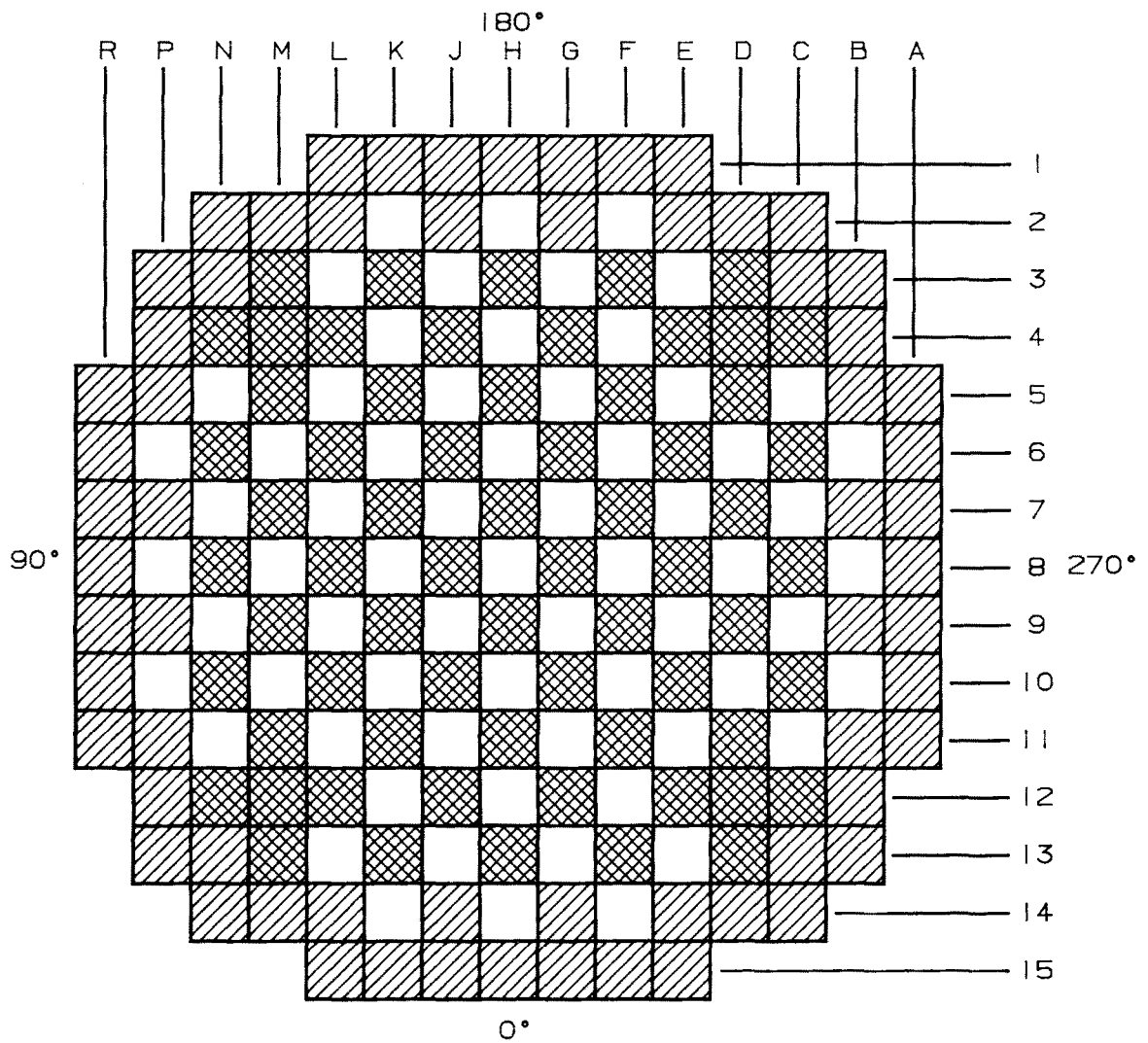
Holddown Assembly Updates - 17 x 17

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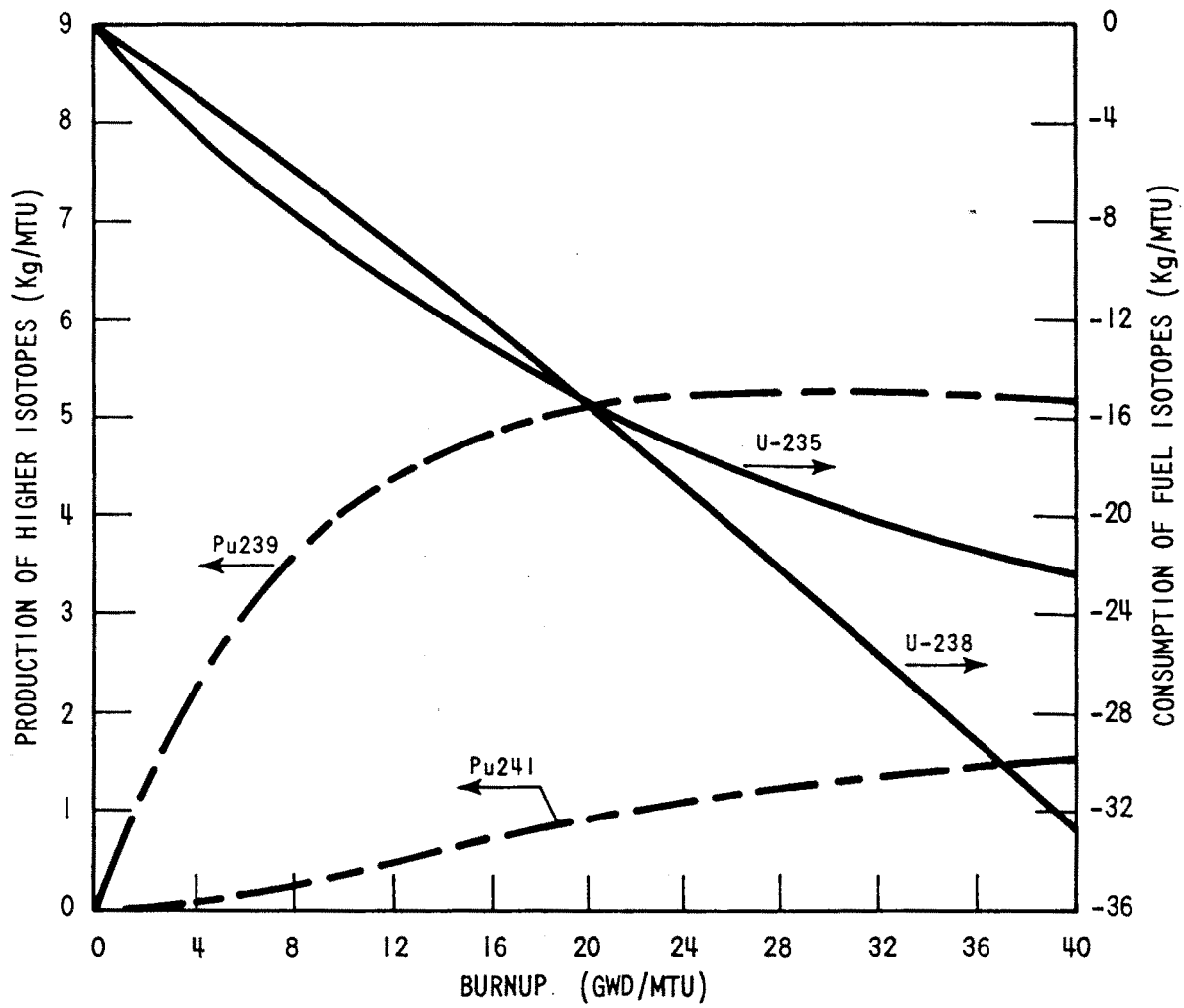
MODIFIED SPRING DESIGN

FIGURE 4.2-15A



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CALLAWAY PLANT
FIGURE 4.3-1 FUEL LOADING ARRANGEMENT

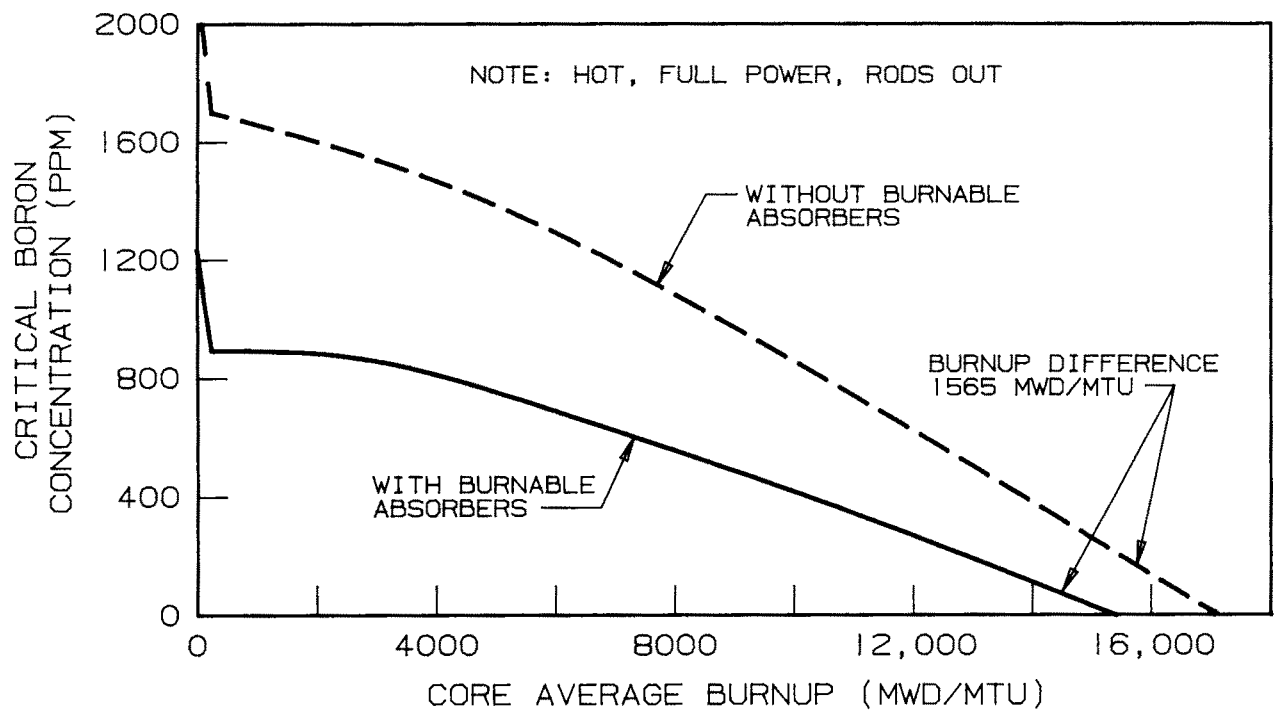


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FIGURE 4.3-2

PRODUCTION AND CONSUMPTION OF
HIGHER ISOTOPES

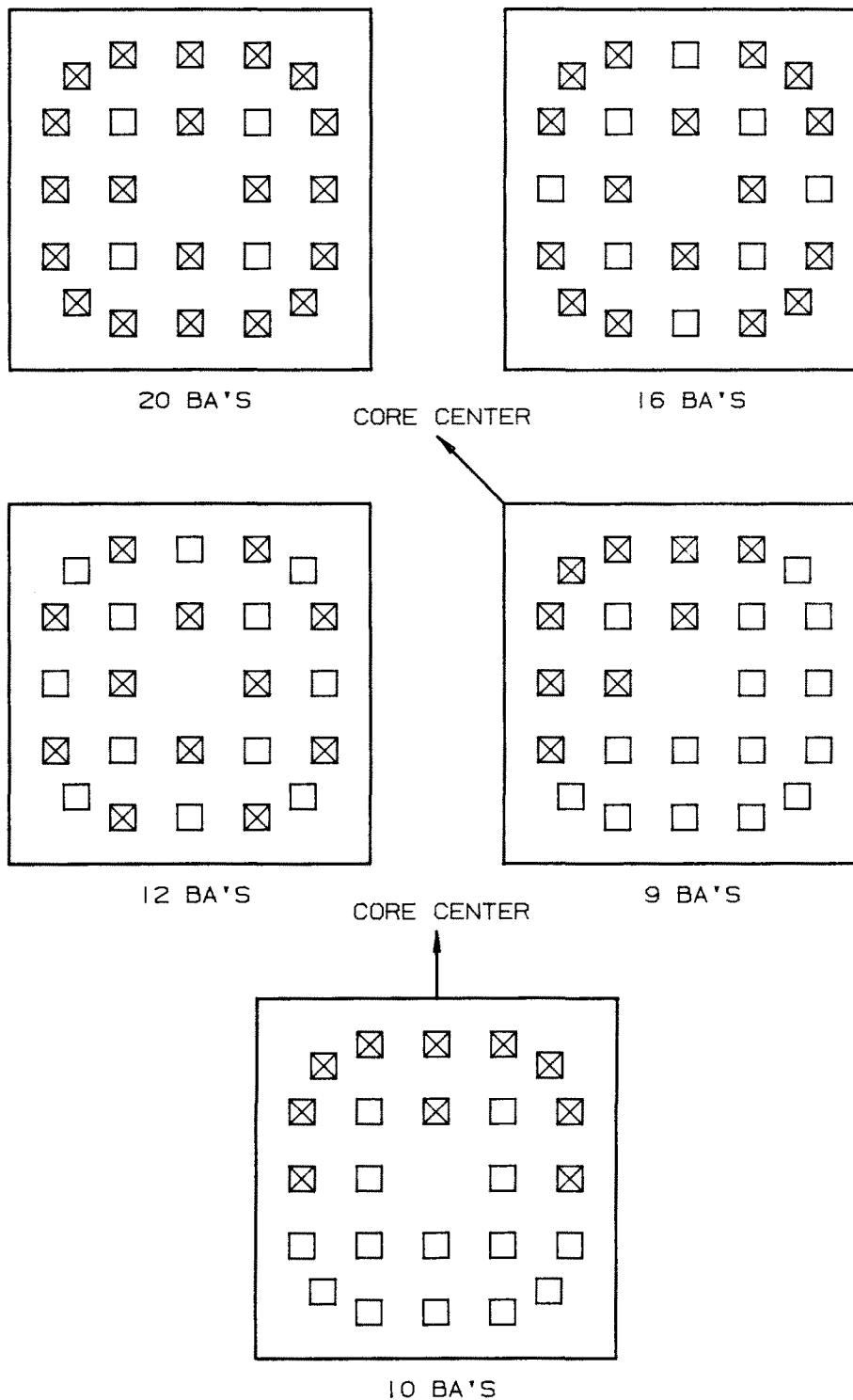


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FIGURE 4.3.3A
BORON CONCENTRATION VERSUS FIRST
CYCLE BURNUP WITH AND WITHOUT
BURNABLE ABSORBER RODS

Figure 4.3-3B Deleted.

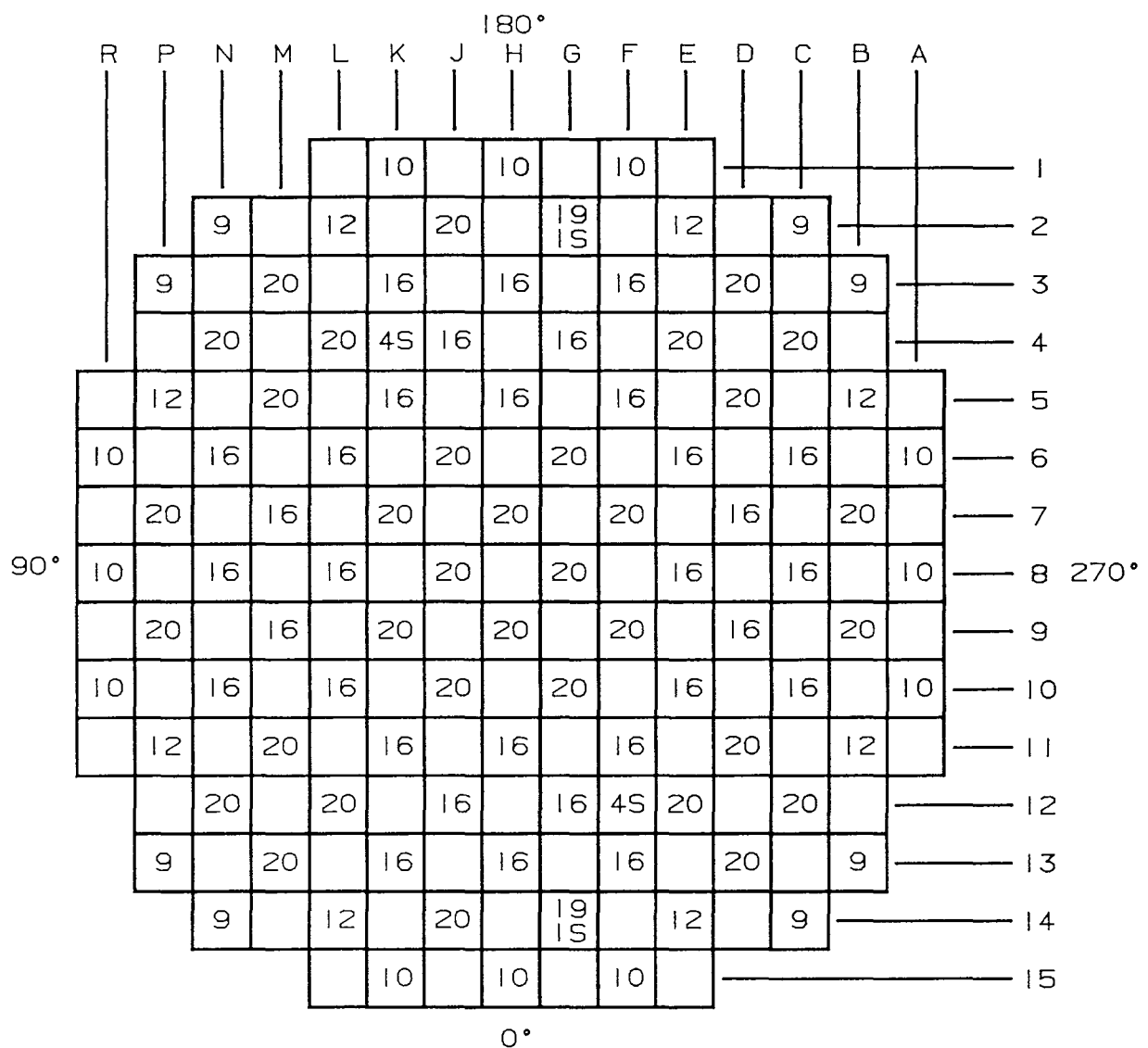


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FIGURE 4.3-4A
BURNABLE ABSORBER ROD
ARRANGEMENT WITHIN AN ASSEMBLY

Figure 4.3-4B Deleted.



NUMBER INDICATES NUMBER OF BURNABLE ABSORBER RODS

1S INDICATES PRIMARY SOURCE ROD

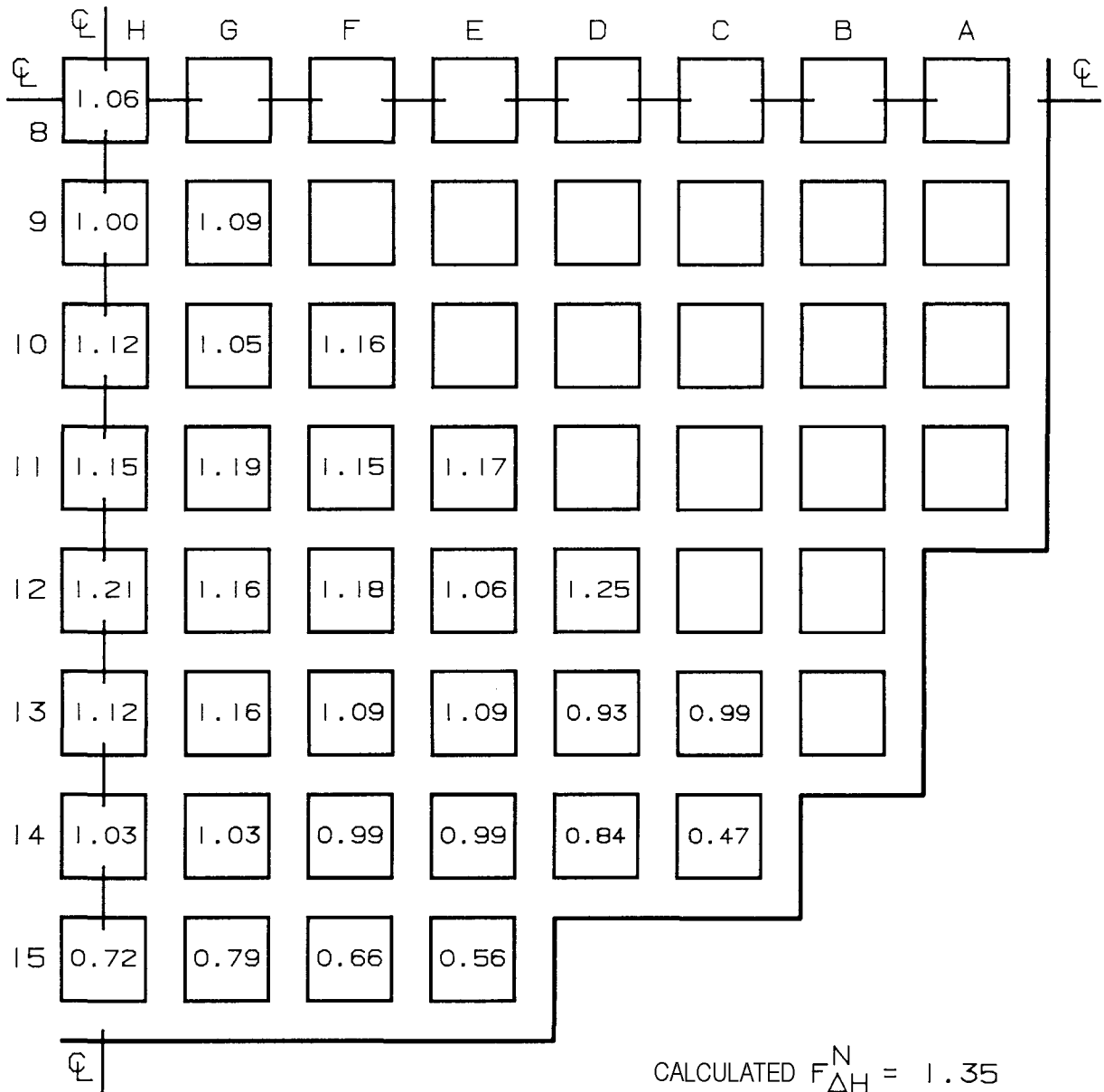
4S INDICATES FOUR SECONDARY SOURCE RODS

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FIGURE 4.3-5 A
TYPICAL BURNABLE ABSORBER LOADING
PATTERN (CYCLE 1)

Figure 4.3-5B Deleted.



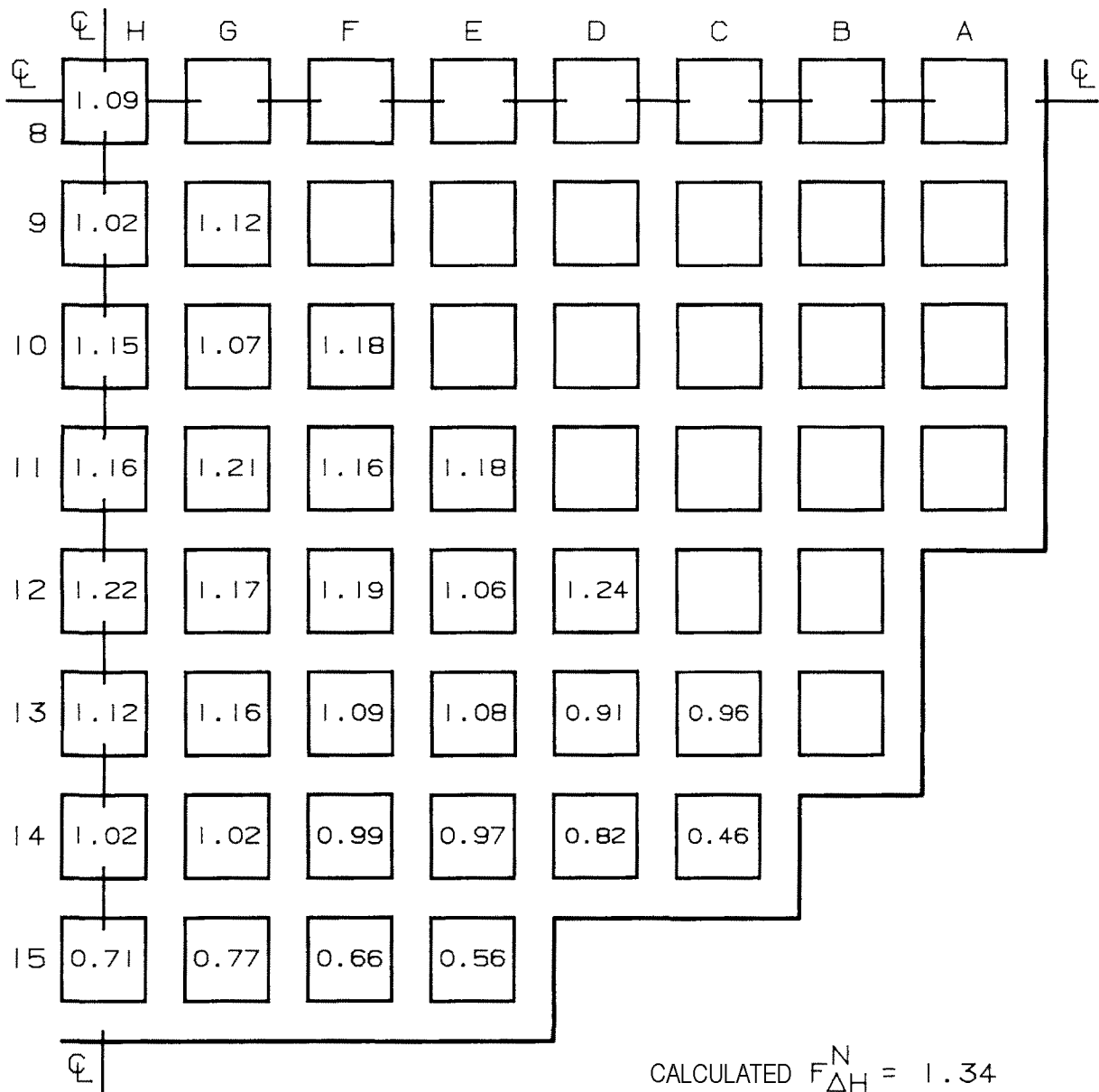
KEY: VALUE REPRESENTS ASSEMBLY
RELATIVE POWER

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FIGURE 4.3-6 A
TYPICAL NORMALIZED POWER DENSITY
DISTRIBUTION NEAR BEGINNING-OF-LIFE,
UNRODDED CORE, HOT FULL POWER, NO XENON
(CYCLE 1)

Figure 4.3-6B Deleted.



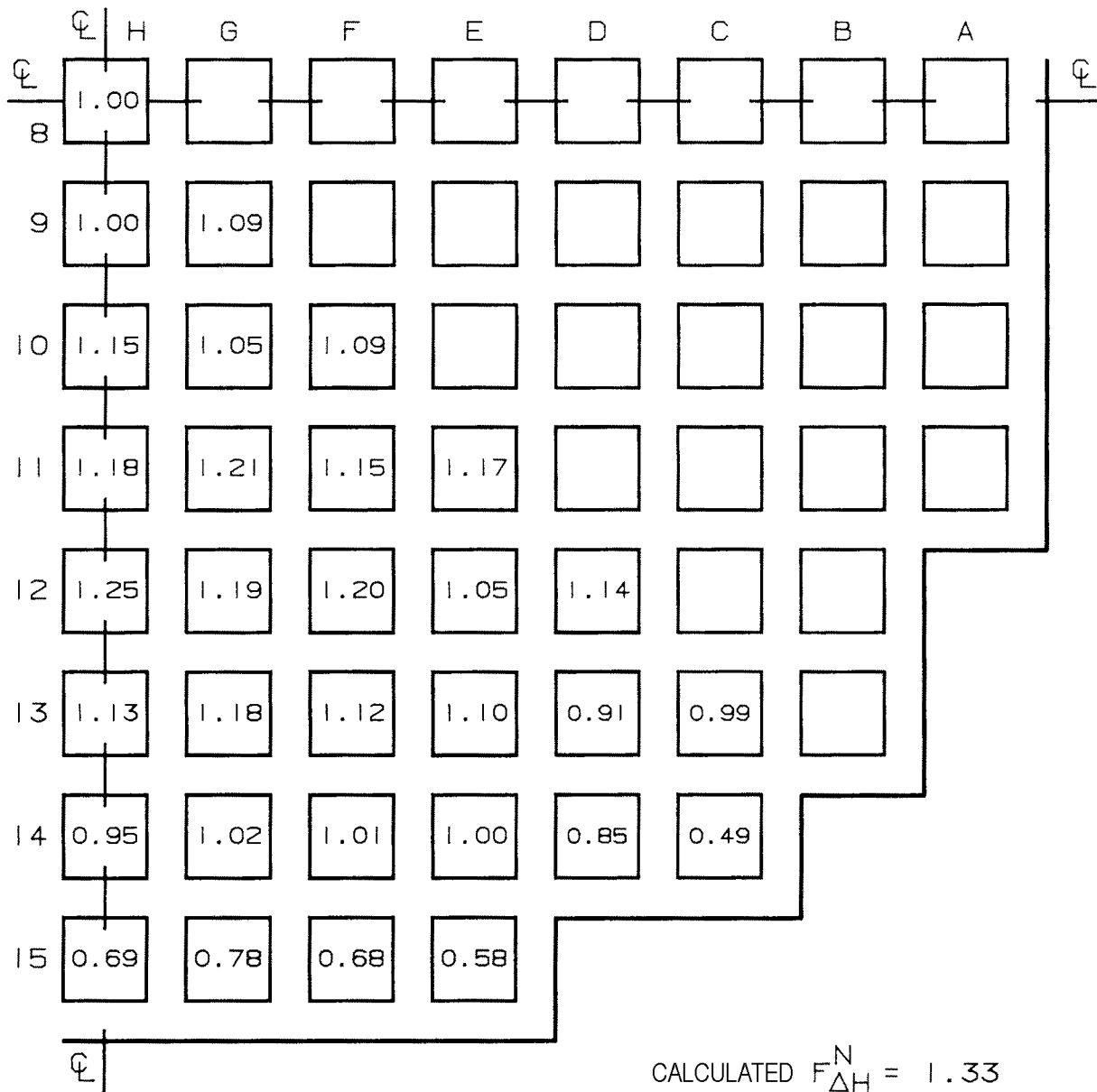
KEY: VALUE REPRESENTS ASSEMBLY
RELATIVE POWER

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FIGURE 4.3-7 A
TYPICAL NORMALIZED POWER DENSITY DISTRIBUTION
NEAR BEGINNING-OF-LIFE, UNRODDED CORE, HOT
FULL POWER, EQUILIBRIUM XENON
(CYCLE 1)

Figure 4.3-7B Deleted.



KEY: VALUE REPRESENTS ASSEMBLY
RELATIVE POWER

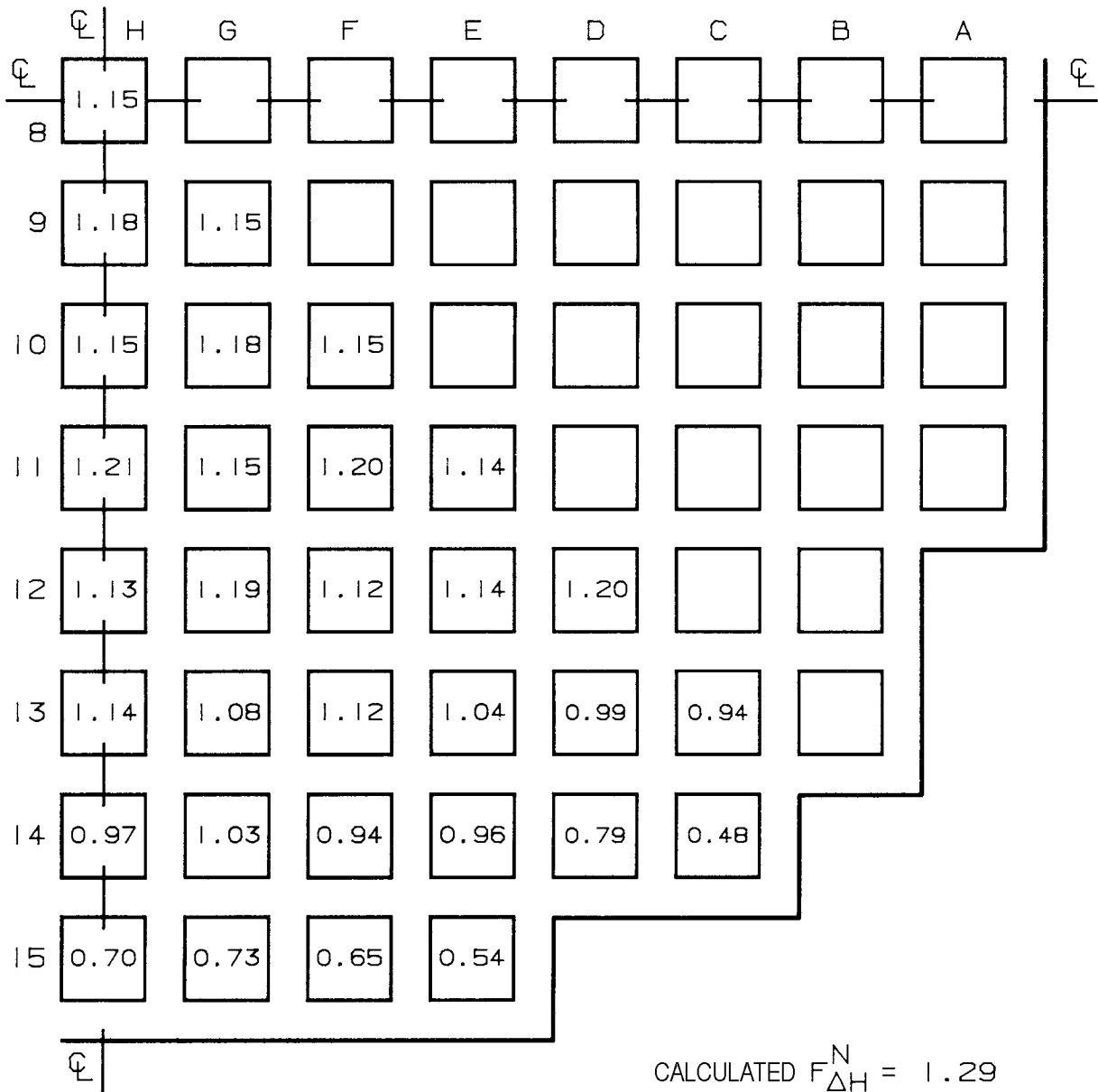
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FIGURE 4.3-8 A

TYPICAL NORMALIZED POWER DENSITY DISTRIBUTION
NEAR BEGINNING-OF-LIFE, GROUP D AT 28 PERCENT
INSERTED, HOT FULL POWER, EQUILIBRIUM XENON
(CYCLE 1)

Figure 4.3-8B Deleted.



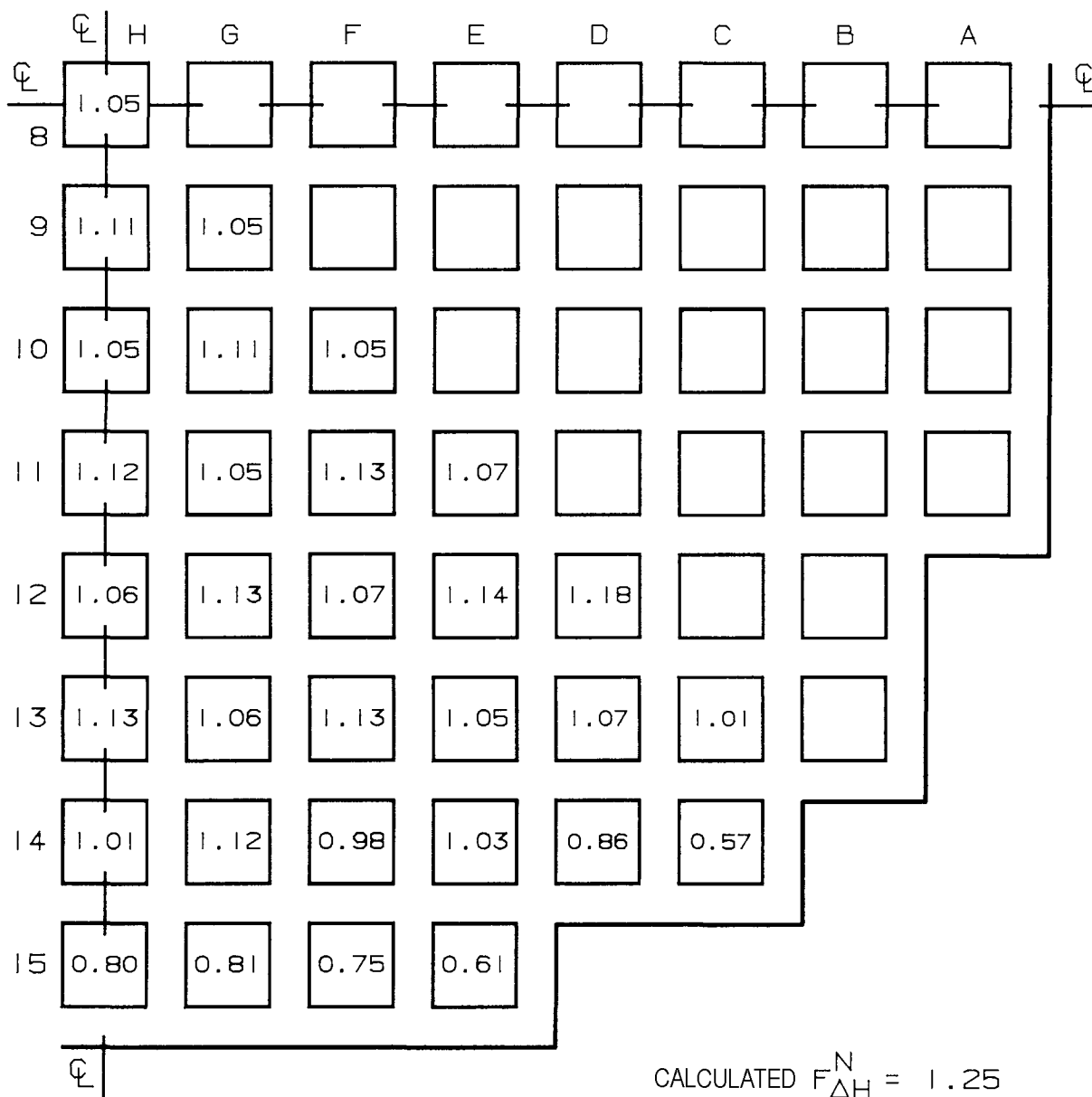
KEY: VALUE REPRESENTS ASSEMBLY
RELATIVE POWER

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FIGURE 4.3-9A
TYPICAL NORMALIZED POWER DENSITY DISTRIBUTION
NEAR MIDDLE-OF-LIFE, UNRODDED CORE, HOT FULL
POWER, EQUILIBRIUM XENON
(CYCLE 1)

Figure 4.3-9B Deleted.



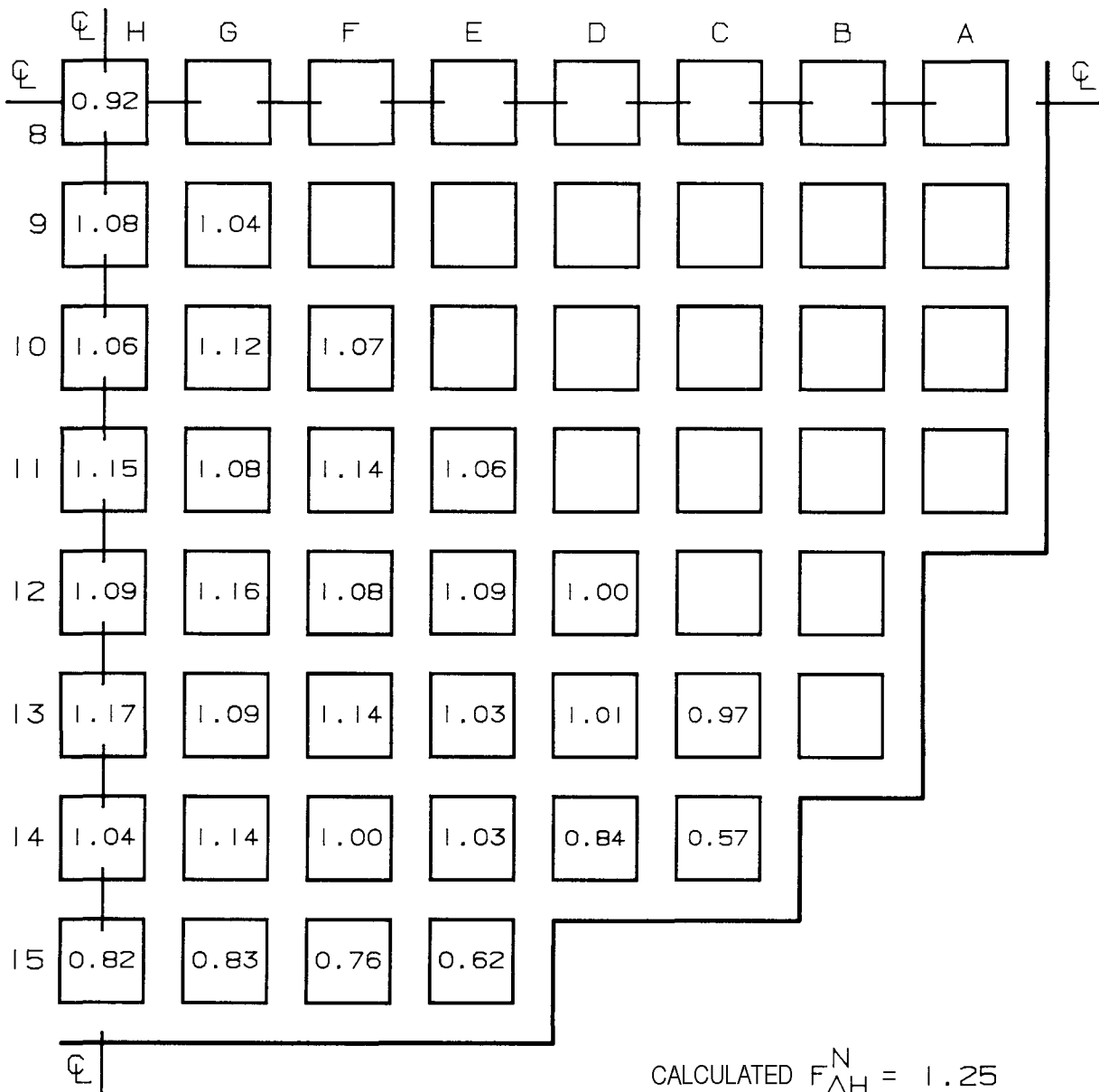
KEY: VALUE REPRESENTS ASSEMBLY
RELATIVE POWER

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FIGURE 4.3-10A
TYPICAL NORMALIZED POWER DENSITY DISTRIBUTION
NEAR END-OF-LIFE, UNRODDED CORE, HOT FULL
POWER, EQUILIBRIUM XENON
(CYCLE 1)

Figure 4.3-10B Deleted.



KEY: VALUE REPRESENTS ASSEMBLY
RELATIVE POWER

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FIGURE 4.3-11 A
TYPICAL NORMALIZED POWER DENSITY DISTRIBUTION
NEAR END-OF-LIFE, GROUP D 28 PERCENT INSERTED,
HOT FULL POWER, EQUILIBRIUM XENON
(CYCLE 1)

Figure 4.3-11B Deleted.

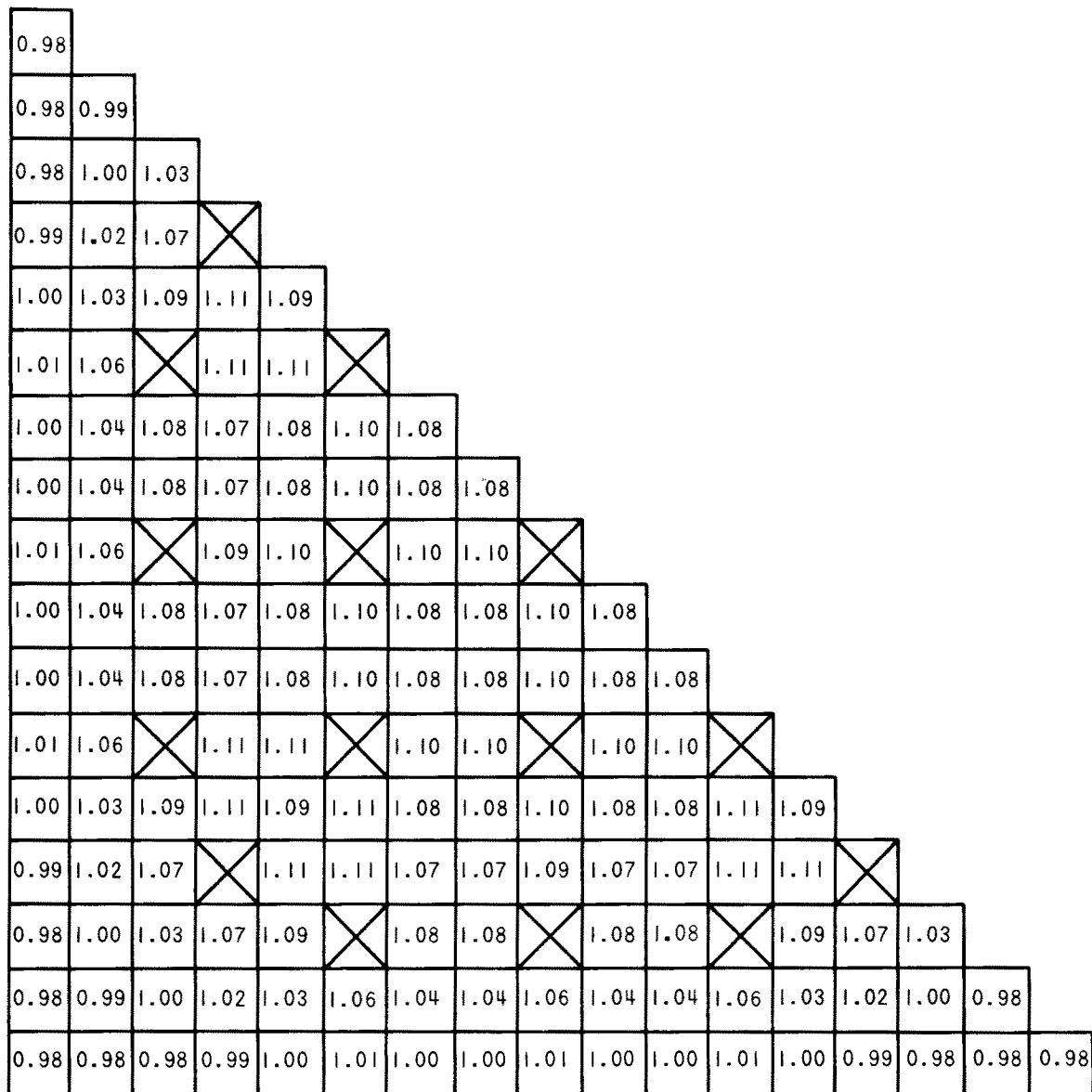
1.02																	
1.02	1.03																
1.02	1.05	1.08															
1.02	1.06	1.12	X														
1.03	1.08	1.14	1.17	1.16													
1.03	1.10	X	1.17	1.18	X												
1.03	1.08	1.14	1.14	1.16	1.18	1.17											
1.03	1.08	1.14	1.14	1.16	1.19	1.17	1.17										
1.03	1.10	X	1.16	1.18	X	1.19	1.20	X									
1.03	1.09	1.14	1.14	1.16	1.19	1.17	1.17	1.20	1.18								
1.03	1.09	1.15	1.15	1.16	1.19	1.17	1.17	1.20	1.18	1.18							
1.04	1.11	X	1.18	1.18	X	1.19	1.19	X	1.20	1.20	X						
1.04	1.09	1.15	1.18	1.17	1.19	1.17	1.17	1.19	1.17	1.17	1.20	1.18					
1.04	1.08	1.14	X	1.18	1.18	1.16	1.16	1.18	1.16	1.16	1.19	1.19	X				
1.04	1.06	1.10	1.14	1.16	X	1.16	1.16	X	1.16	1.16	X	1.17	1.15	1.11			
1.04	1.05	1.07	1.08	1.10	1.12	1.10	1.10	1.12	1.10	1.11	1.12	1.11	1.09	1.08	1.07		
1.04	1.04	1.04	1.04	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.06	1.06	1.06	1.06	1.06	1.06	

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FIGURE 4.3-12

RODWISE POWER DISTRIBUTION IN A
TYPICAL ASSEMBLY NEAR BEGINNING-
OF-LIFE, HOT FULL POWER,
EQUILIBRIUM XENON; UNRODDED CORE

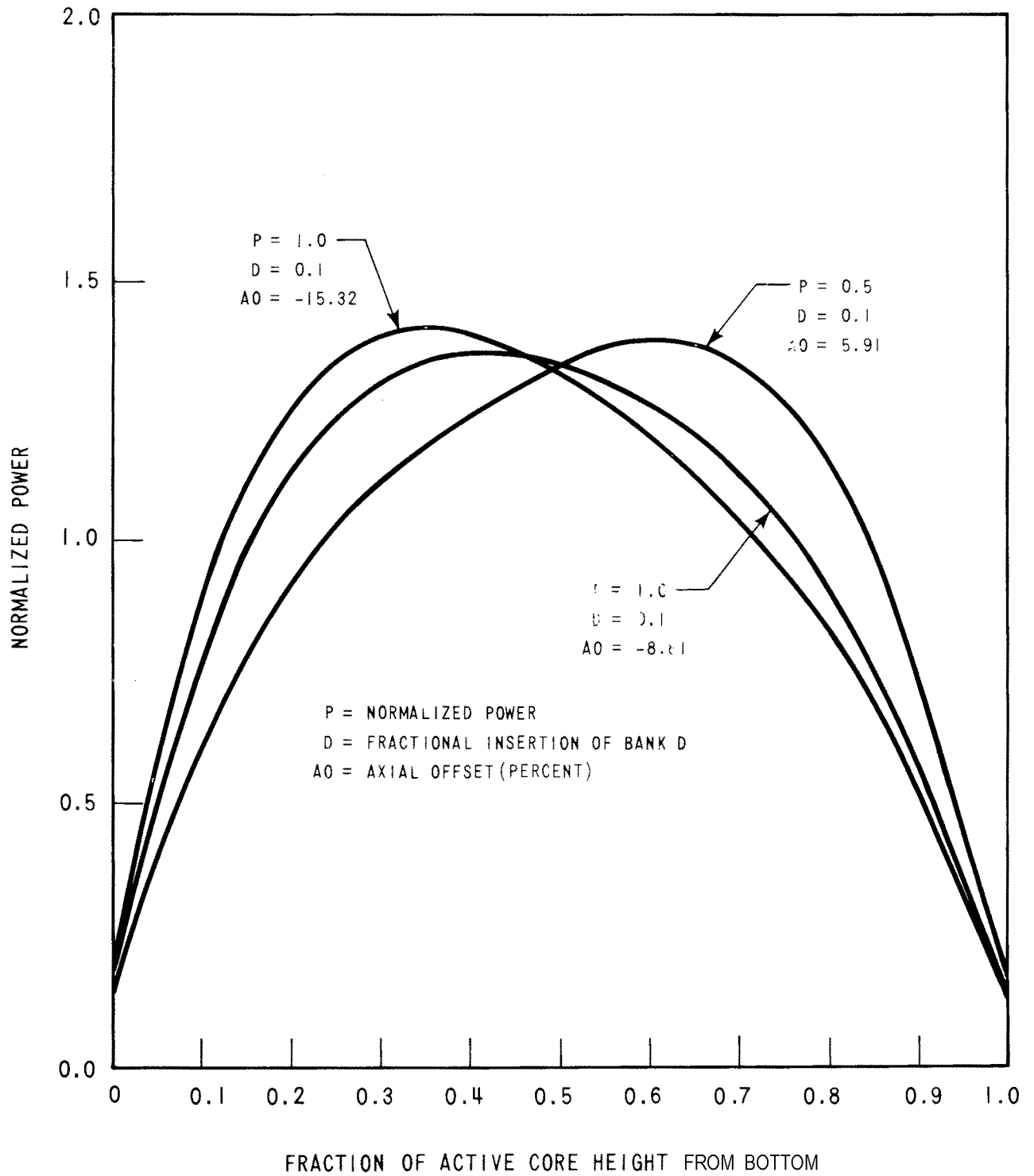


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FIGURE 4.3-13

RODWISE POWER DISTRIBUTION IN
A TYPICAL ASSEMBLY NEAR END-OF-
LIFE, HOT FULL POWER, EQUILIBRIUM
XENON; UNRODDED CORE

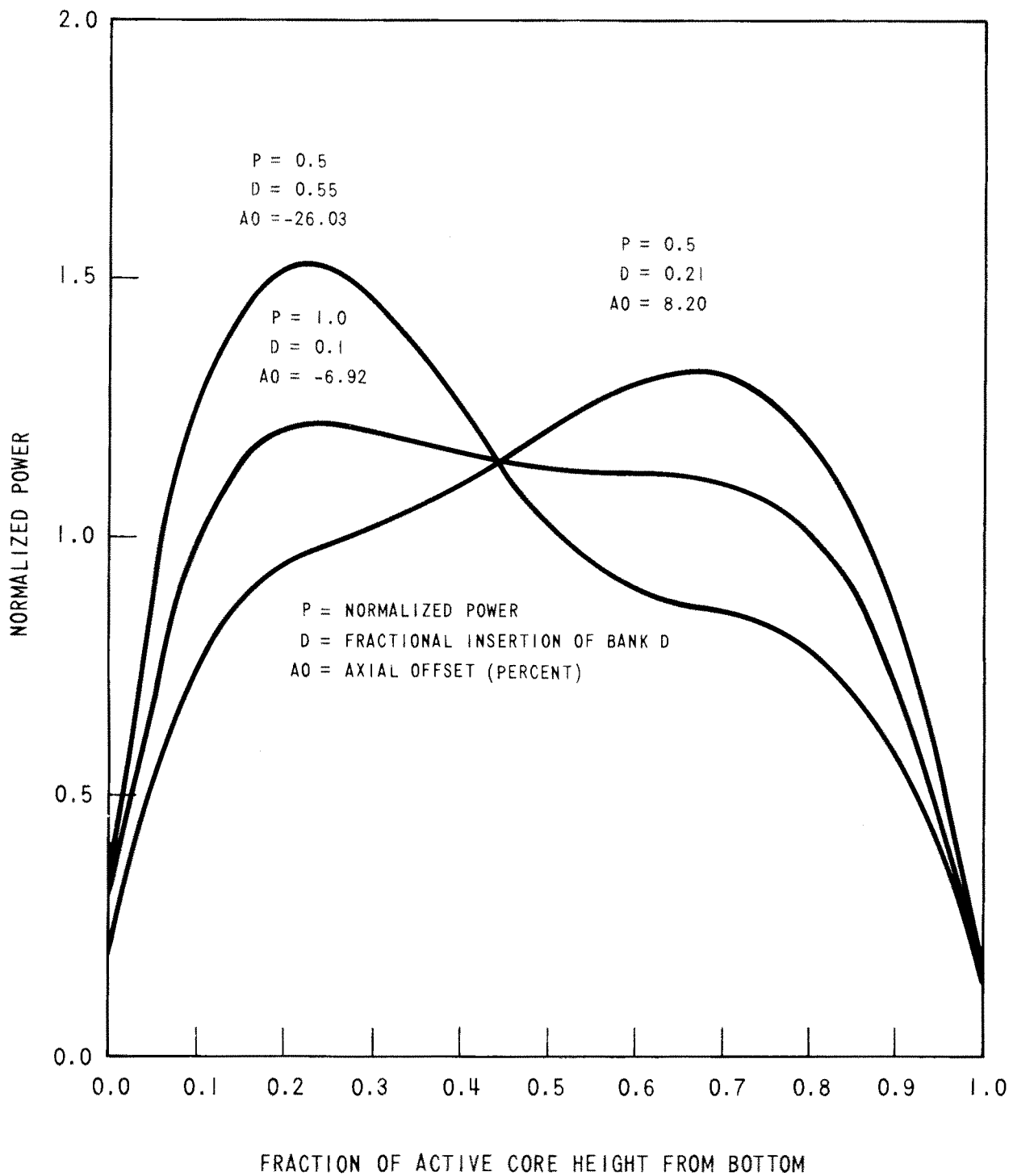


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FIGURE 4.3-14

TYPICAL AXIAL POWER SHAPES
OCCURRING AT BEGINNING-OF-LIFE
(CYCLE 1)

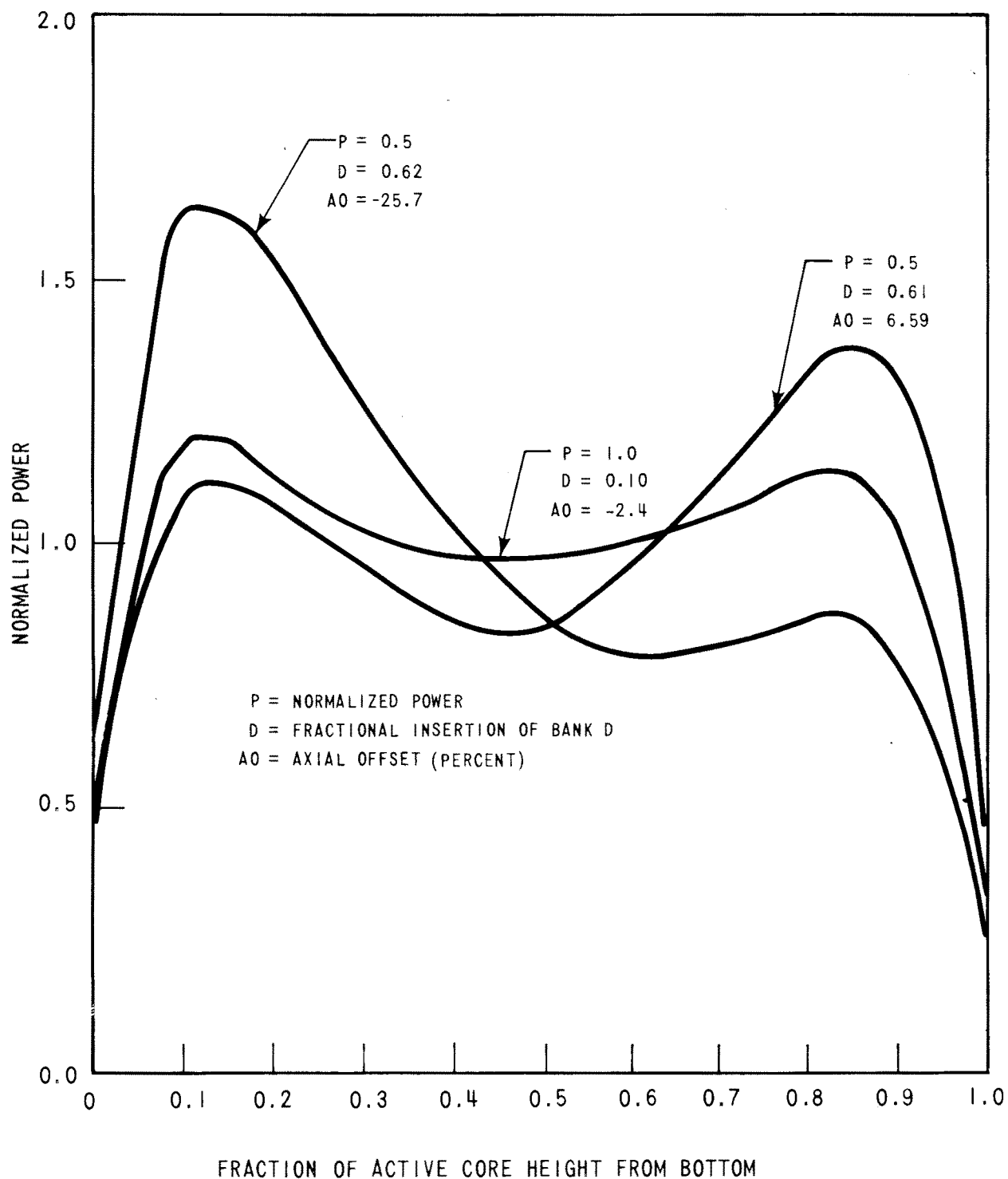


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FIGURE 4.3-15

TYPICAL AXIAL POWER SHAPES
OCCURRING AT MIDDLE-OF-LIFE
(CYCLE 1)

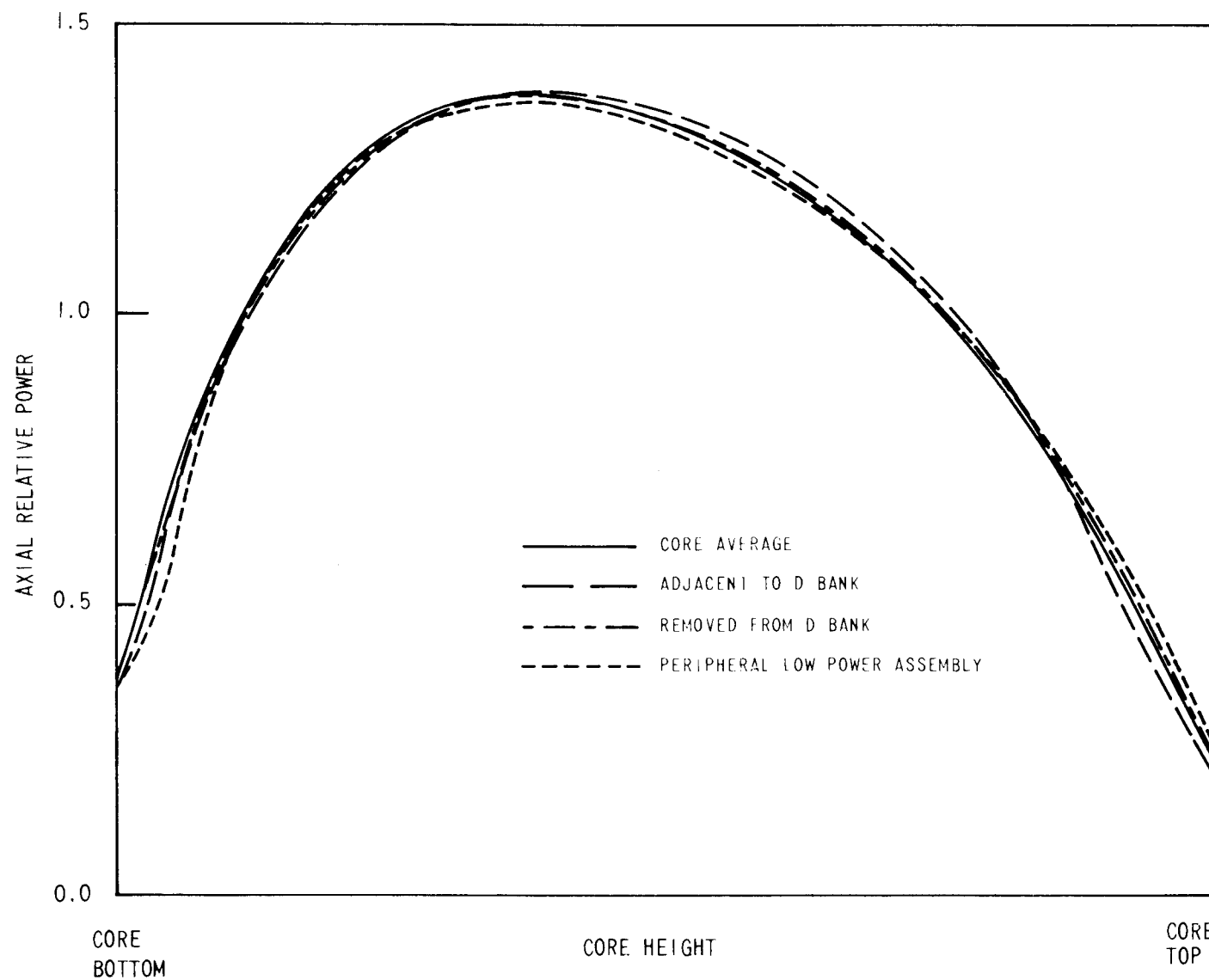


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FIGURE 4.3-16

TYPICAL AXIAL POWER SHAPES
OCCURRING AT END-OF-LIFE
(CYCLE 1)



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FIGURE 4.3-17
COMPARISON OF A TYPICAL ASSEMBLY
AXIAL POWER DISTRIBUTION WITH
CORE AVERAGE AXIAL DISTRIBUTION
BANK D SLIGHTLY INSERTED

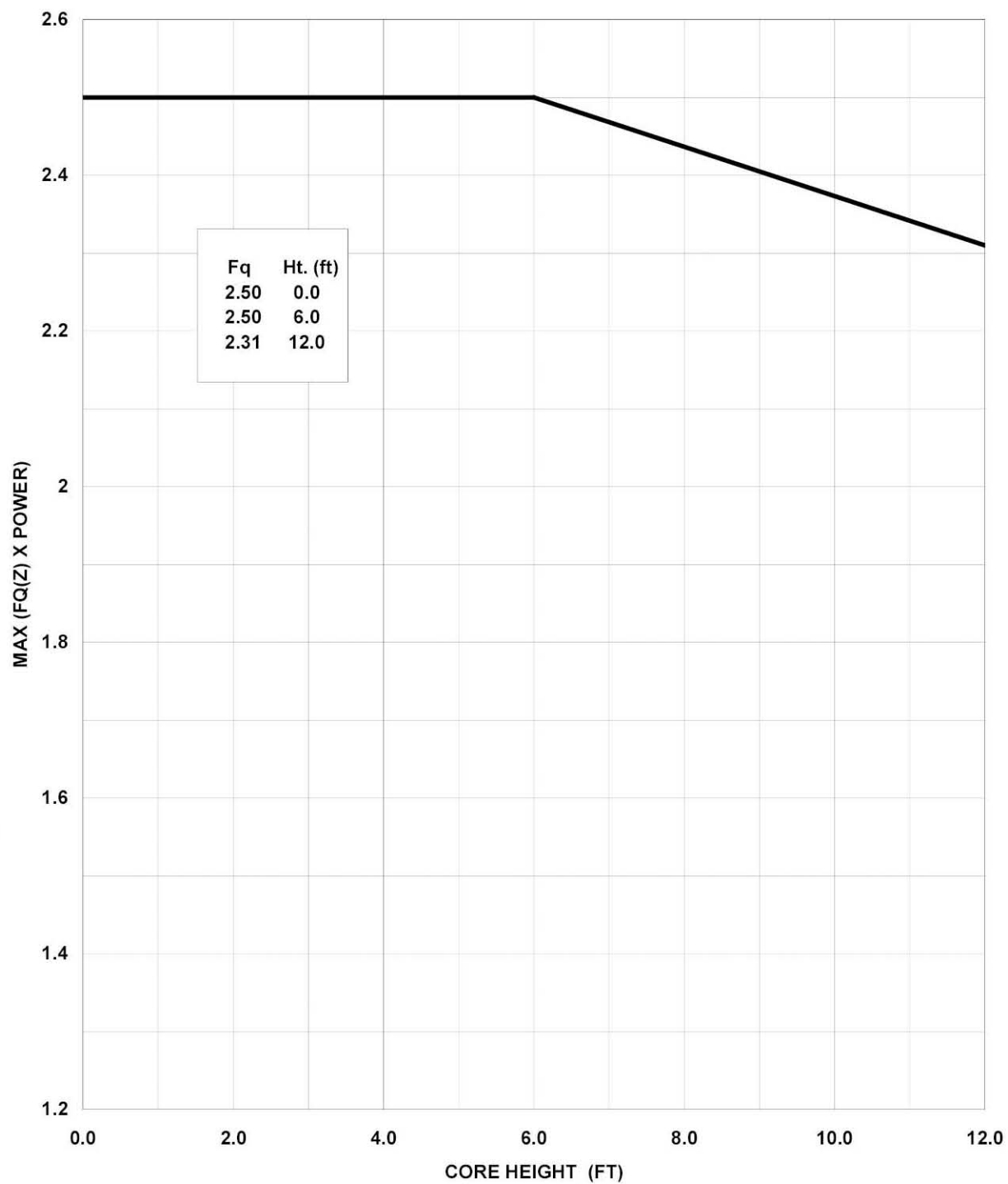
CALLAWAY - SP

FIGURE 4.3-18 HAS BEEN DELETED

Figure 4.3-19 has been deleted.

CALLAWAY - SP

FIGURE 4.3-20 HAS BEEN DELETED

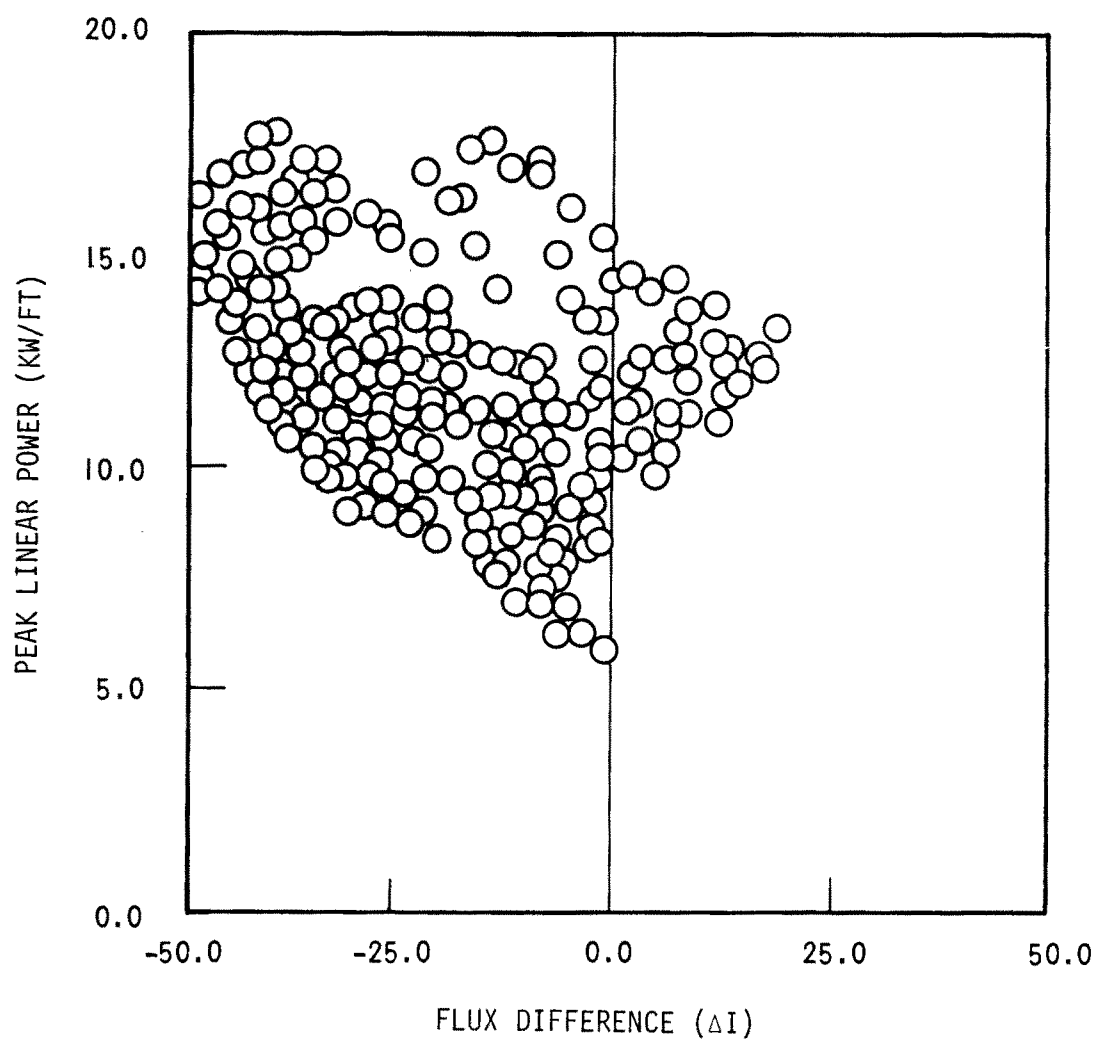


CALLAWAY PLANT

FIGURE 4.3-21

**MAXIMUM $FQ \times \text{POWER}$ VERSUS
AXIAL HEIGHT DURING NORMAL
OPERATION**

REV. 14 10/09

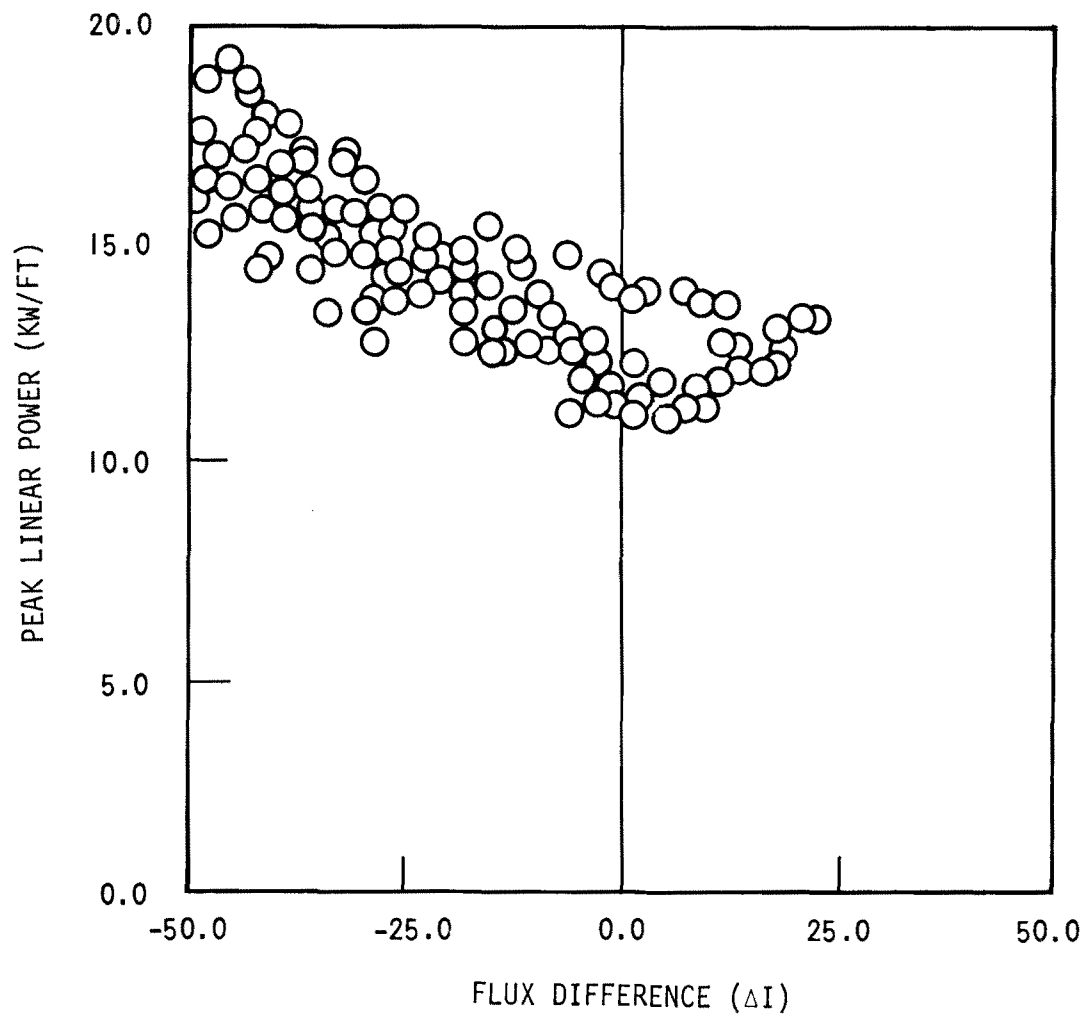


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FIGURE 4.3-22

PEAK LINEAR POWER DURING
CONTROL ROD MALFUNCTION
OVERPOWER TRANSIENTS

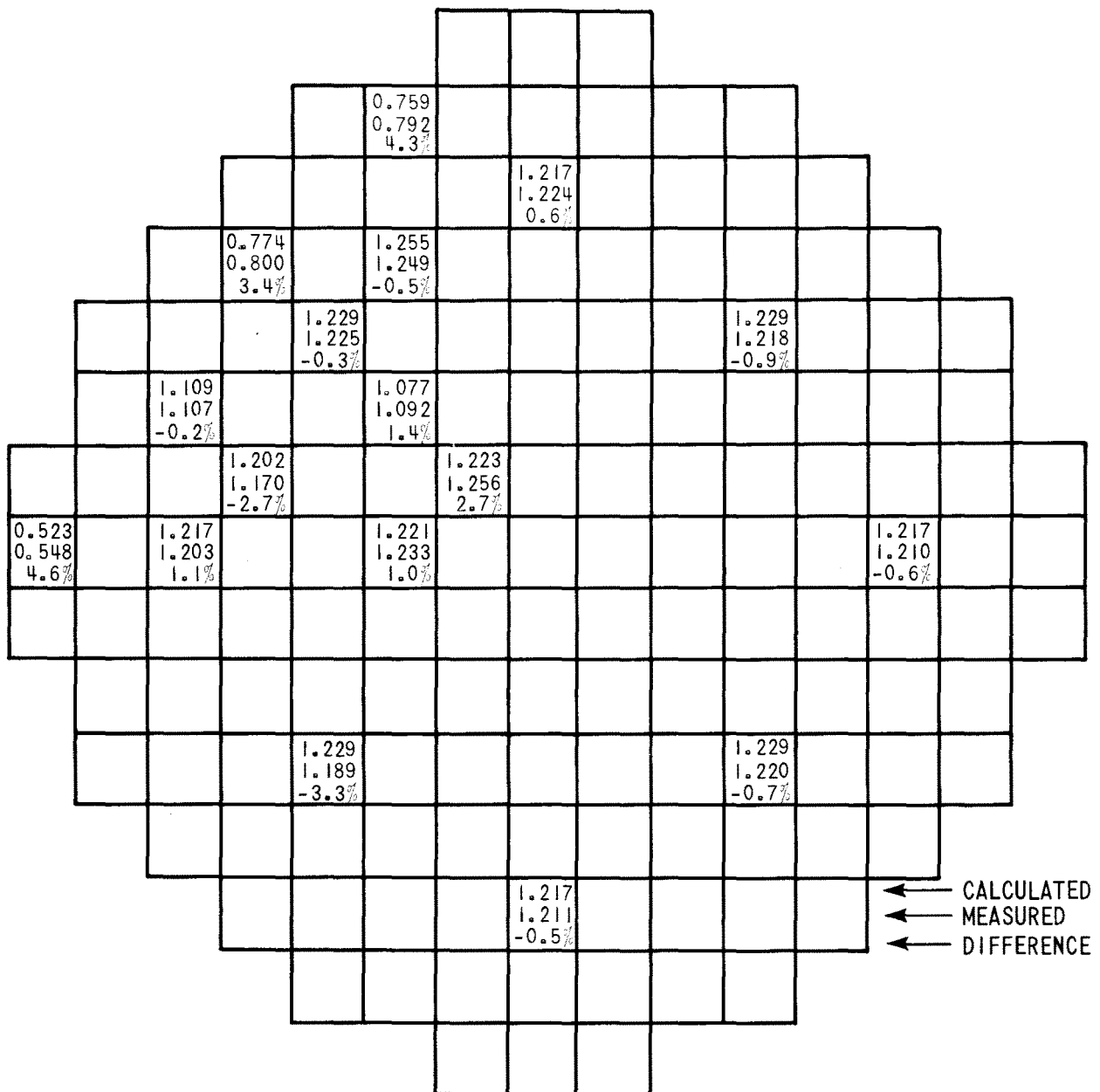


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FIGURE 4.3-23

PEAK LINEAR POWER DURING
BORATION/DILUTION OVERPOWER
TRANSIENTS



PEAKING FACTORS

$$\bar{F}_z = 1.5$$

$$F_{\Delta H}^N = 1.357$$

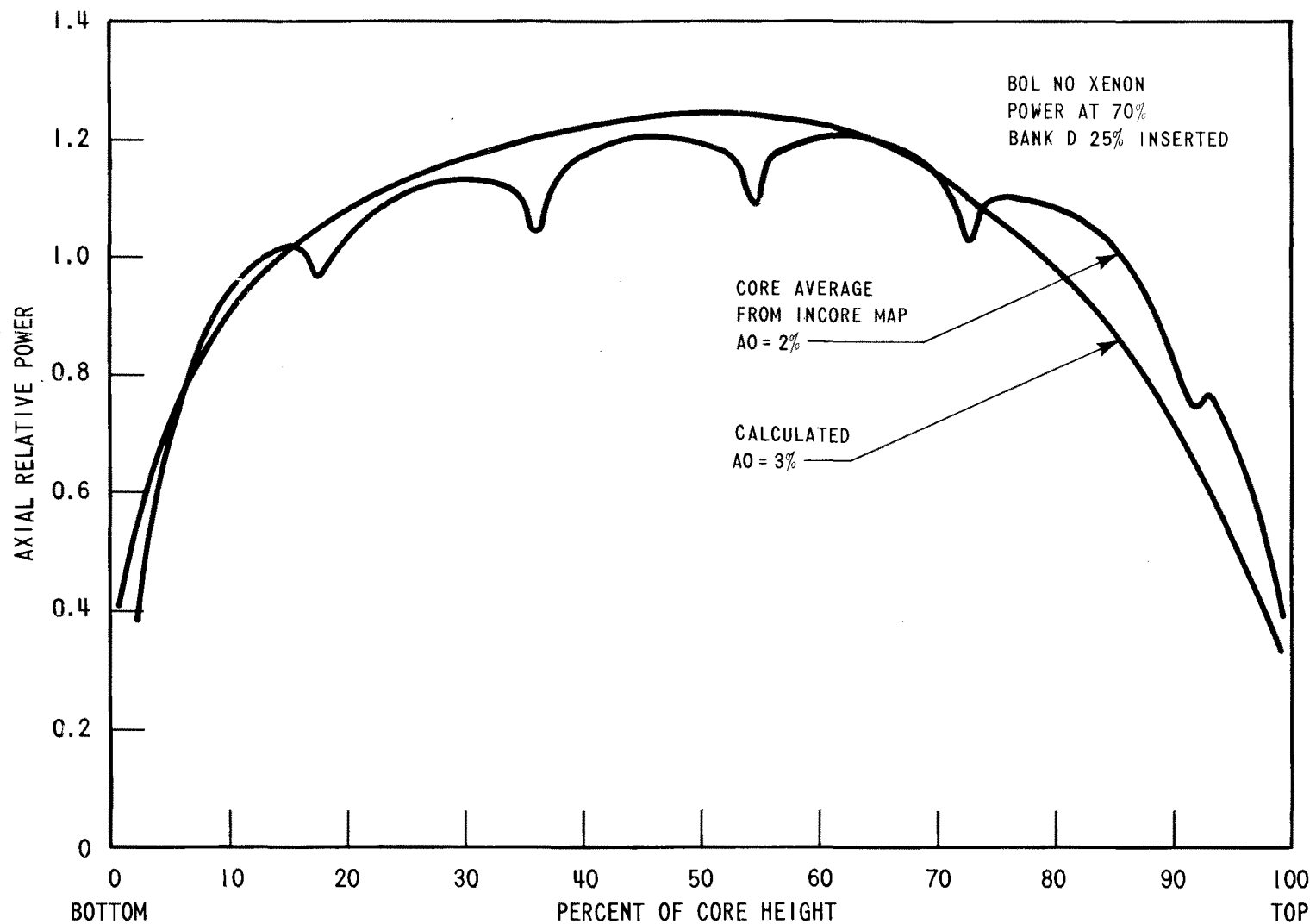
$$F_Q^N = 2.07$$

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05/03

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FIGURE 4.3-24

COMPARISON BETWEEN TYPICAL CALCULATED
AND MEASURED RELATIVE FUEL ASSEMBLY
POWER DISTRIBUTION

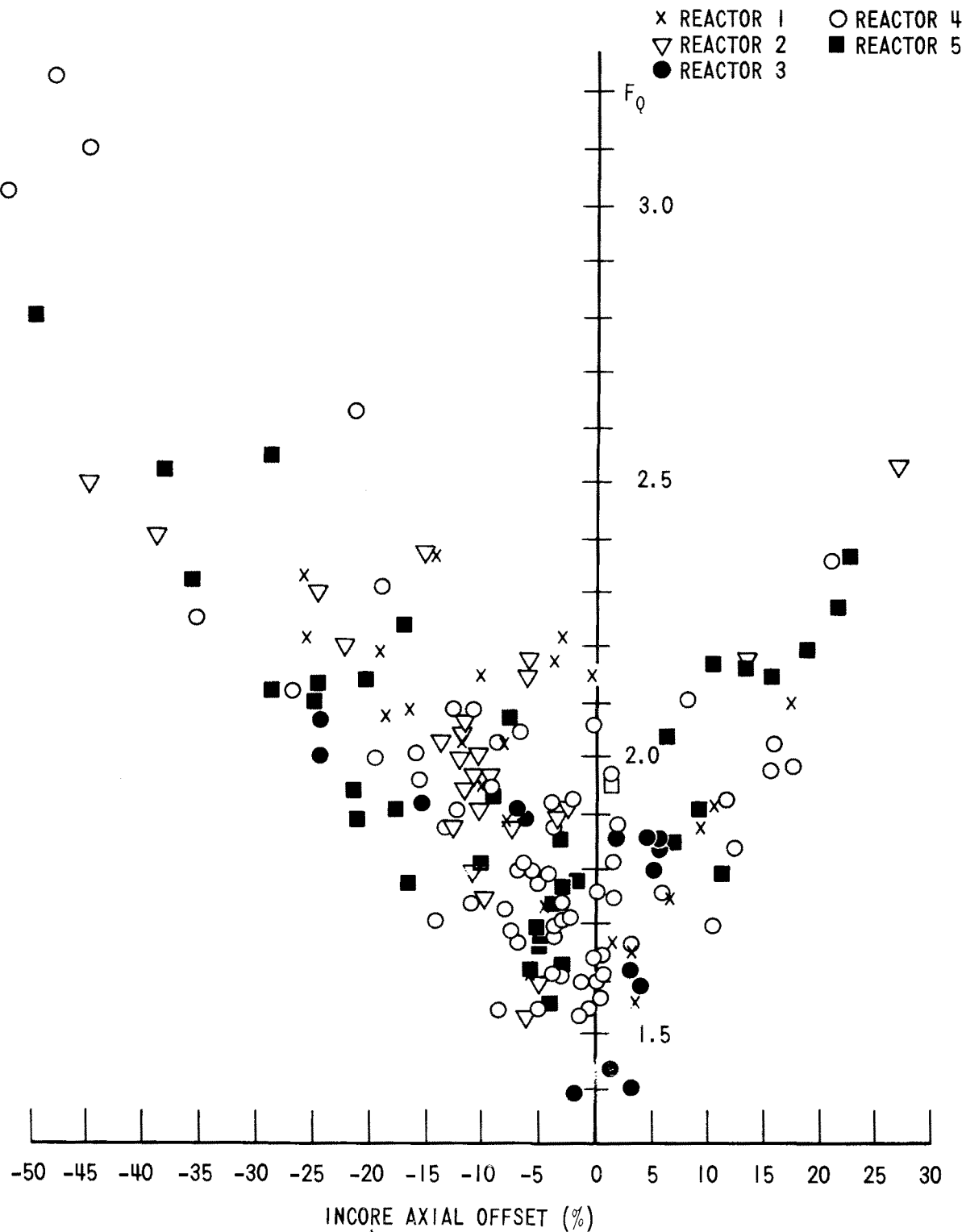


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FIGURE 4.3-25

COMPARISON OF TYPICAL CALCULATED
AND MEASURED AXIAL SHAPES

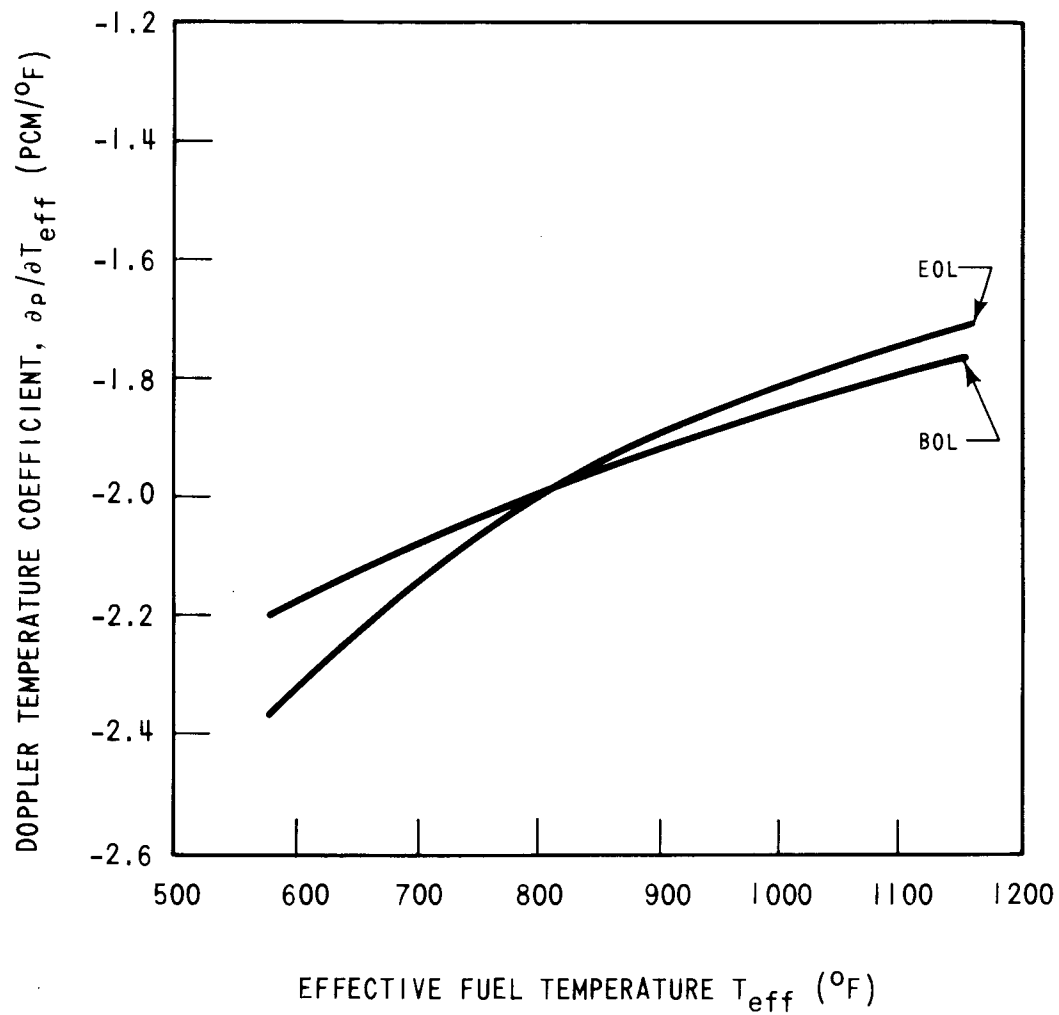


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FIGURE 4.3-26

MEASURED VALUES OF F_Q FOR
FULL POWER ROD CONFIGURATIONS

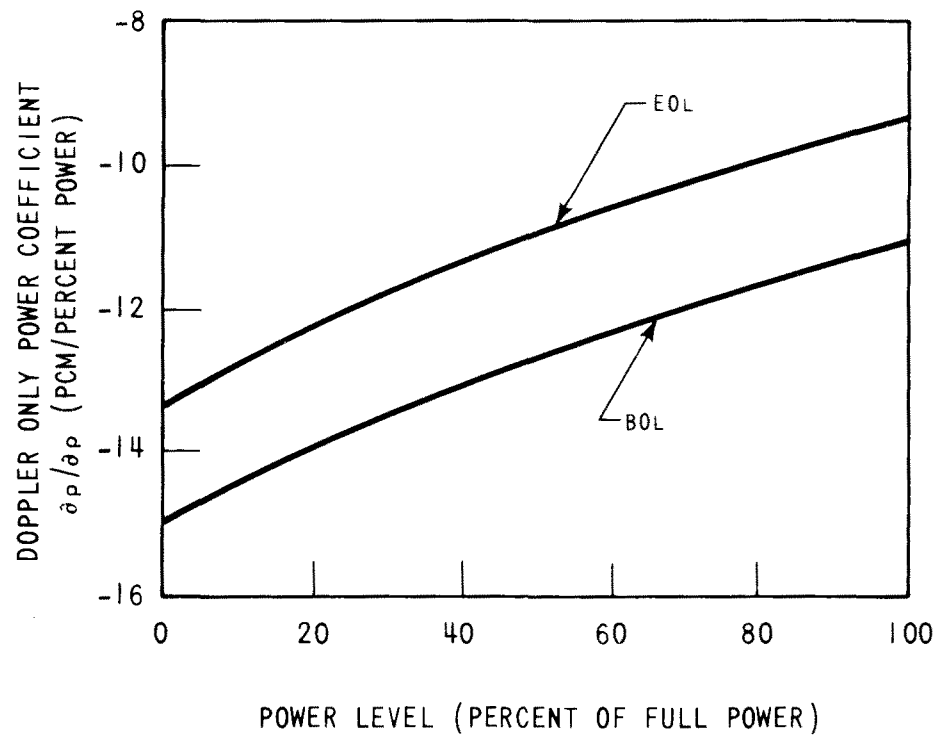


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FIGURE 4.3-27

TYPICAL DOPPLER TEMPERATURE
COEFFICIENT AT BOL AND EOL,
CYCLE 1

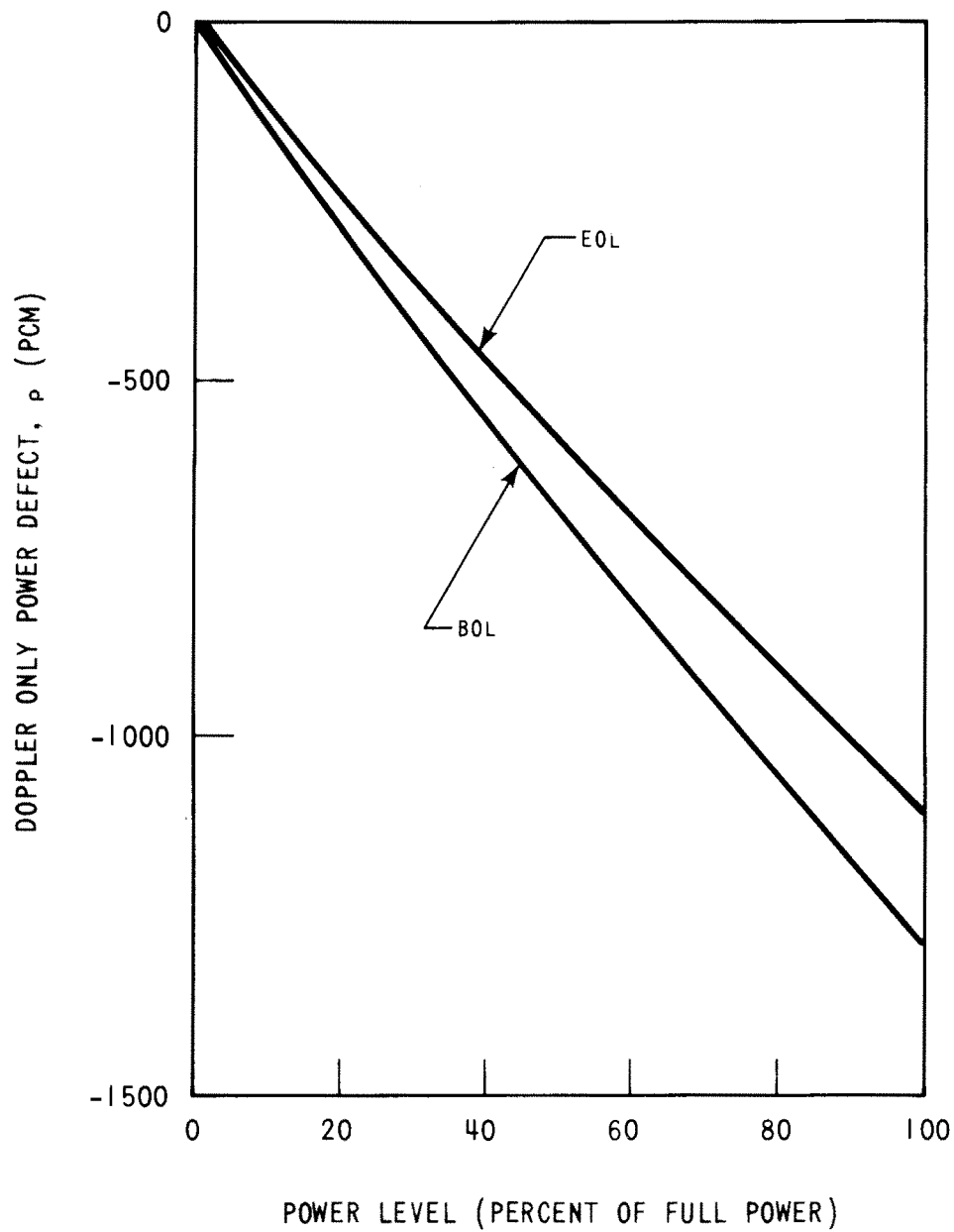


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FIGURE 4.3-28

TYPICAL DOPPLER-ONLY POWER
COEFFICIENT AT BOL AND EOL,
CYCLE 1

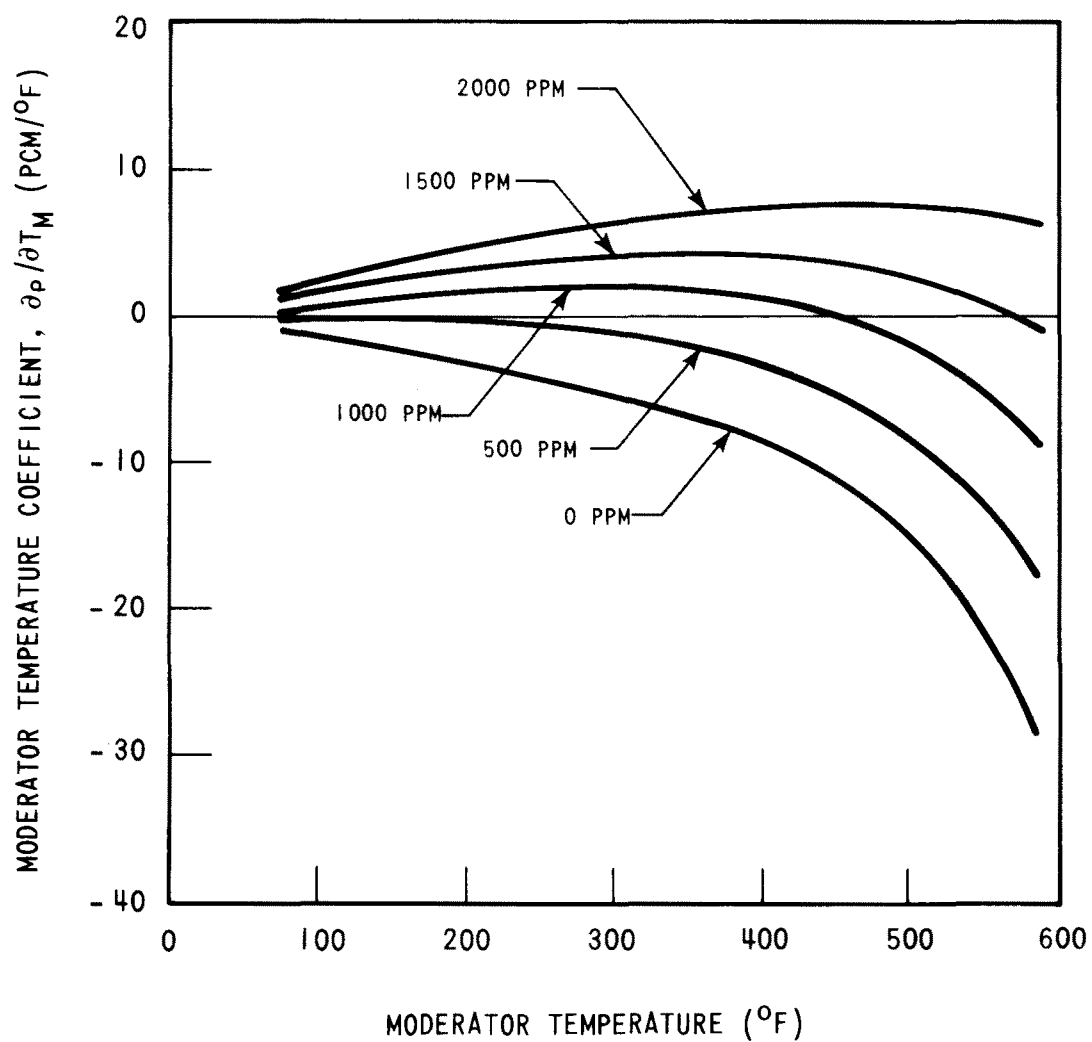


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FIGURE 4.3-29

TYPICAL DOPPLER-ONLY POWER
DEFECT AT BOL AND EOL, CYCLE 1

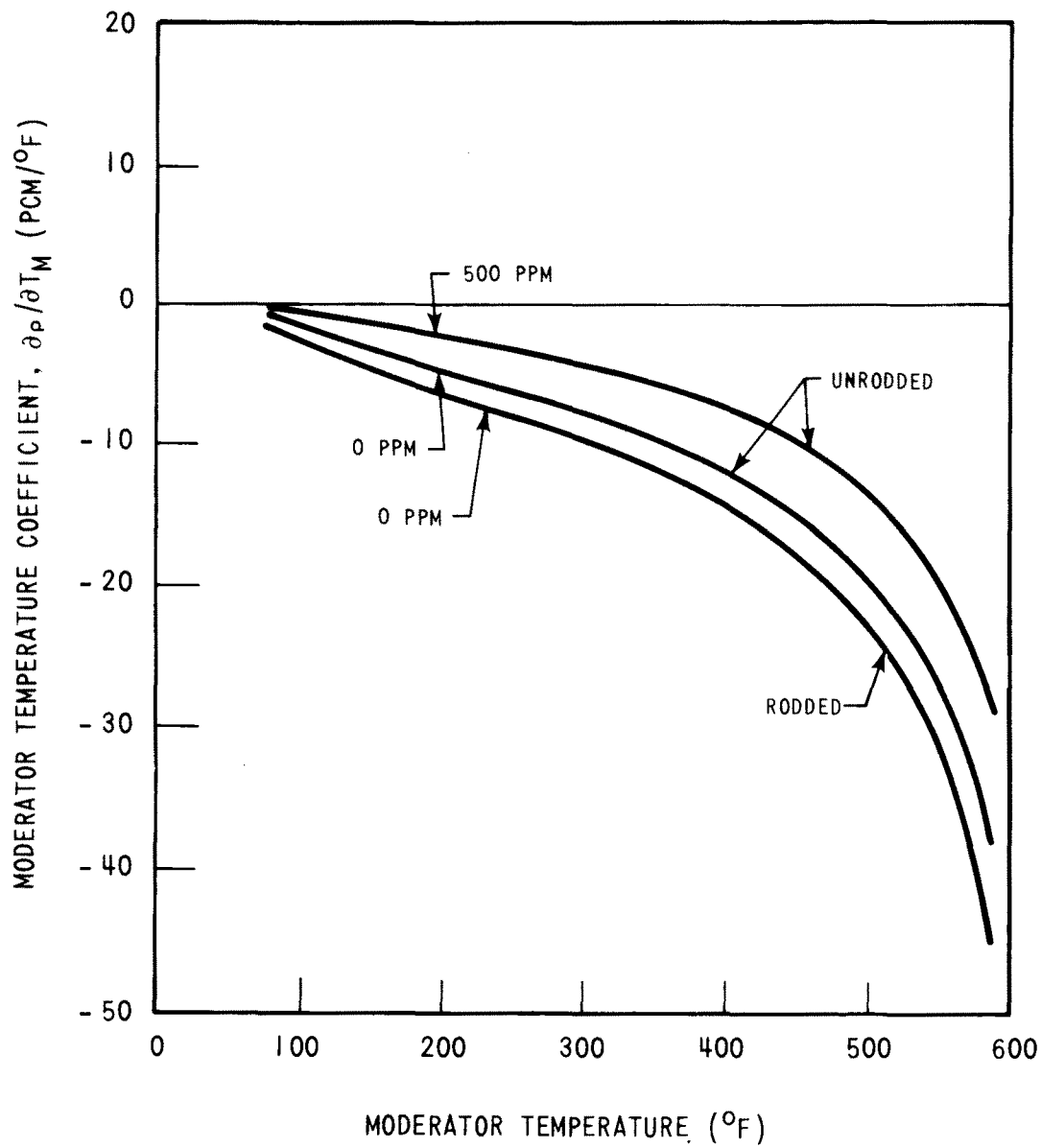


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FIGURE 4.3-30

TYPICAL MODERATOR TEMPERATURE
COEFFICIENT AT BOL, CYCLE 1,
NO RODS

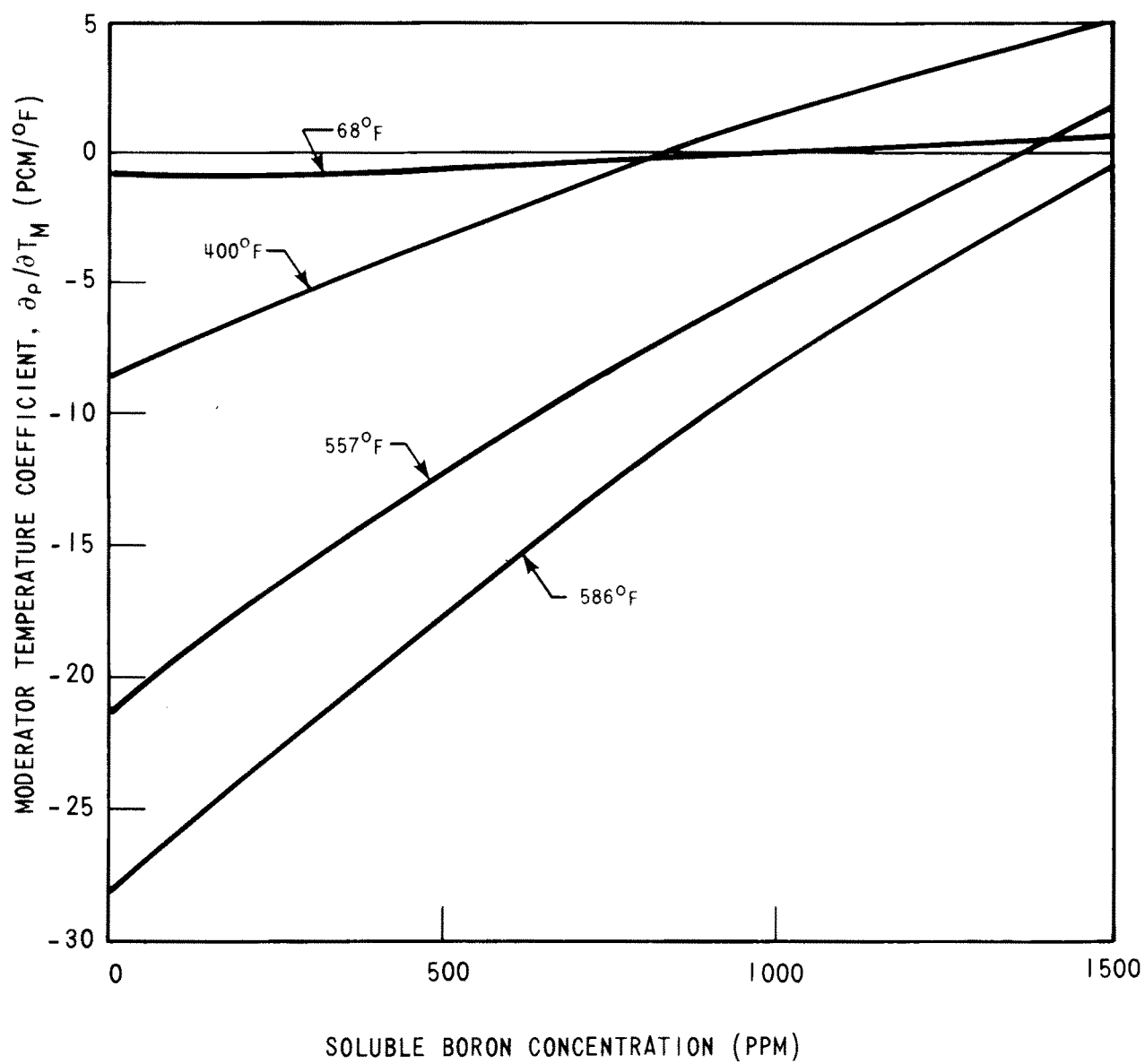


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FIGURE 4.3-31

TYPICAL MODERATOR TEMPERATURE
COEFFICIENT AT EOL, CYCLE 1

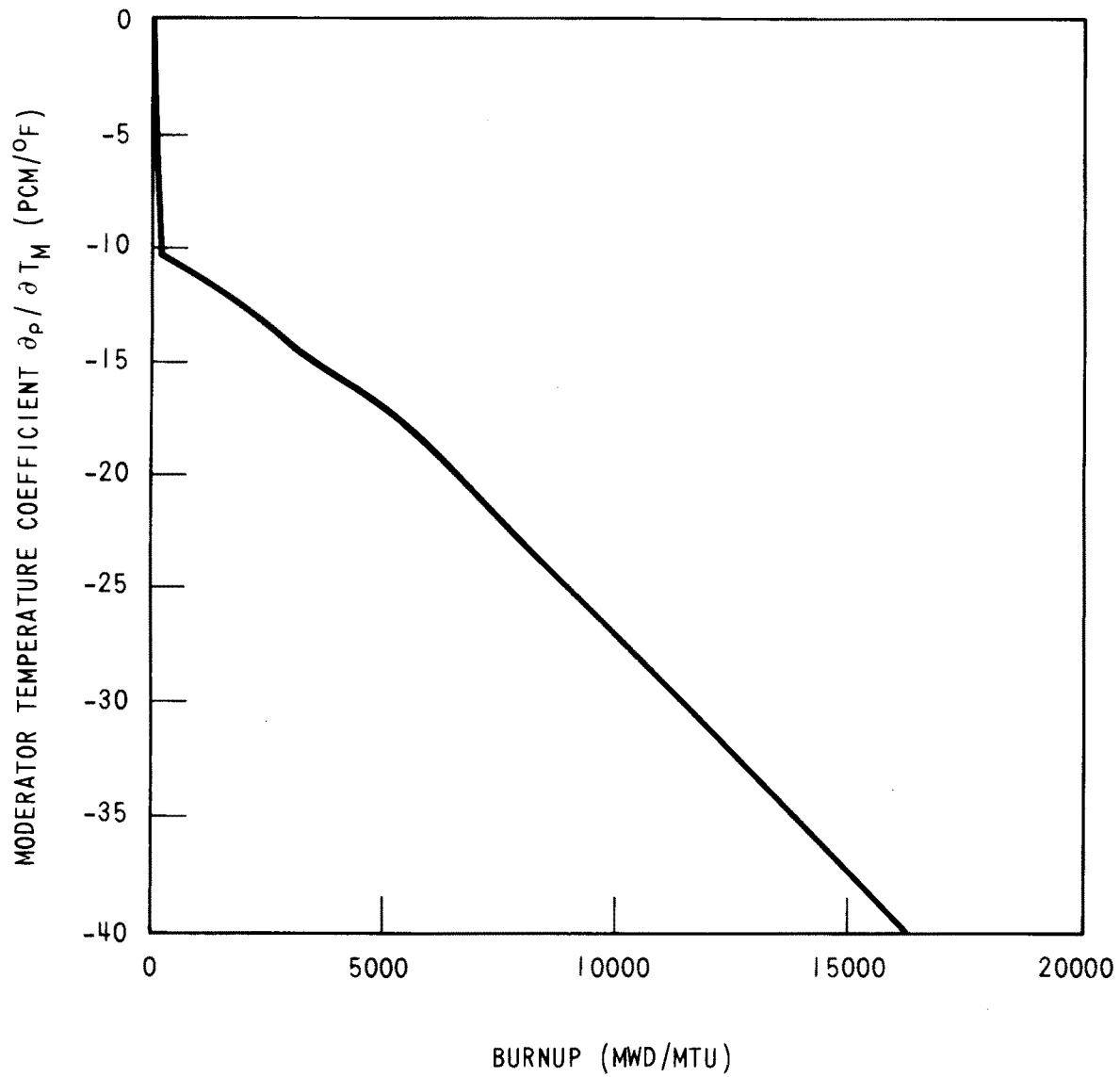


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FIGURE 4.3-32

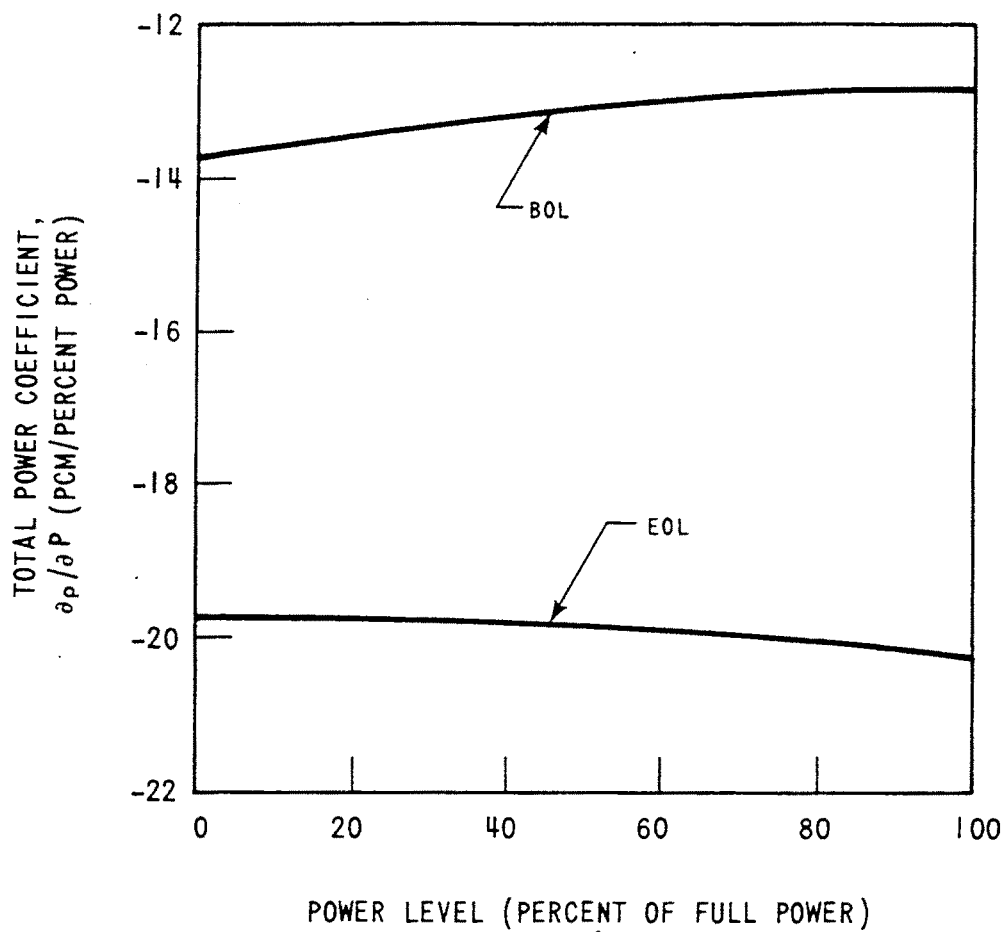
TYPICAL MODERATOR TEMPERATURE
COEFFICIENT AS A FUNCTION OF
BORON CONCENTRATION AT BOL,
CYCLE 1, NO RODS



REV OL-13
05/03

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FIGURE 4.3-33
TYPICAL HOT FULL POWER
TEMPERATURE COEFFICIENT DURING
CYCLE 1 FOR THE CRITICAL BORON
CONCENTRATION

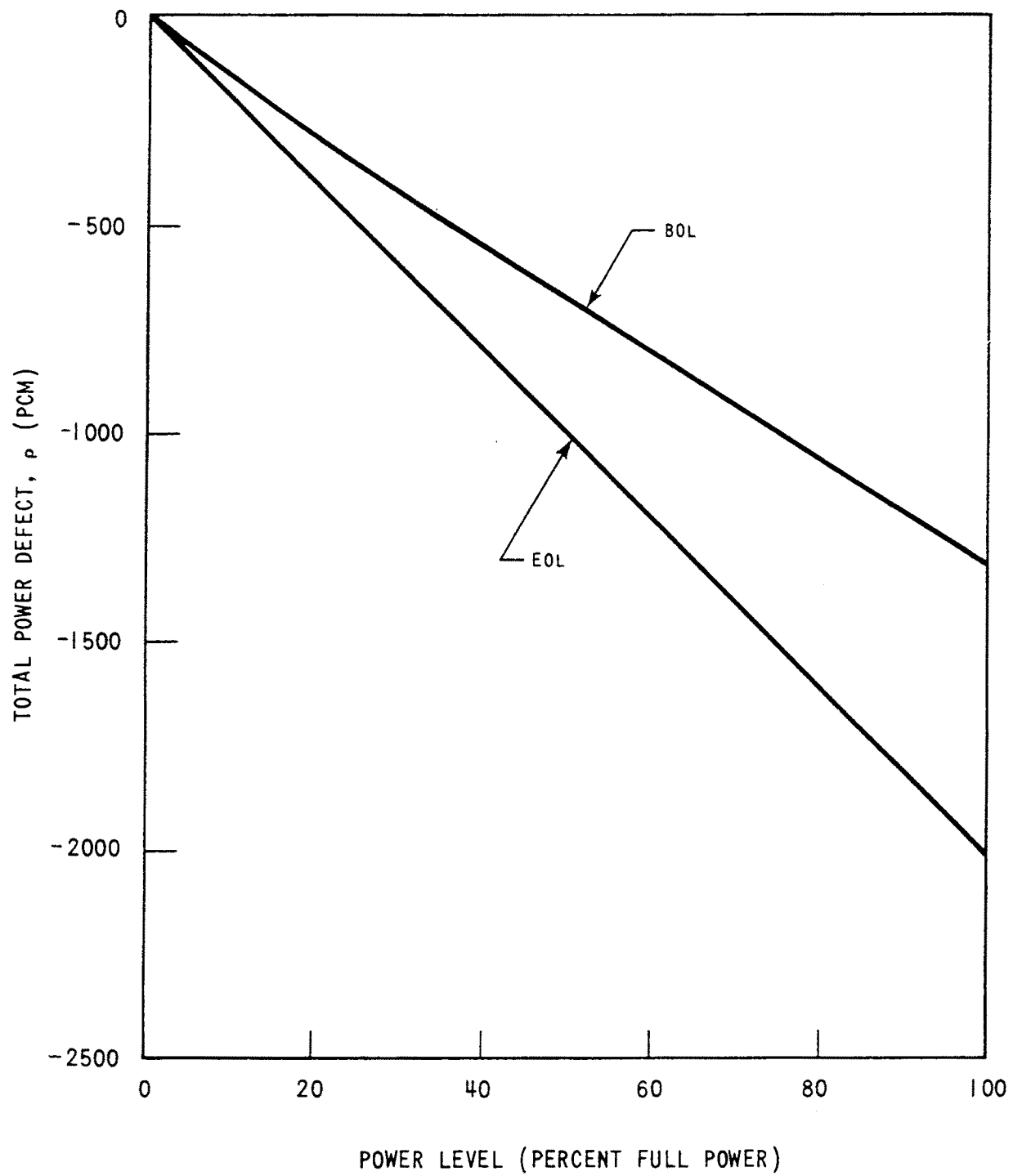


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FIGURE 4.3-34

TYPICAL TOTAL POWER COEFFICIENT
AT BOL AND EOL, CYCLE 1

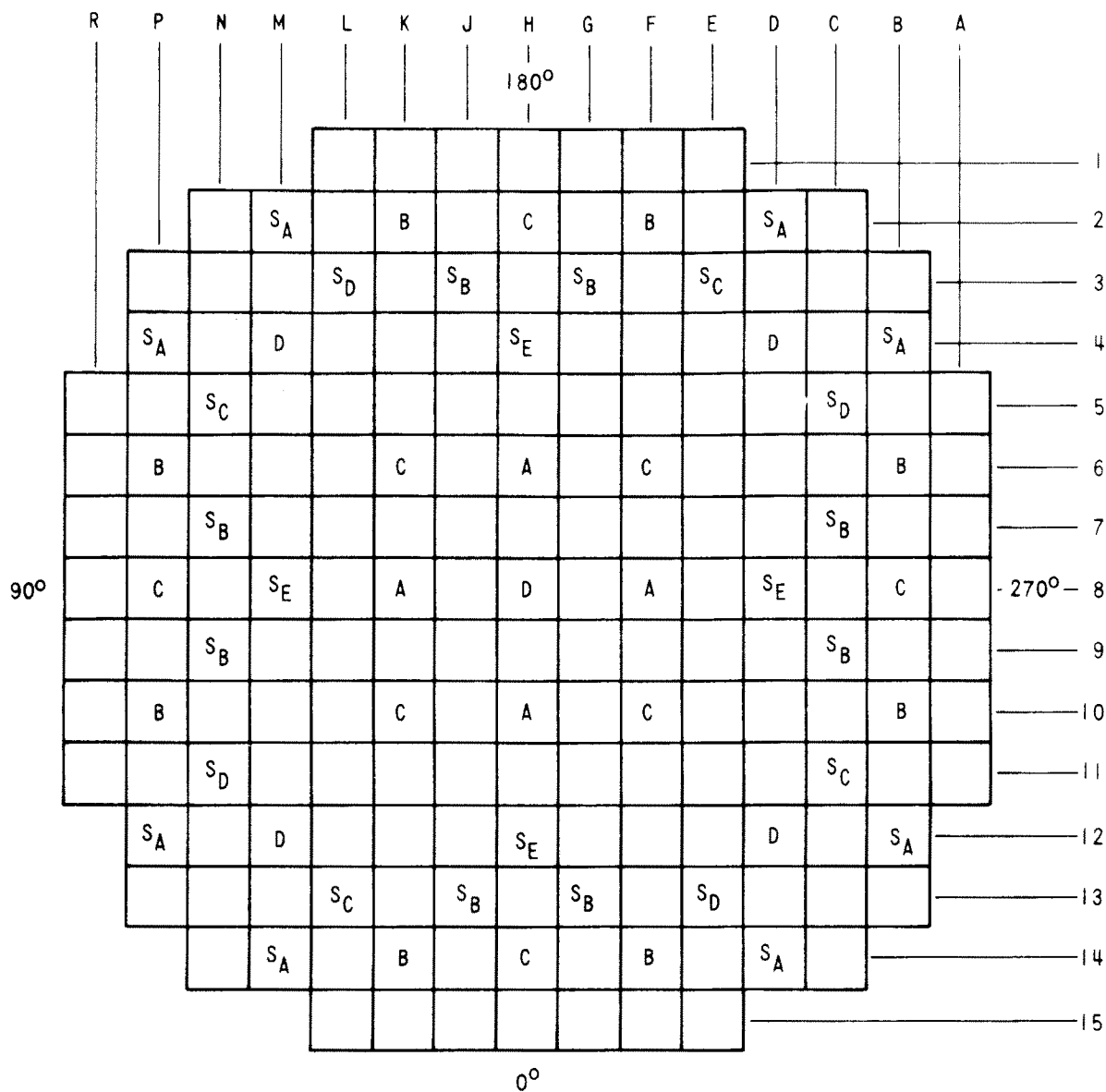


REV. OL-7
5/94

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FIGURE 4.3-35

TOTAL POWER DEFECT AT
BOL AND EOL, CYCLE 1



CONTROL BANK	NUMBER OF RODS
A	4
B	8
C	8
D	5
TOTAL	25

SHUTDOWN BANK	NUMBER OF RODS
S _A	8
S _B	8
S _C	4
S _D	4
S _E	4
TOTAL	28

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6/86

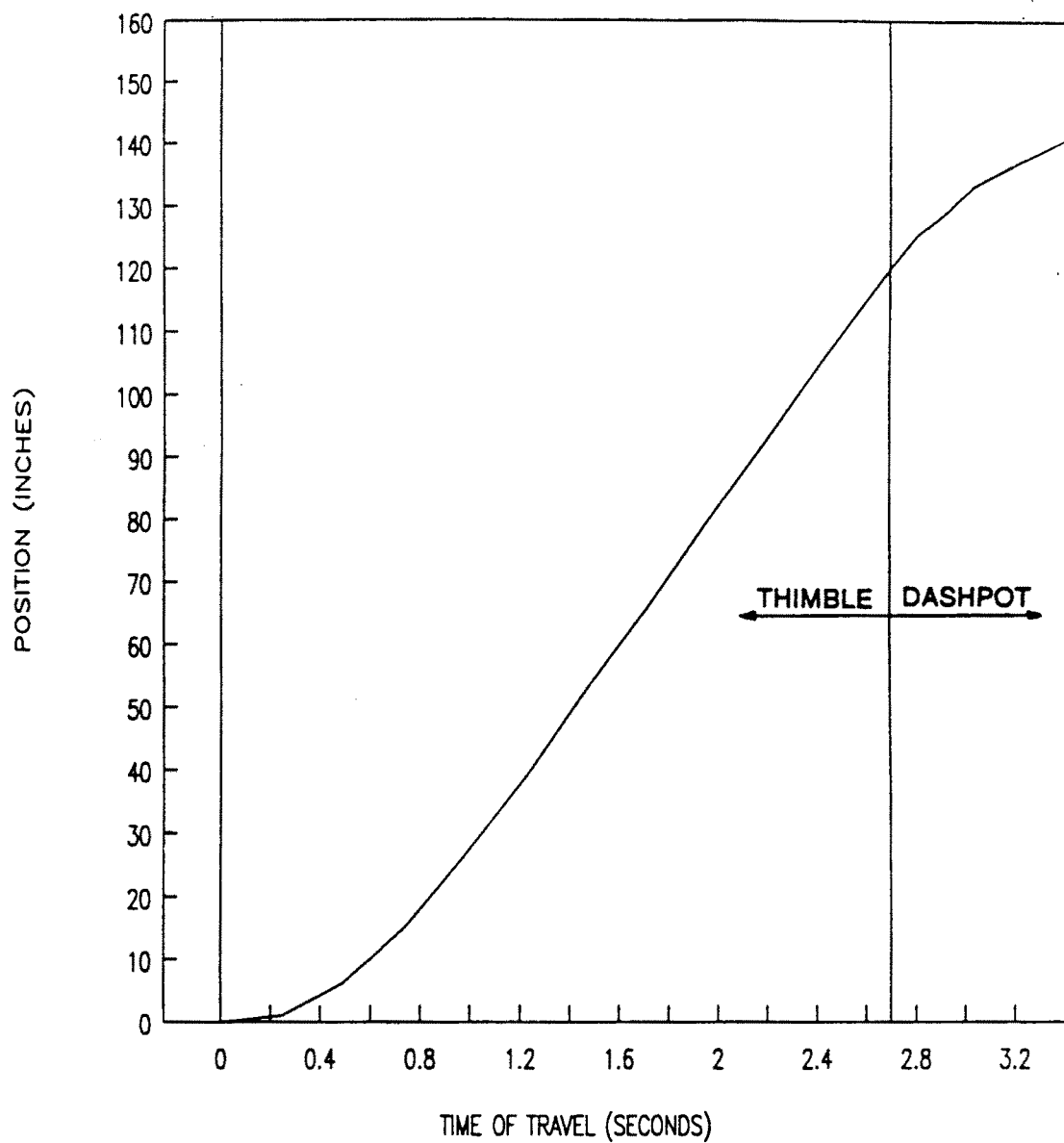
CALLAWAY PLANT

FIGURE 4.3-36

ROD CLUSTER CONTROL ASSEMBLY
PATTERN

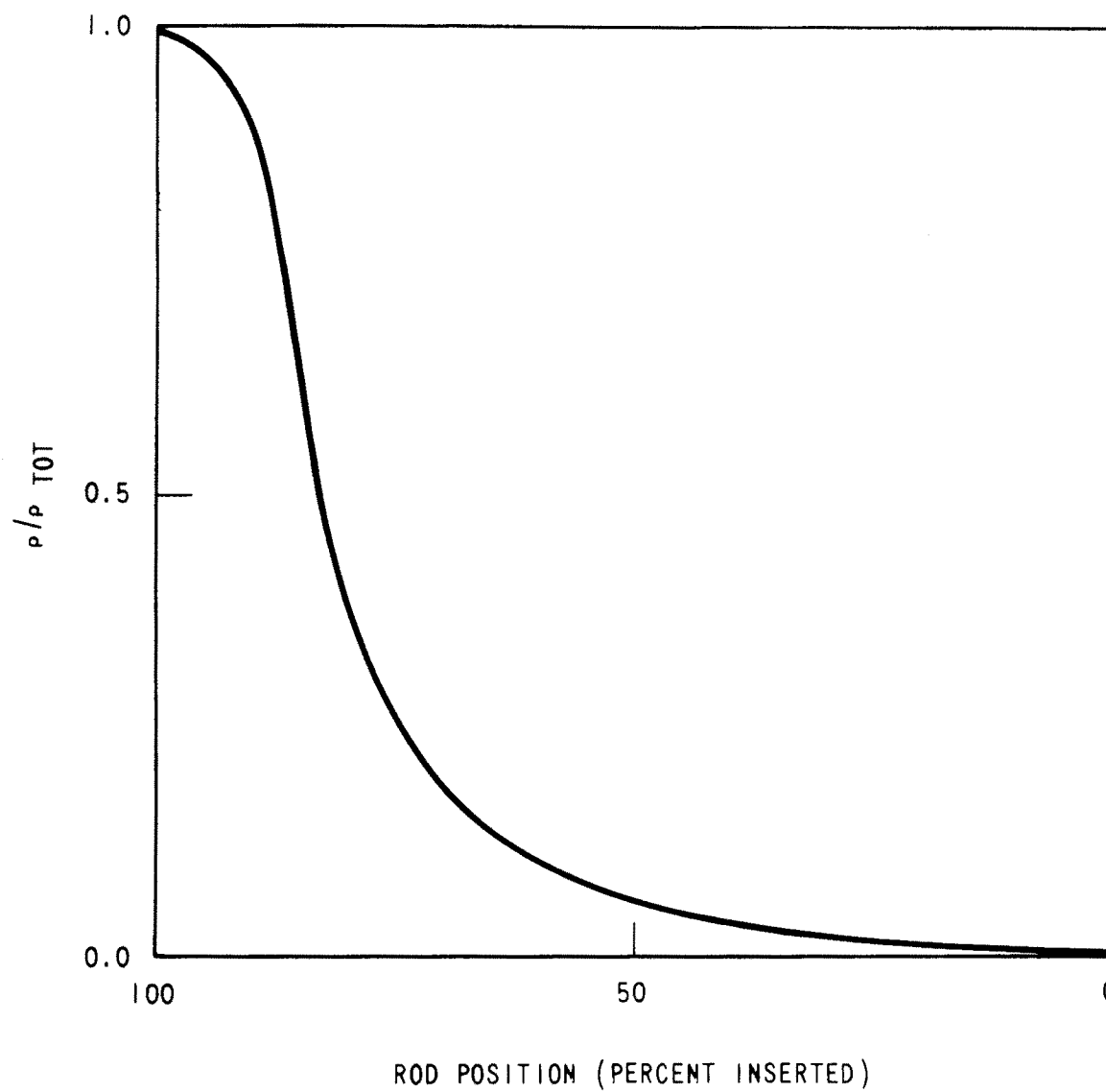
CALLAWAY SP

FIGURE 4.3-37 HAS BEEN DELETED



REV. OL-5
6/91

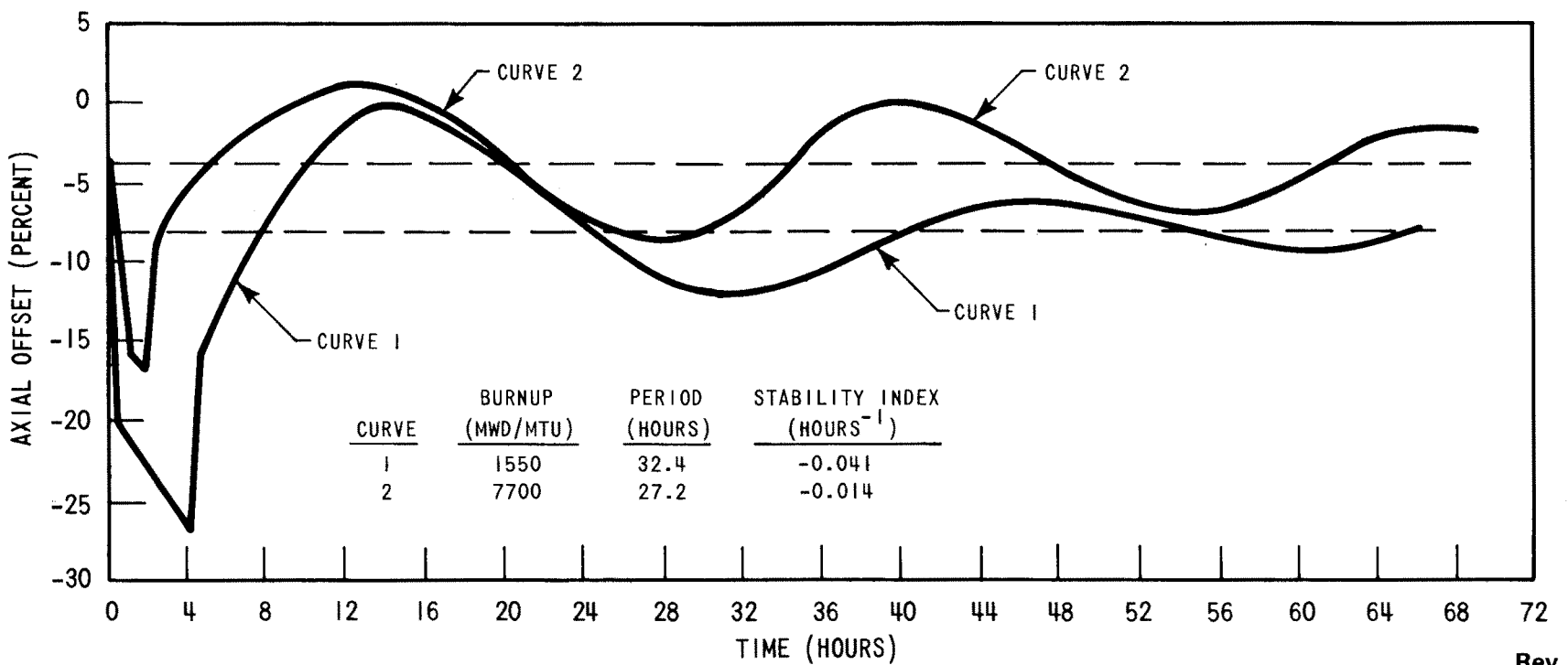
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FIGURE 4.3-38
DESIGN TRIP CURVE



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6/86

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FIGURE 4.3-39
TYPICAL NORMALIZED ROD WORTH
VERSUS PERCENT INSERTION, ALL
RODS OUT BUT ONE

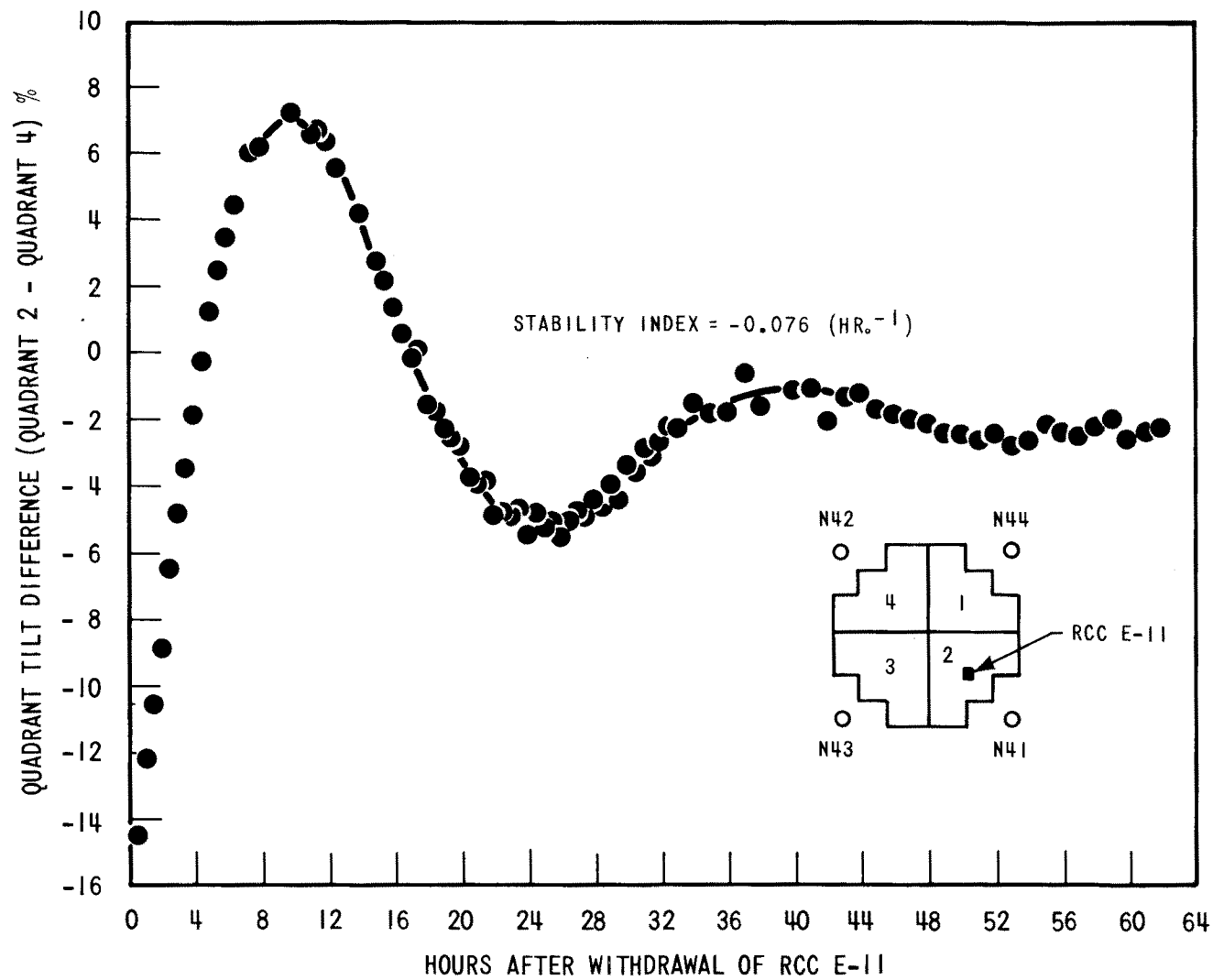


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FIGURE 4.3-40

AXIAL OFFSET VERSUS TIME, PWR
CORE WITH A 12 FOOT HEIGHT
AND 121 ASSEMBLIES

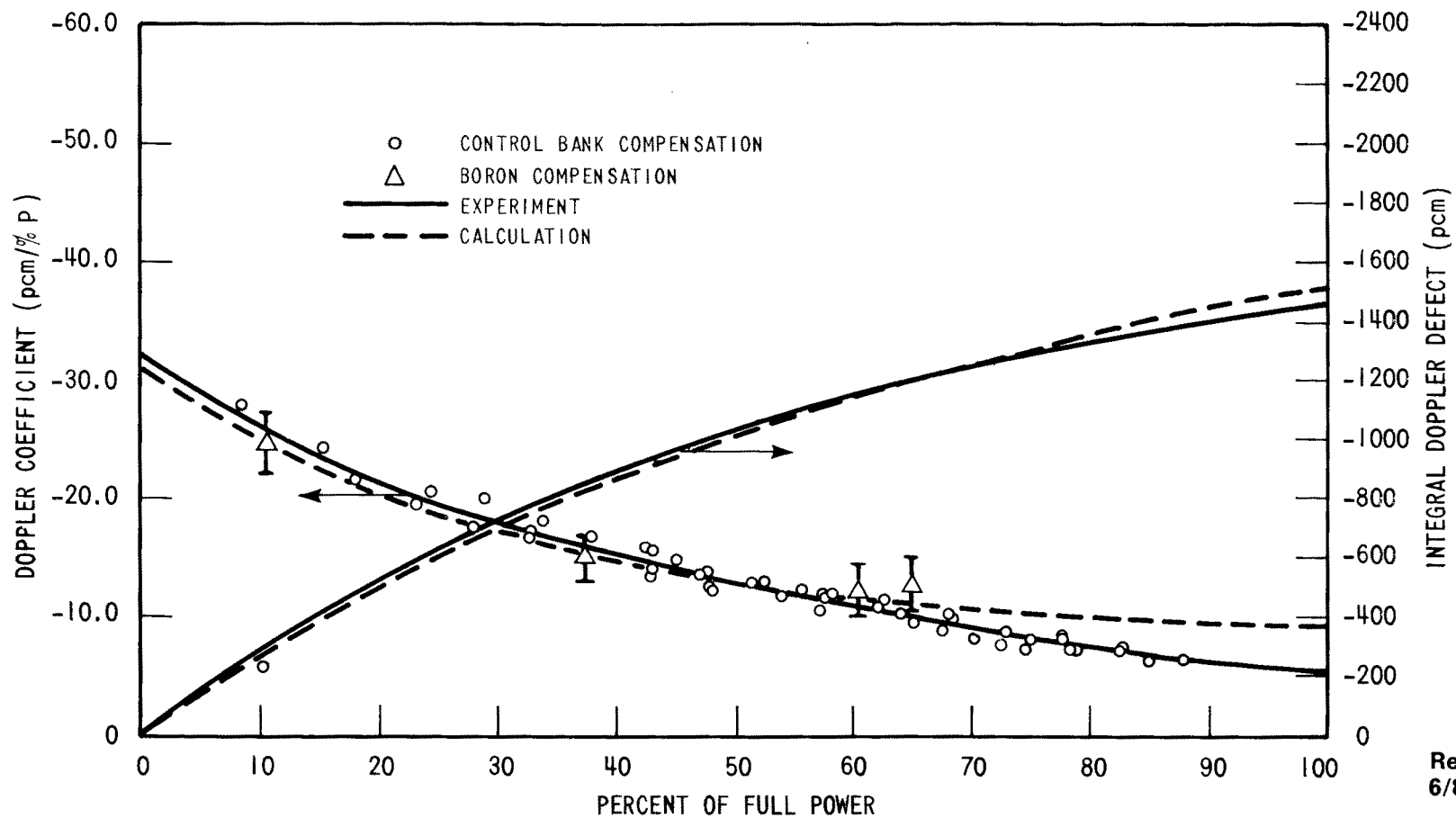


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FIGURE 4.3-41

X-Y XENON TEST THERMOCOUPLE
RESPONSE QUADRANT TILT
DIFFERENCE VERSUS TIME



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FIGURE 4.3-42
CALCULATED AND MEASURED DOPPLER
DEFECT AND COEFFICIENTS AT BOL,
2-LOOP PLANT, 121 ASSEMBLIES,
12 FOOT CORE

CALLAWAY SP

FIGURE 4.3-43 HAS BEEN DELETED

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CALLAWAY SP

FIGURE 4.3-44 HAS BEEN DELETED

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CALLAWAY SP

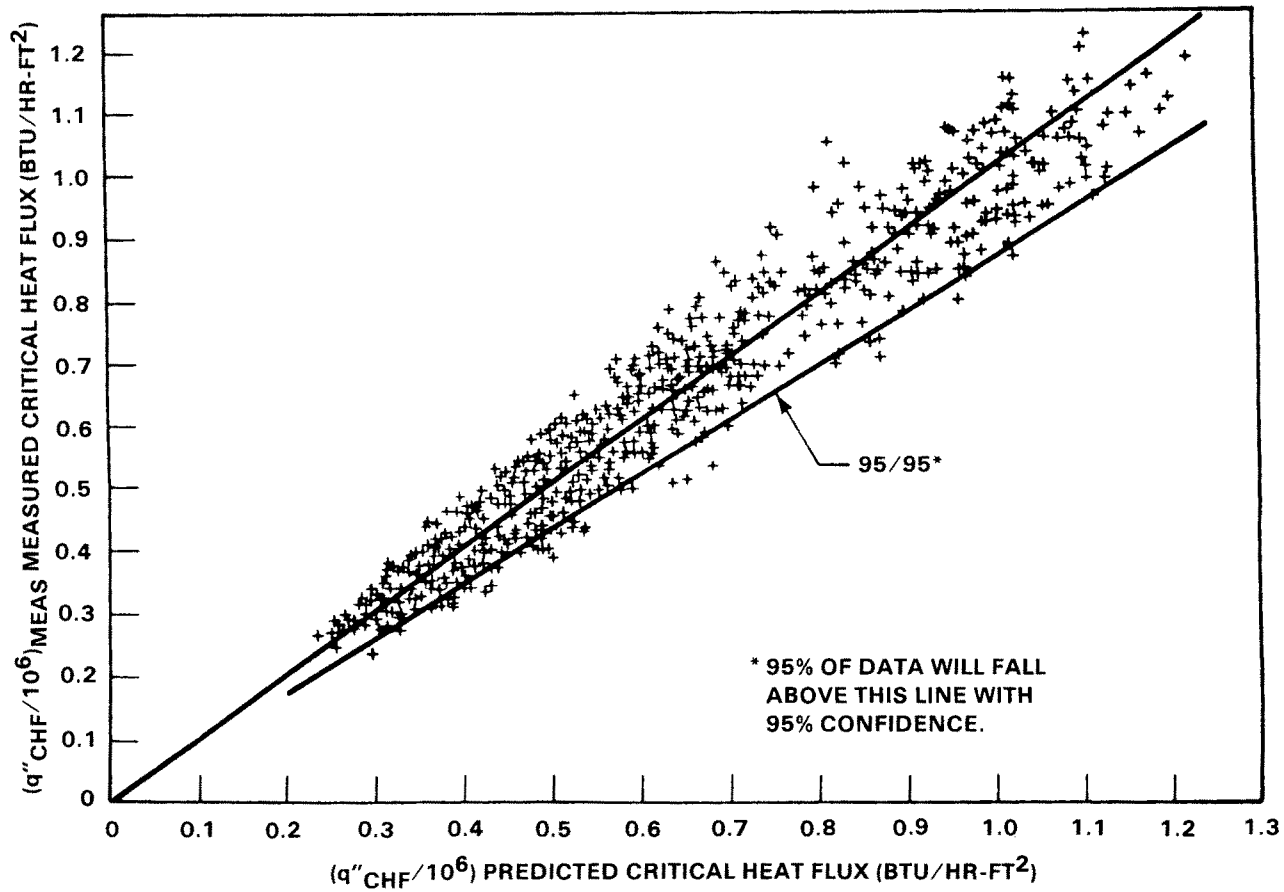
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Figure 4.4-1 Deleted.

Figure 4.4-1a Deleted

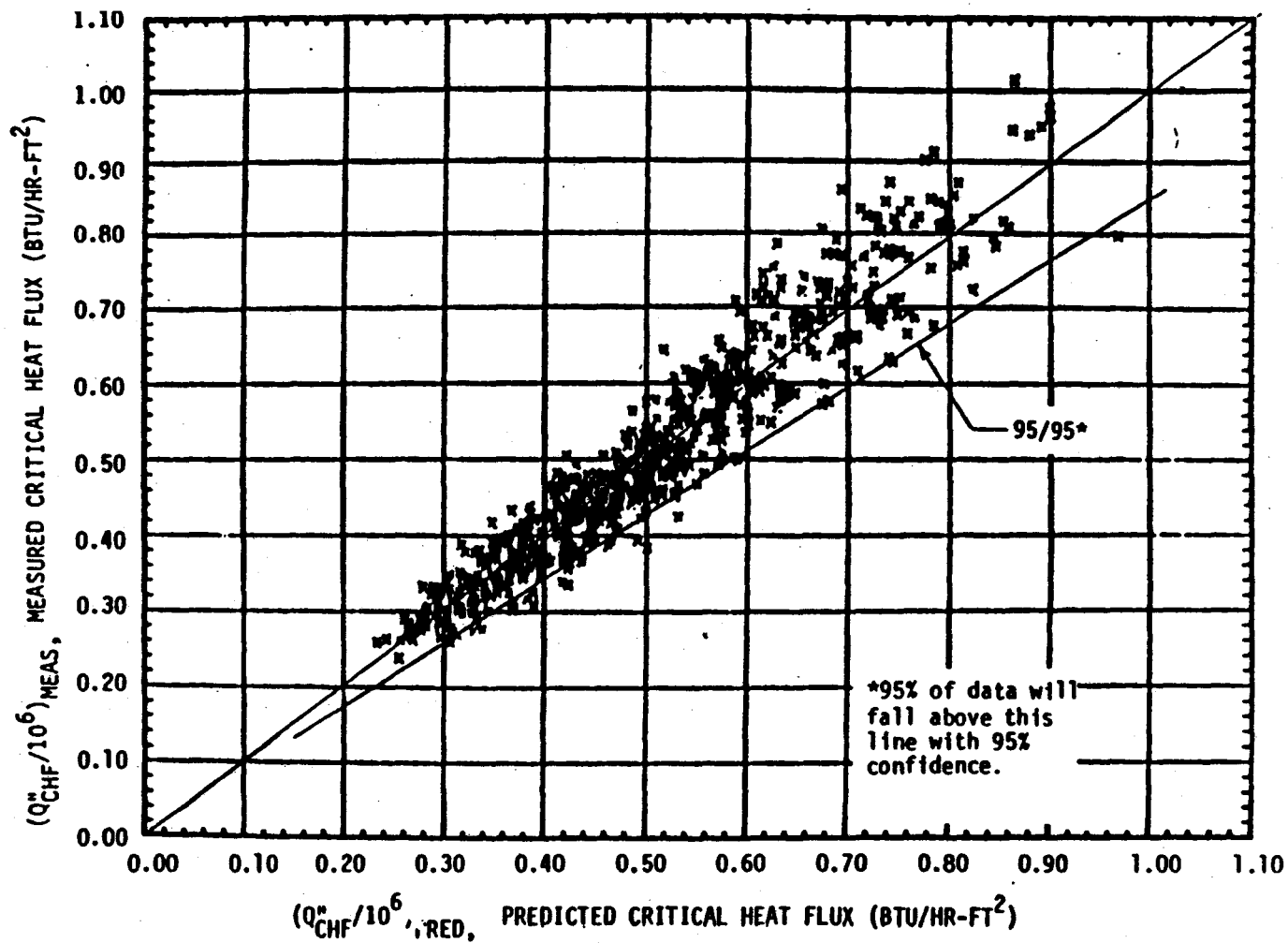
Figure 4.4-2 Deleted.



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6/87

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FIGURE 4.4-2a
MEASURED VERSUS PREDICTED CRITICAL
HEAT FLUX - WRB-1 CORRELATION

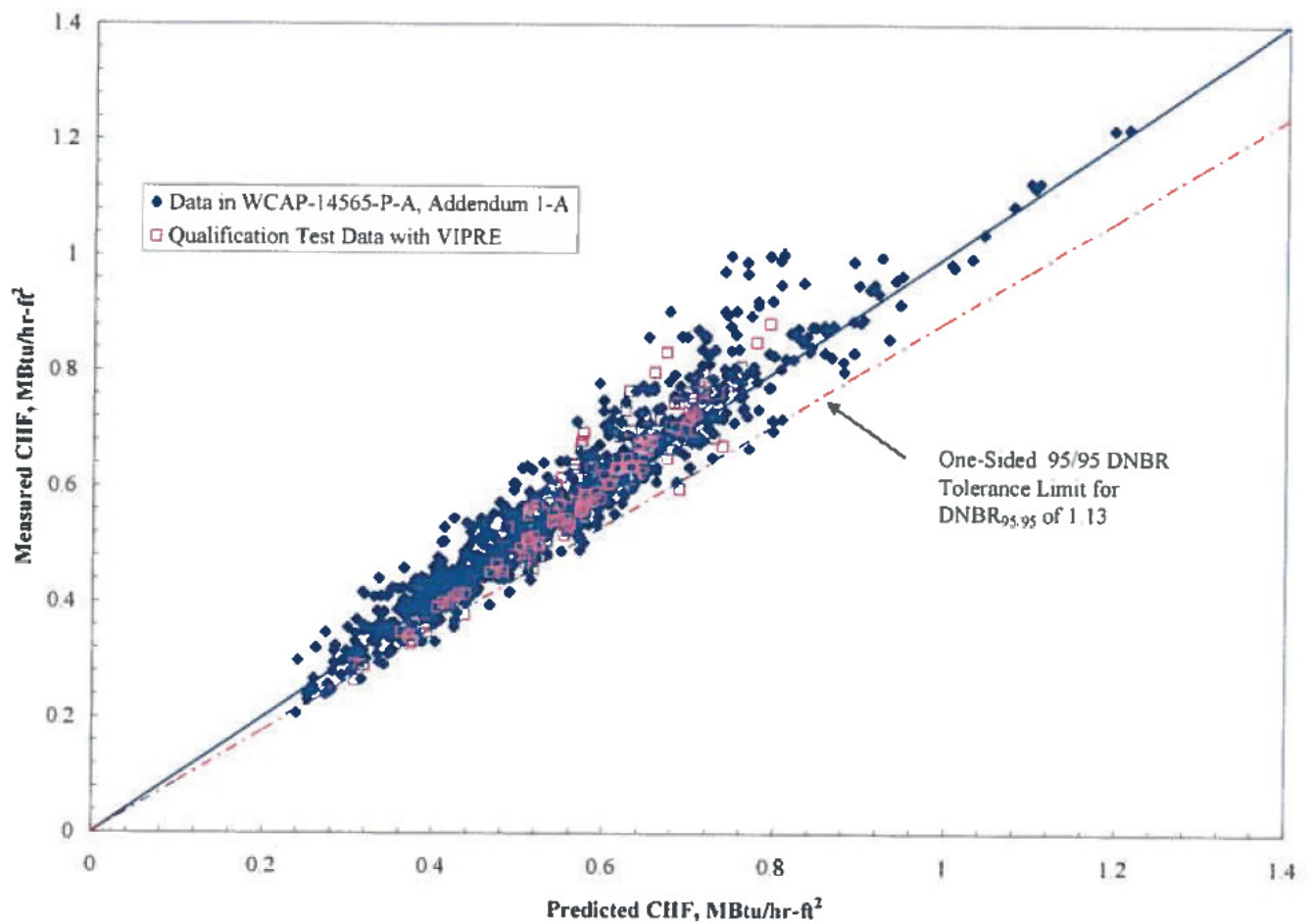


REV. 16
10/06

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FIGURE 4.4-2b
MEASURED VERSUS PREDICTED
CRITICAL HEAT FLUX WRB-2
CORRELATION

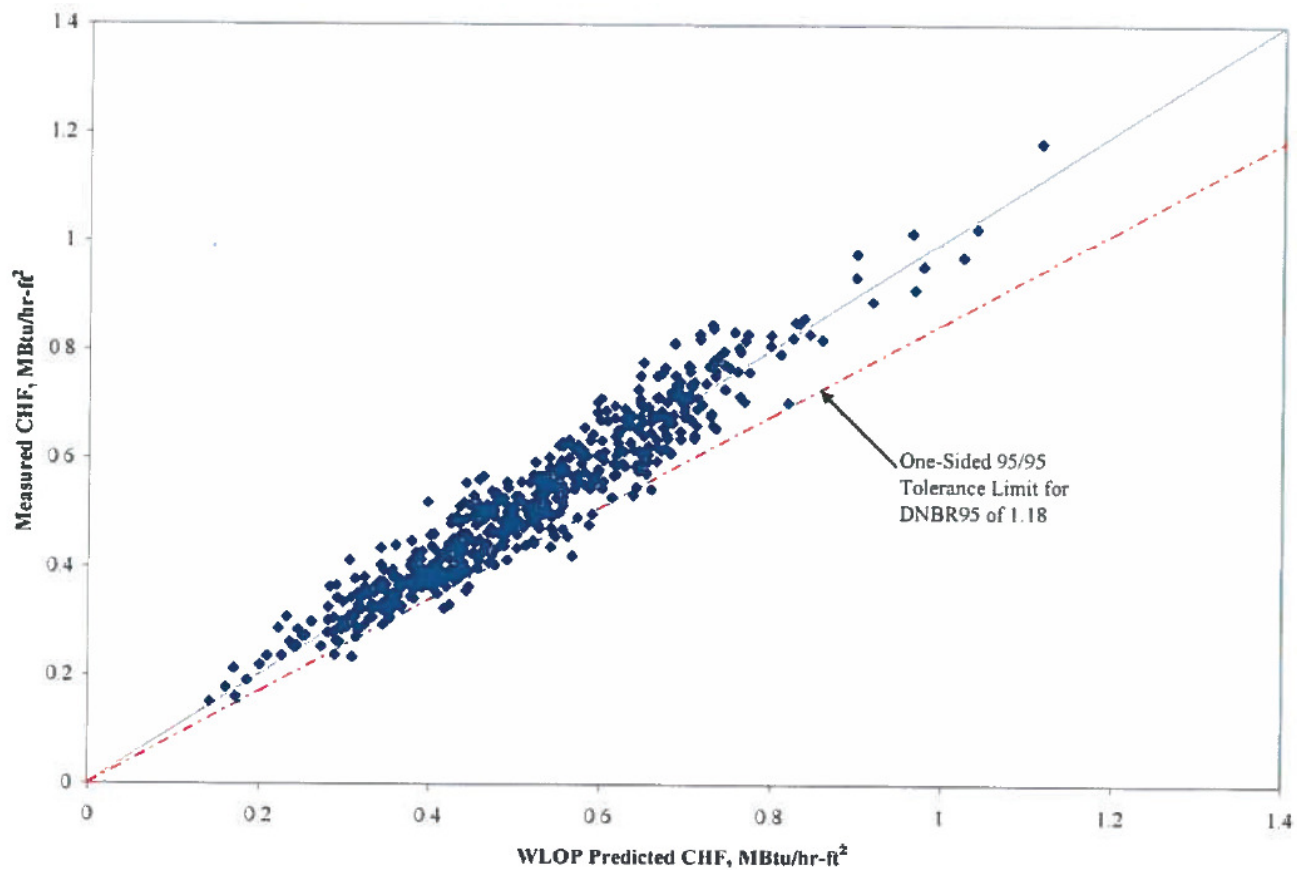
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4/16

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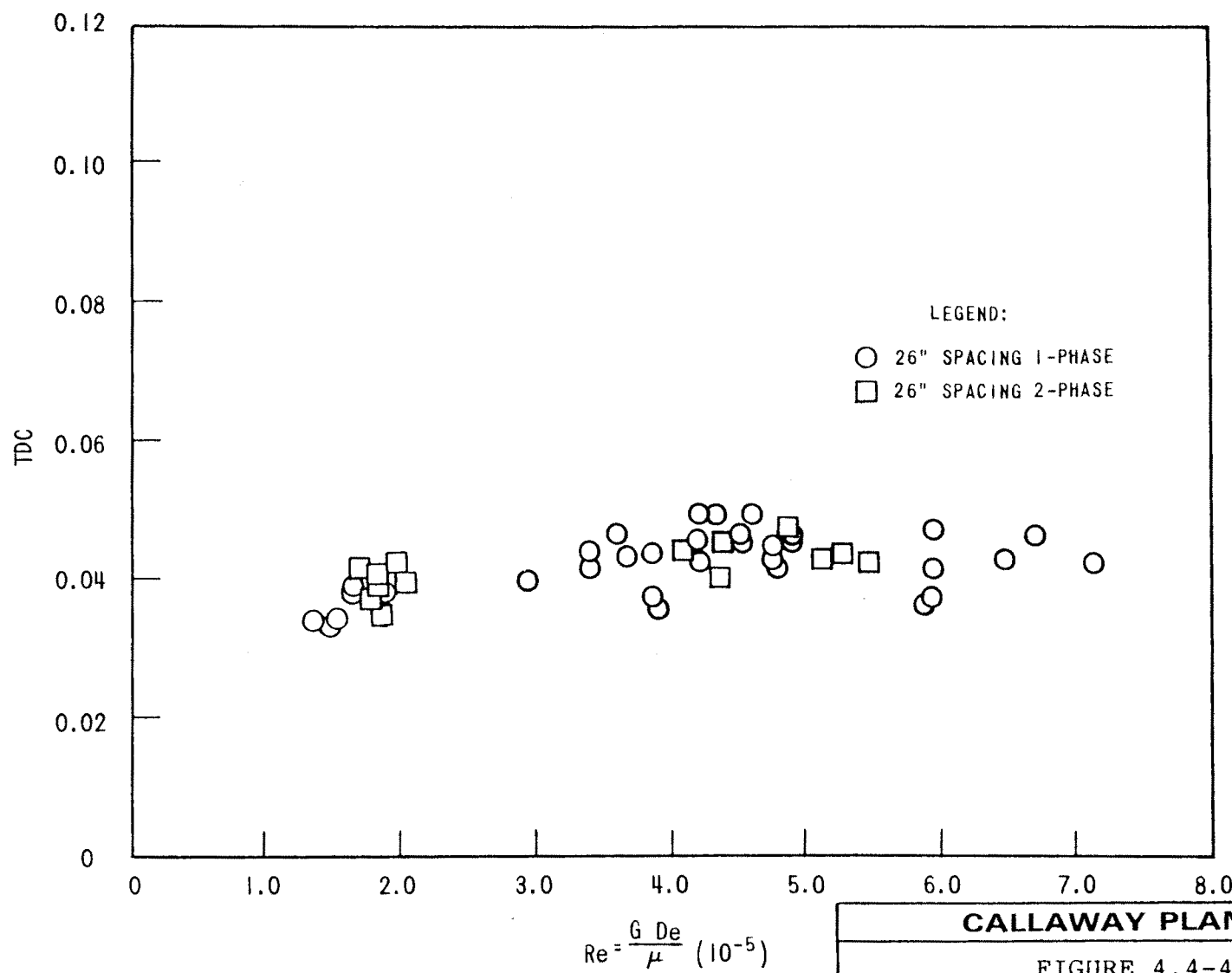
**FIGURE 4.4-3a
MEASURED VERSUS PREDICTED CRITICAL
HEAT FLUX – ABB-NV CORRELATION**



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4/16

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**FIGURE 4.4-3b
MEASURED VERSUS PREDICTED CRITICAL
HEAT FLUX – WLOP CORRELATION**

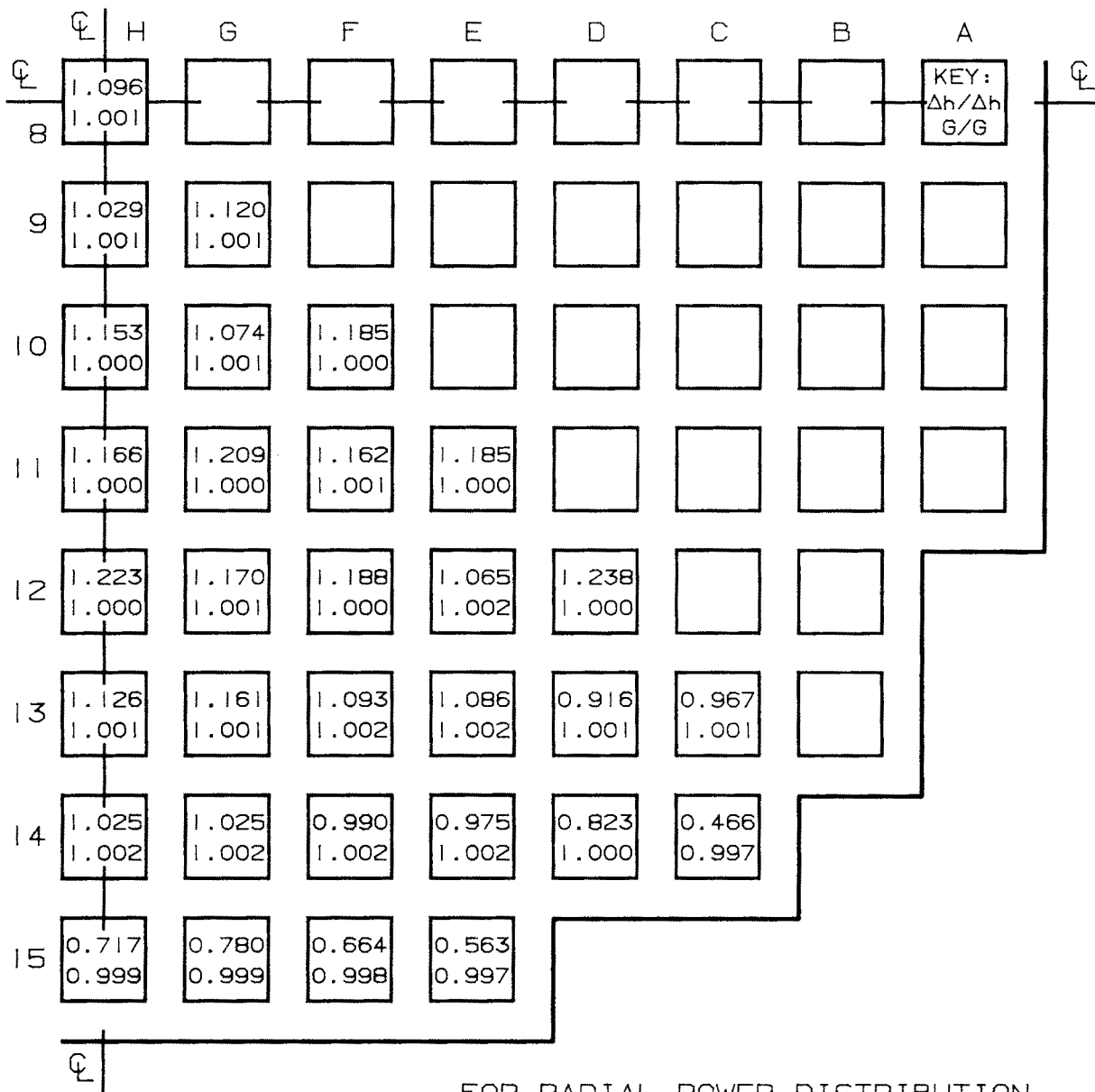


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FIGURE 4.4-4

TDC VERSUS REYNOLDS NUMBER
FOR 26 INCH GRID SPACING



FOR RADIAL POWER DISTRIBUTION
NEAR BEGINNING OF LIFE. HOT FULL
POWER, EQUILIBRIUM XENON

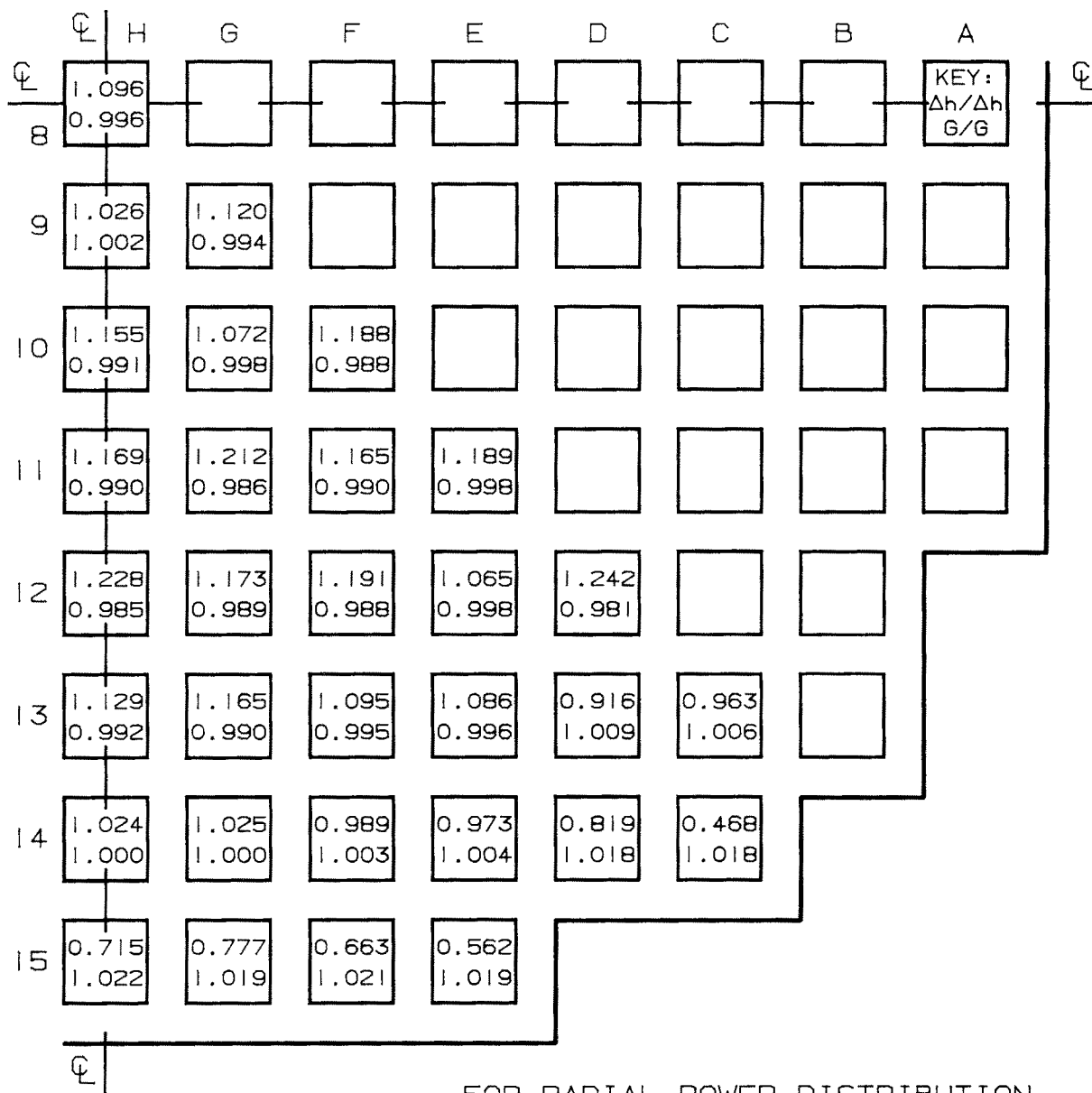
CALCULATED $F_{\Delta H}^N = 1.34$

(CYCLE 1 ONLY)

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**FIGURE 4.4-5
NORMALIZED RADIAL FLOW AND
ENTHALPY DISTRIBUTION AT 4 FOOT
ELEVATION**



FOR RADIAL POWER DISTRIBUTION
NEAR BEGINNING OF LIFE. HOT FULL
POWER, EQUILIBRIUM XENON

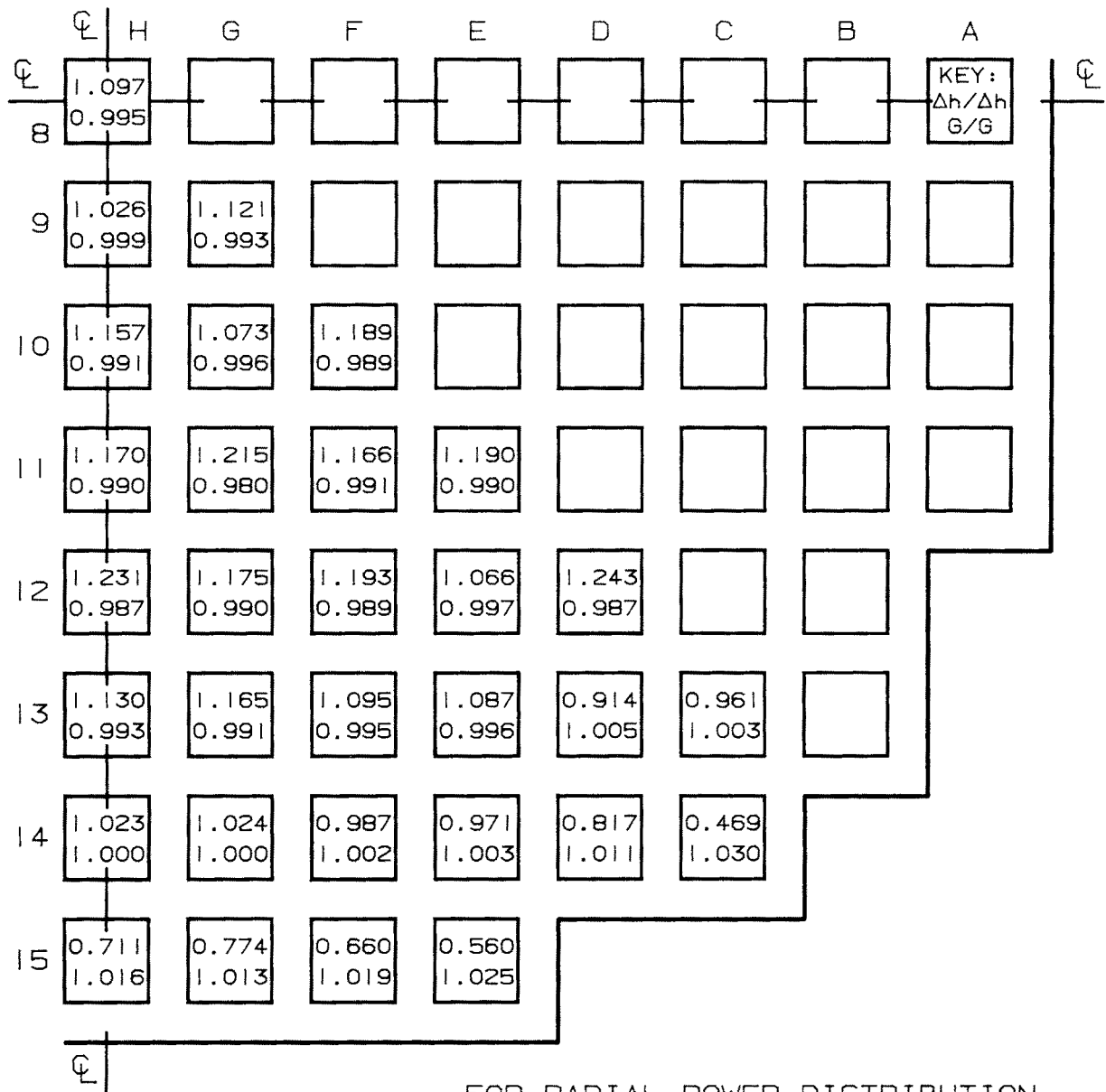
CALCULATED $F_{\Delta H}^N = 1.34$

(CYCLE 1 ONLY)

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FIGURE 4.4-6
NORMALIZED RADIAL FLOW AND
ENTHALPY DISTRIBUTION AT 8 FOOT
ELEVATION



FOR RADIAL POWER DISTRIBUTION
NEAR BEGINNING OF LIFE. HOT FULL
POWER, EQUILIBRIUM XENON

CALCULATED $F_{\Delta H}^N = 1.34$

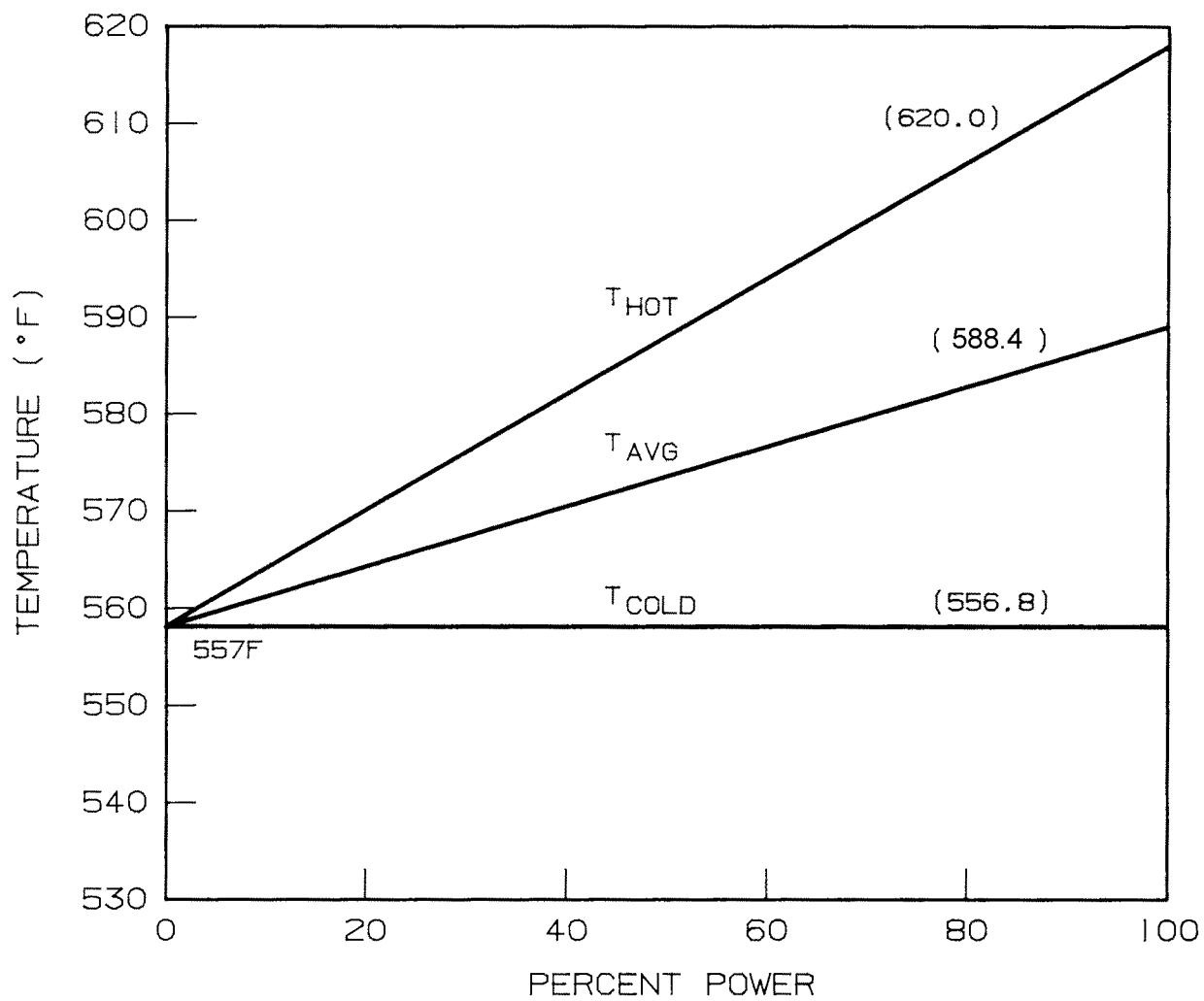
(CYCLE 1 ONLY)

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FIGURE 4.4-7
NORMALIZED RADIAL FLOW AND
ENTHALPY DISTRIBUTION AT 12 FOOT
ELEVATION - CORE EXIT

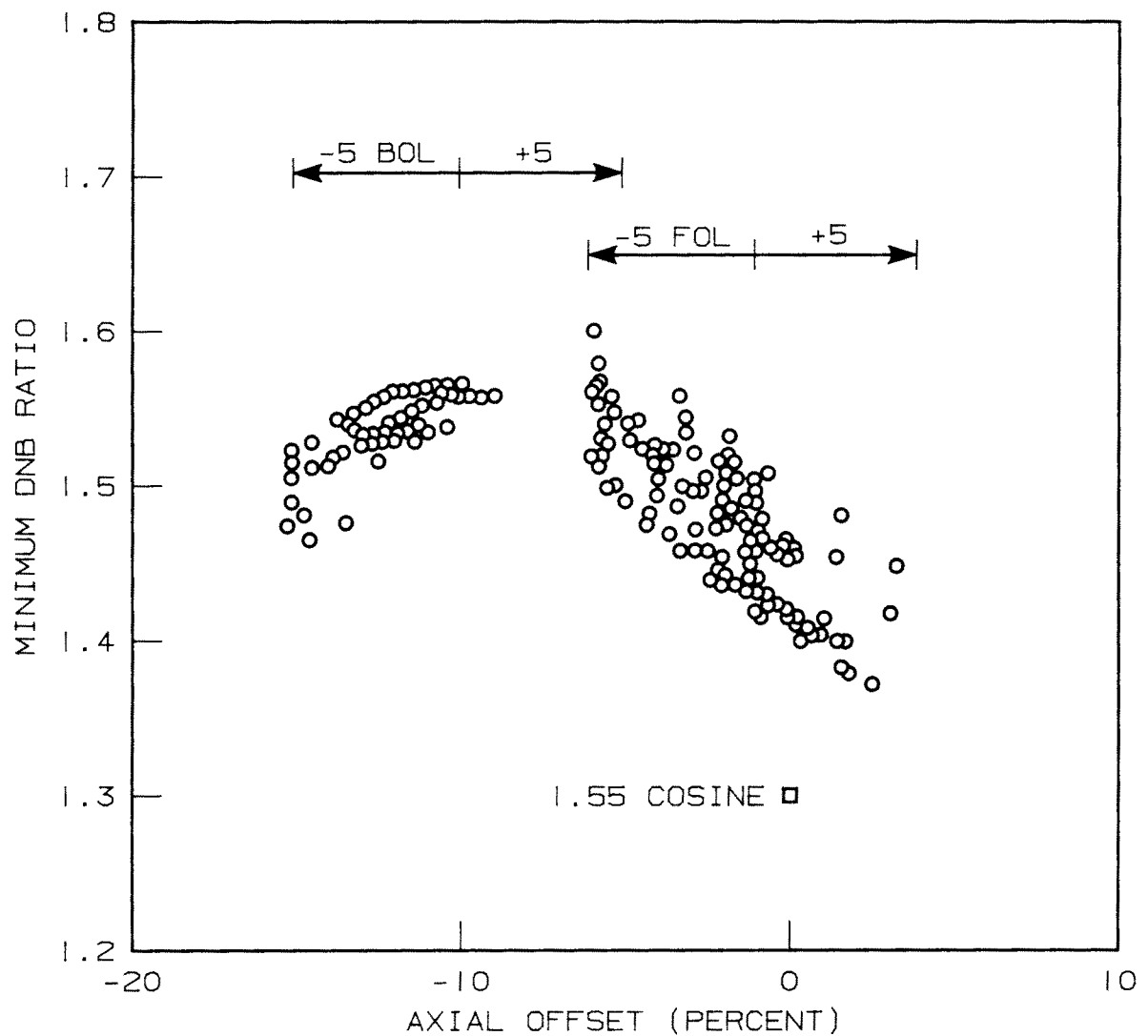
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REV. OL-15
5/06

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**FIGURE 4.4-10
REACTOR COOLANT SYSTEM
TEMPERATURE-PERCENT POWER MAP**



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FIGURE 4.4-11
100% POWER SHAPES EVALUATED AT
CONDITIONS REPRESENTATIVE OF LOSS
OF FLOW, ALL SHAPES EVALUATED
WITH $FN_{\Delta H} = 1.55$
(CYCLE 1 ONLY)

Figure 4.4-12 Deleted.

Figure 4.4-13 Deleted.

Figure 4.4-14 Deleted.

Figure 4.4-15 Deleted.

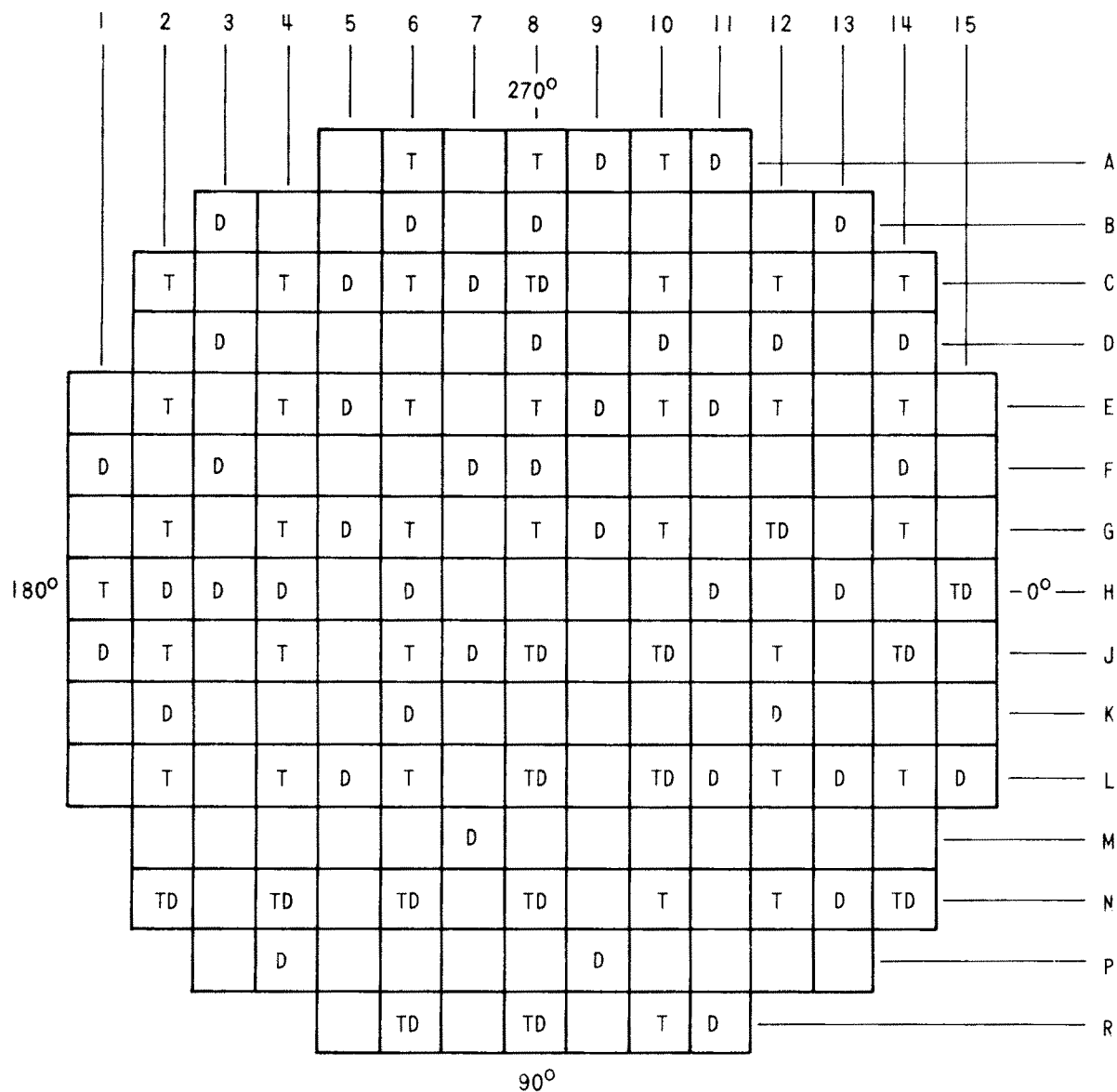
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Figure 4.4-17 Deleted.

Figure 4.4-18 Deleted.

Figure 4.4-19 Deleted.

Figure 4.4-20 Deleted.



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FIGURE 4.4-21

DISTRIBUTION OF INCORE
INSTRUMENTATION