

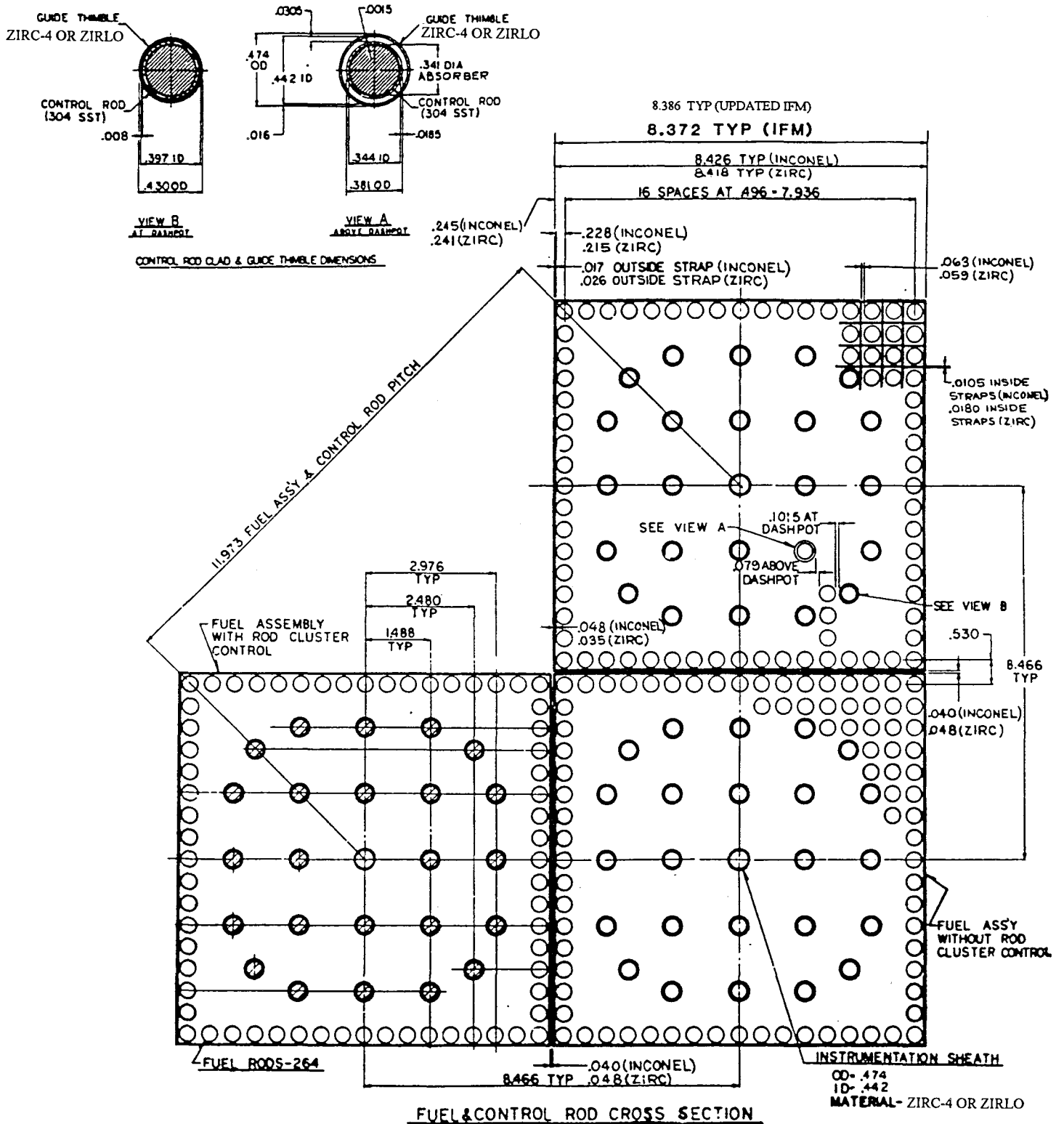
DIMENSIONS ARE IN INCHES (NOMINAL)

CALLAWAY PLANT

FIGURE 4.2-1

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

REV. OL-9 SHEET 1
 5/97



CALLAWAY PLANT

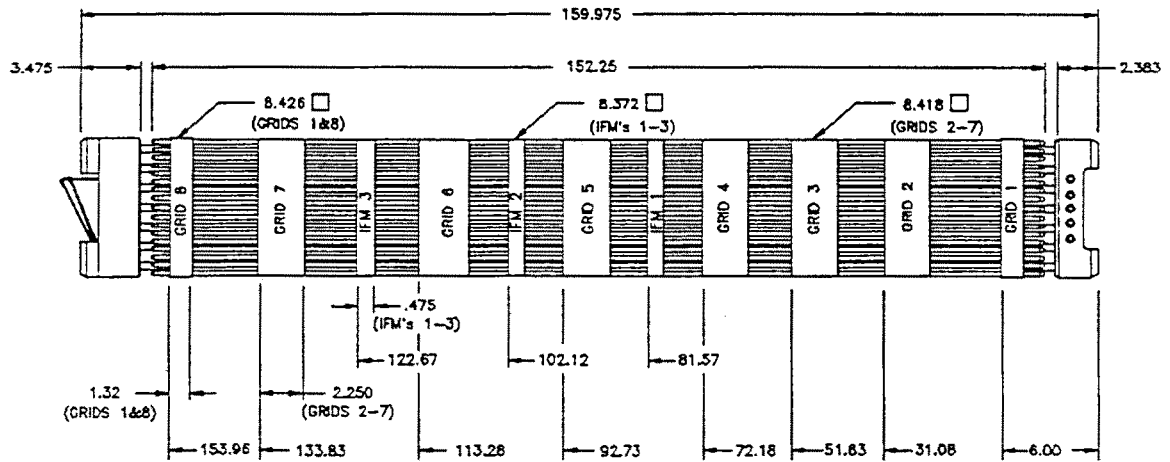
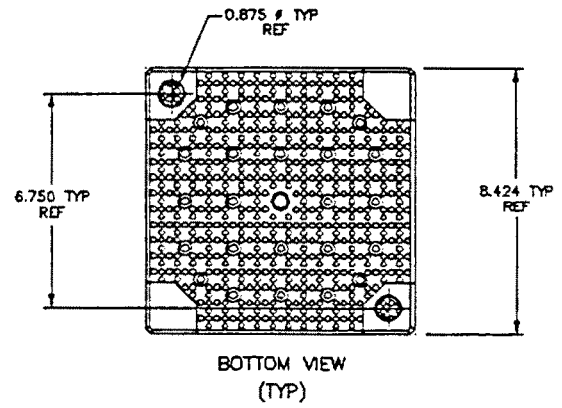
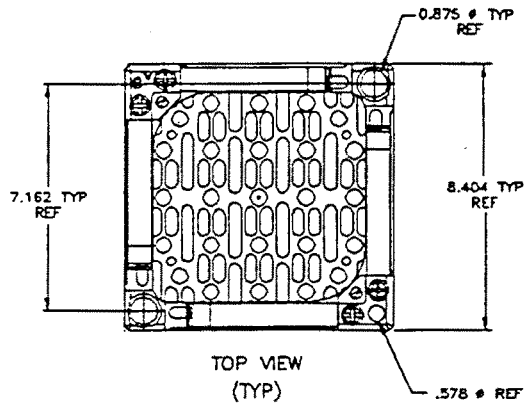
FIGURE 4.2-1

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

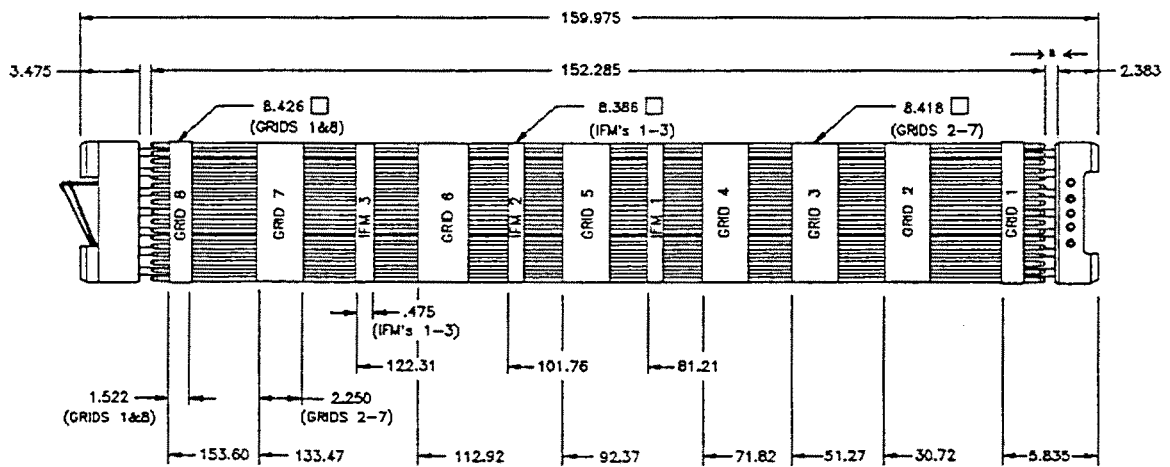
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SHEET 2

Figure 4.2-1A has been deleted.



17X17 VANTAGE 5 FUEL ASSEMBLY



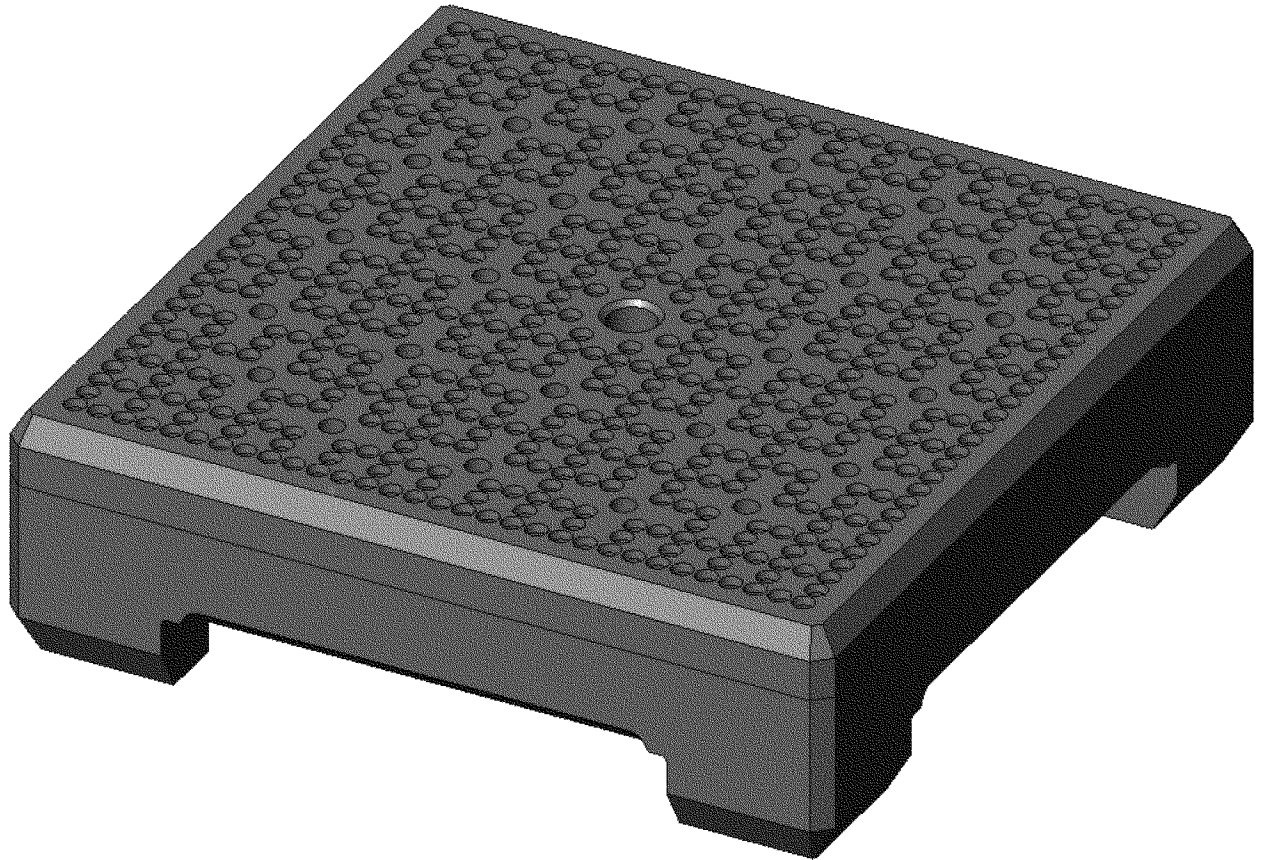
17X17 VANTAGE 5 UPDATE FUEL ASSEMBLY

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

DIMENSIONS ARE IN INCHES (NOMINAL)

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

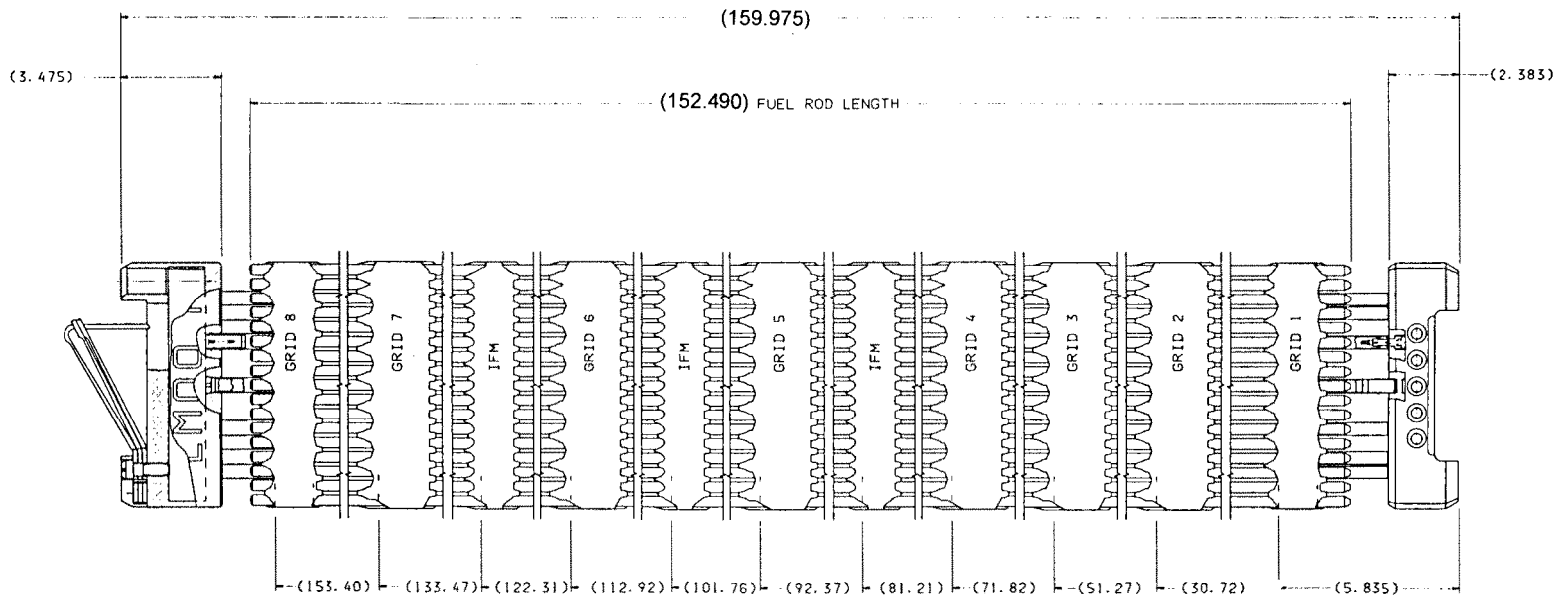
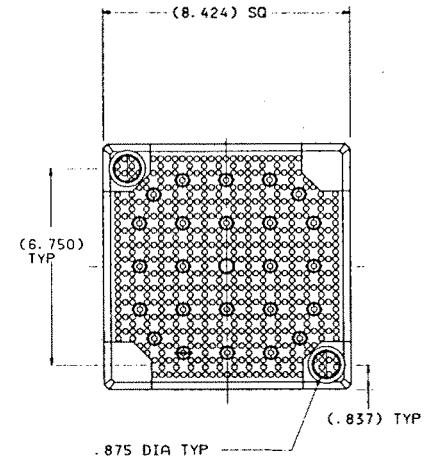
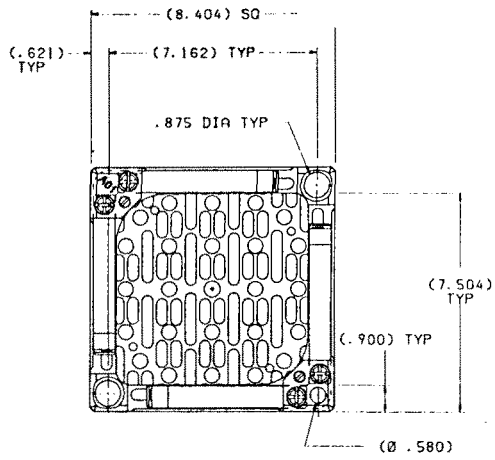


CALLAWAY PLANT

FIGURE 4.2-2A

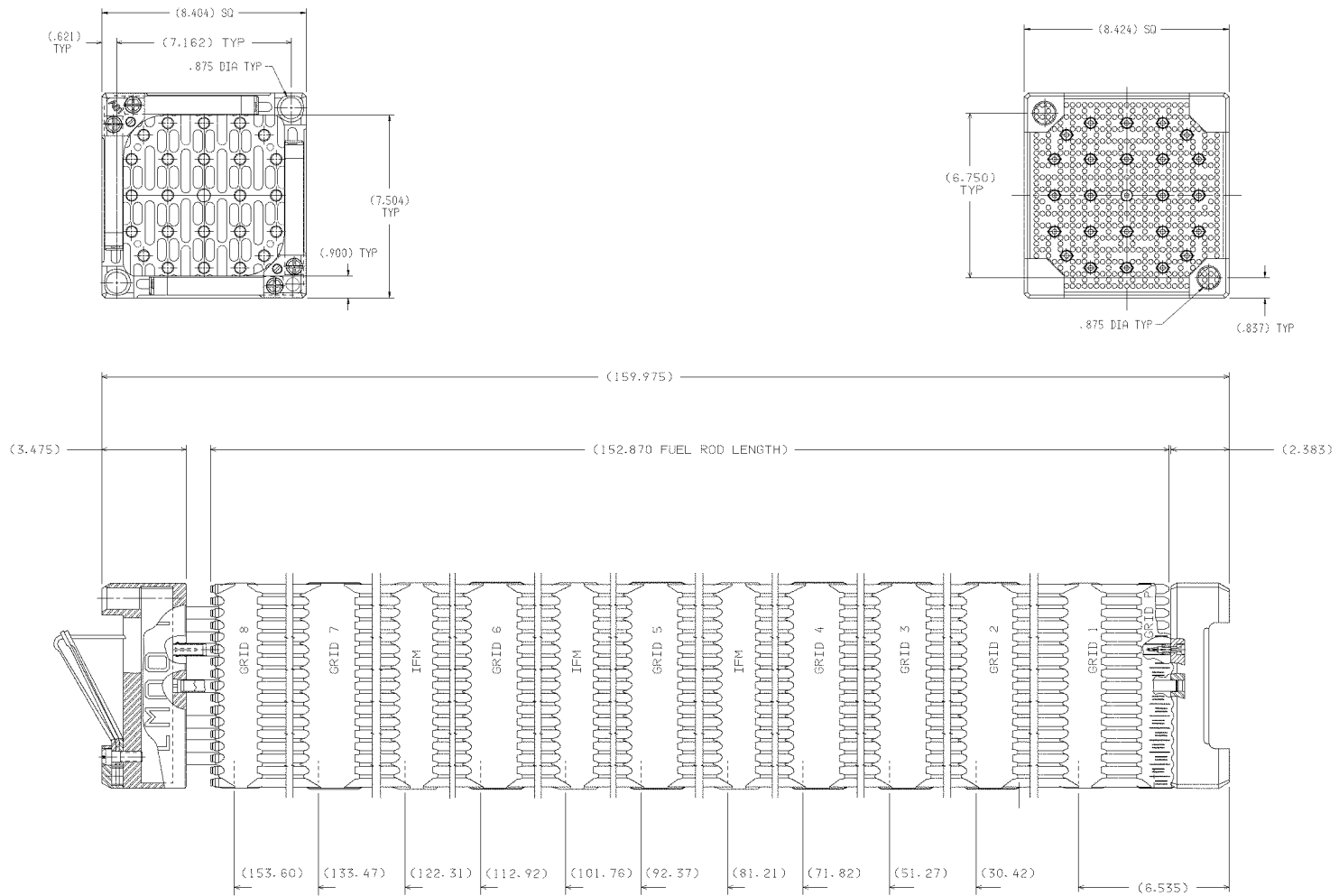
STANDARDIZED BOTTOM NOZZLE
PICTURE OF 17 X 17 SDFBN

REV. 6 5/12



REV OL-11
5/00

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

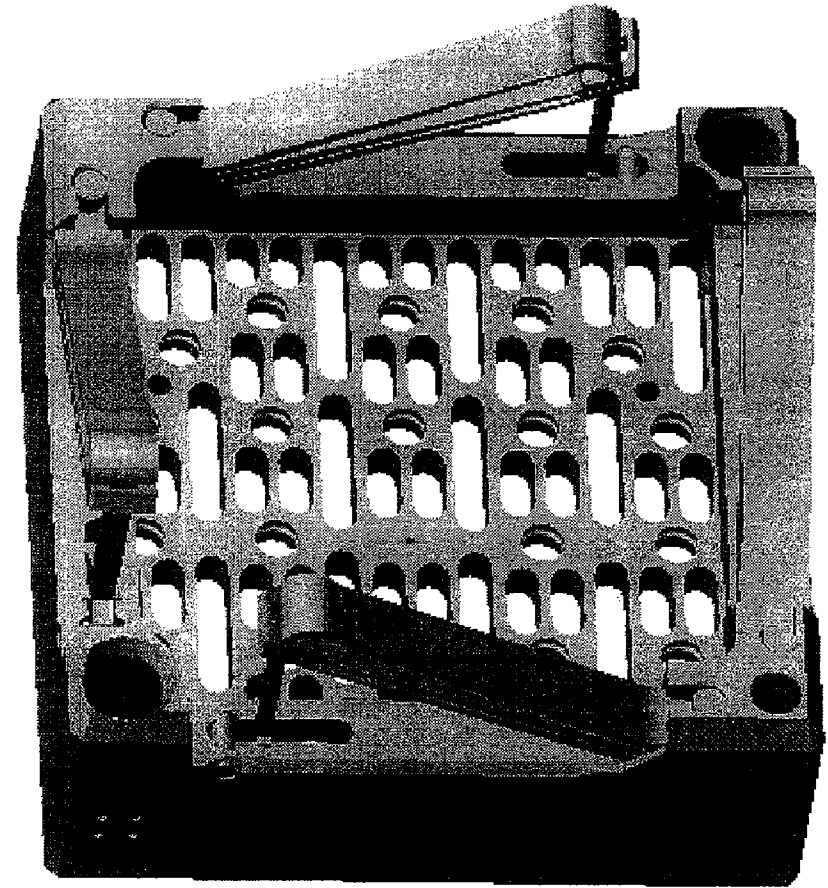
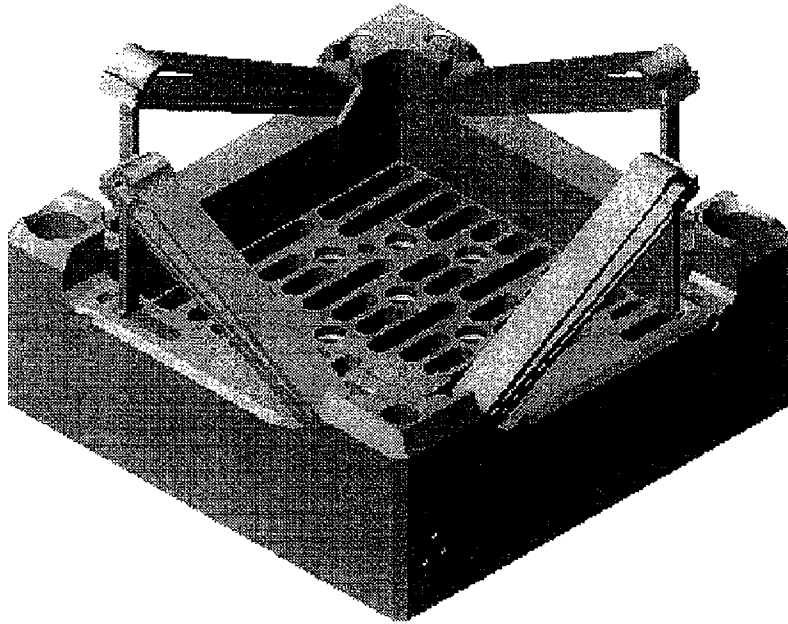


CALLAWAY PLANT

FIGURE 4.2-2C

17X17 PERFORMANCE+
FUEL ASSEMBLY

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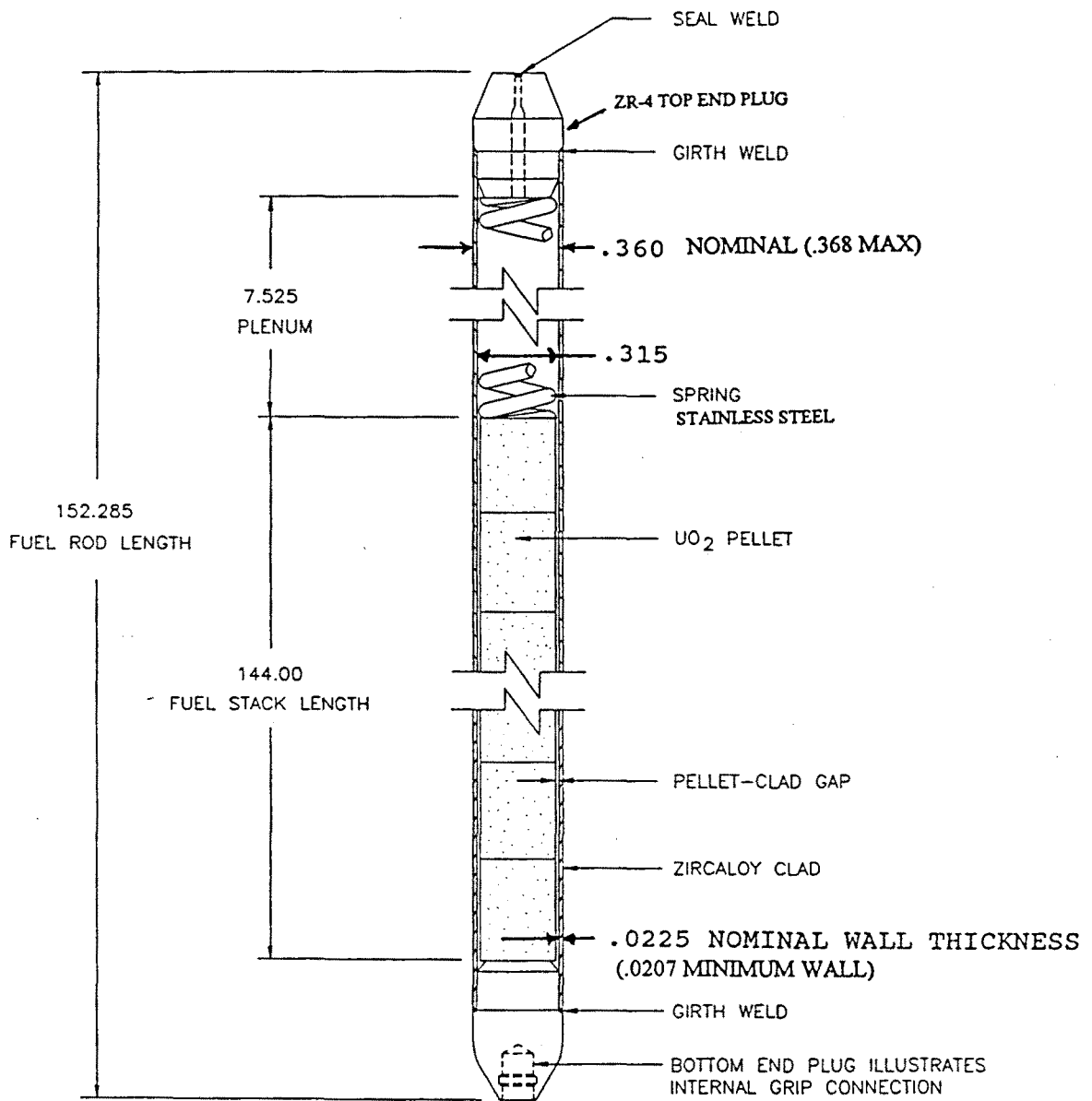


CALLAWAY PLANT

FIGURE 4.2-2D

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

REV. 0 2/09



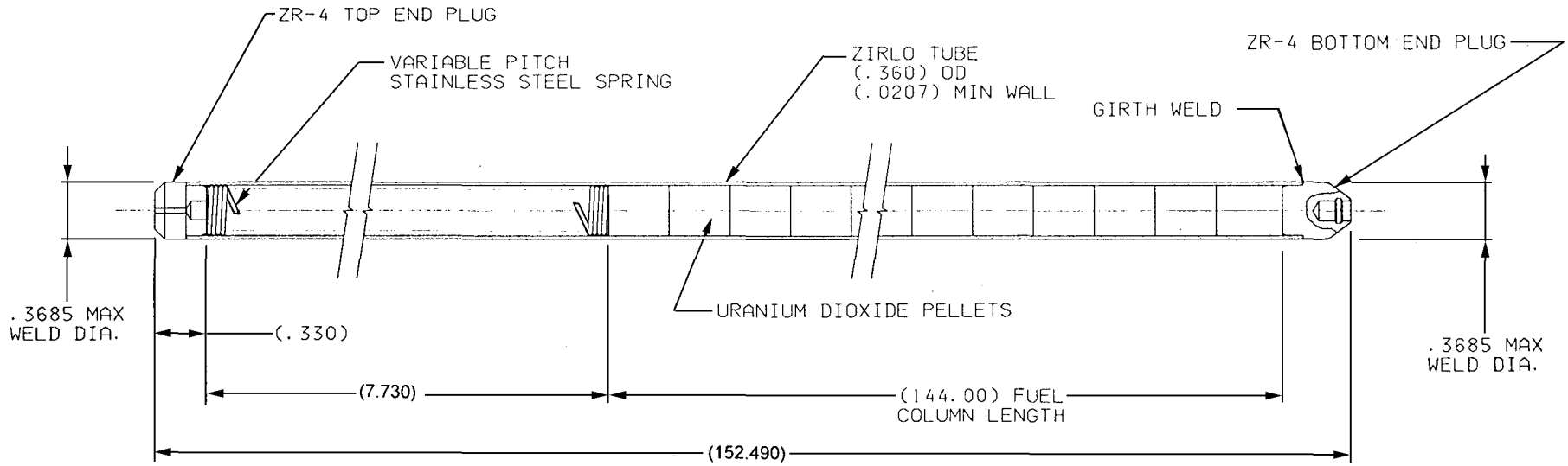
17x17 VANTAGE 5 UPDATE FUEL ROD ASSEMBLY

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)

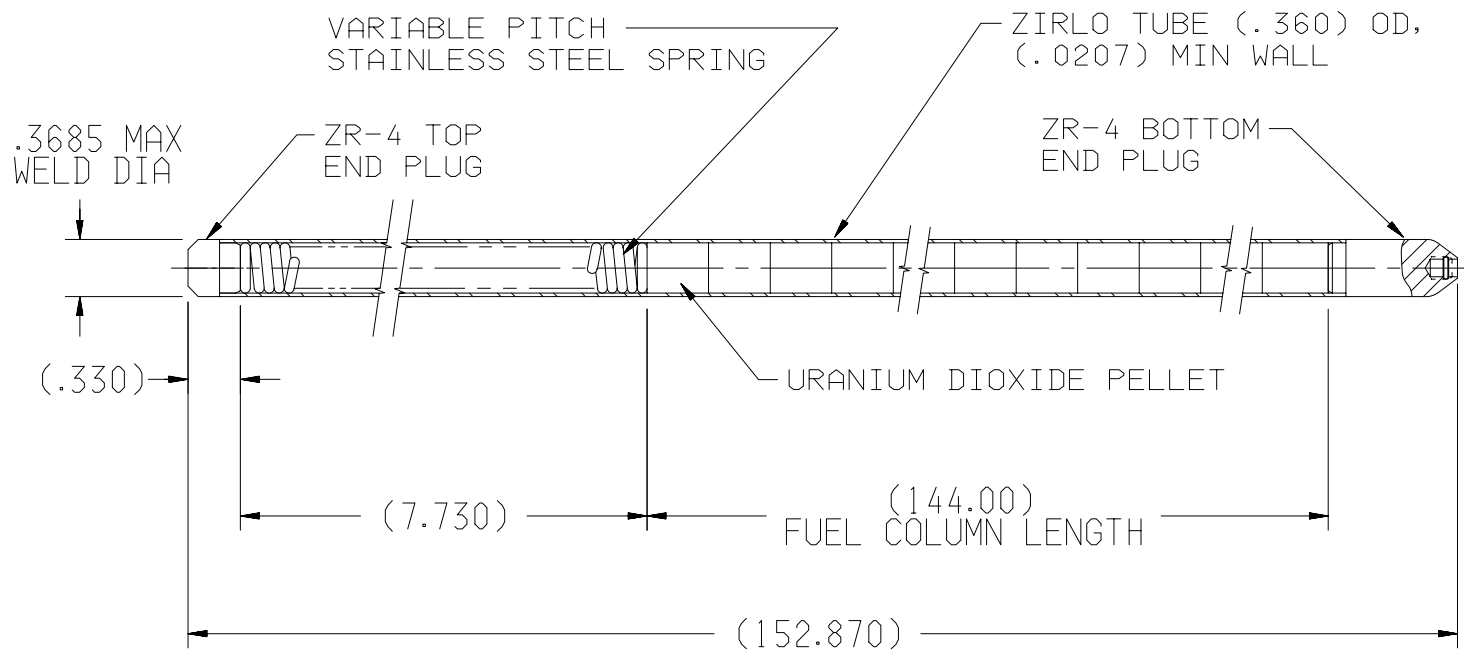
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CALLAWAY PLANT
FUEL ROD SCHEMATIC
FIGURE 4.2-3



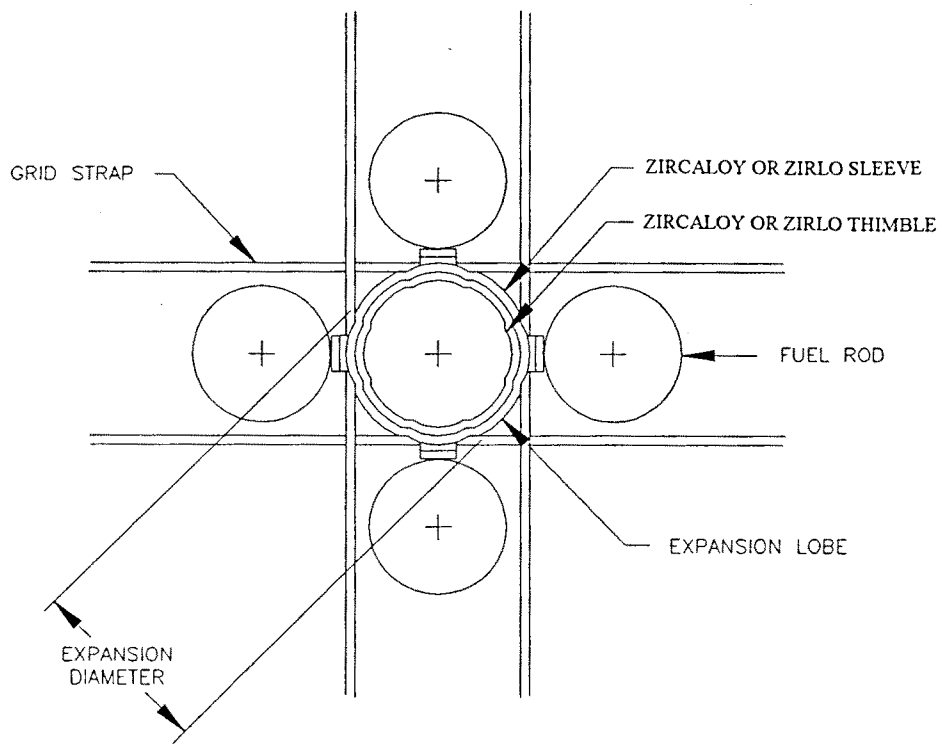
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CALLAWAY PLANT
17X17 VANTAGE + FUEL ROD ZIRLO™ FIGURE 4.2-3A



REV OL-13
05/03

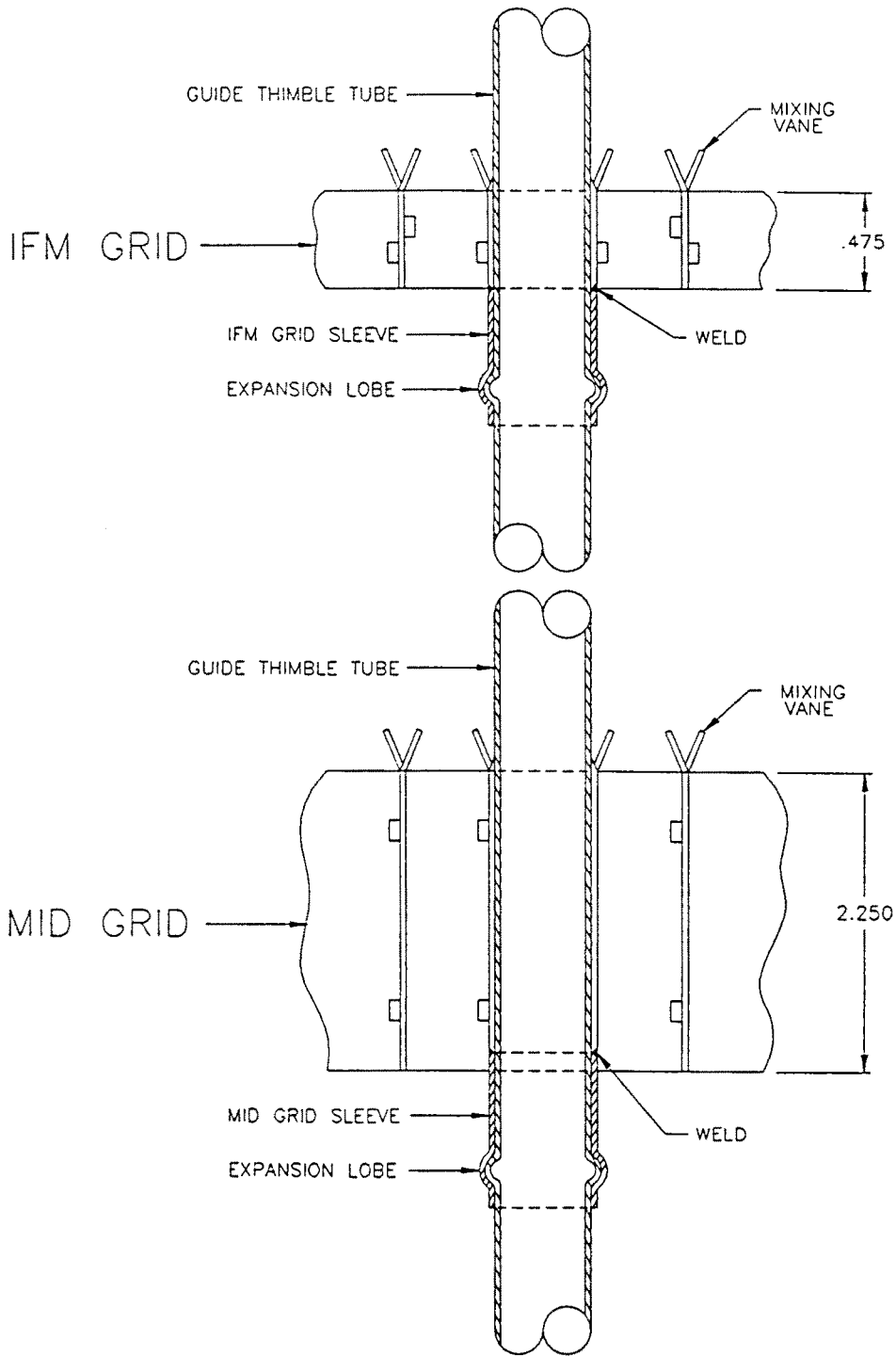
CALLAWAY PLANT
17X17 PERFORMANCE+ FUEL ASSEMBLY
FIGURE 4.2-3B



IFM AND MID GRID EXPANSION JOINT DESIGN

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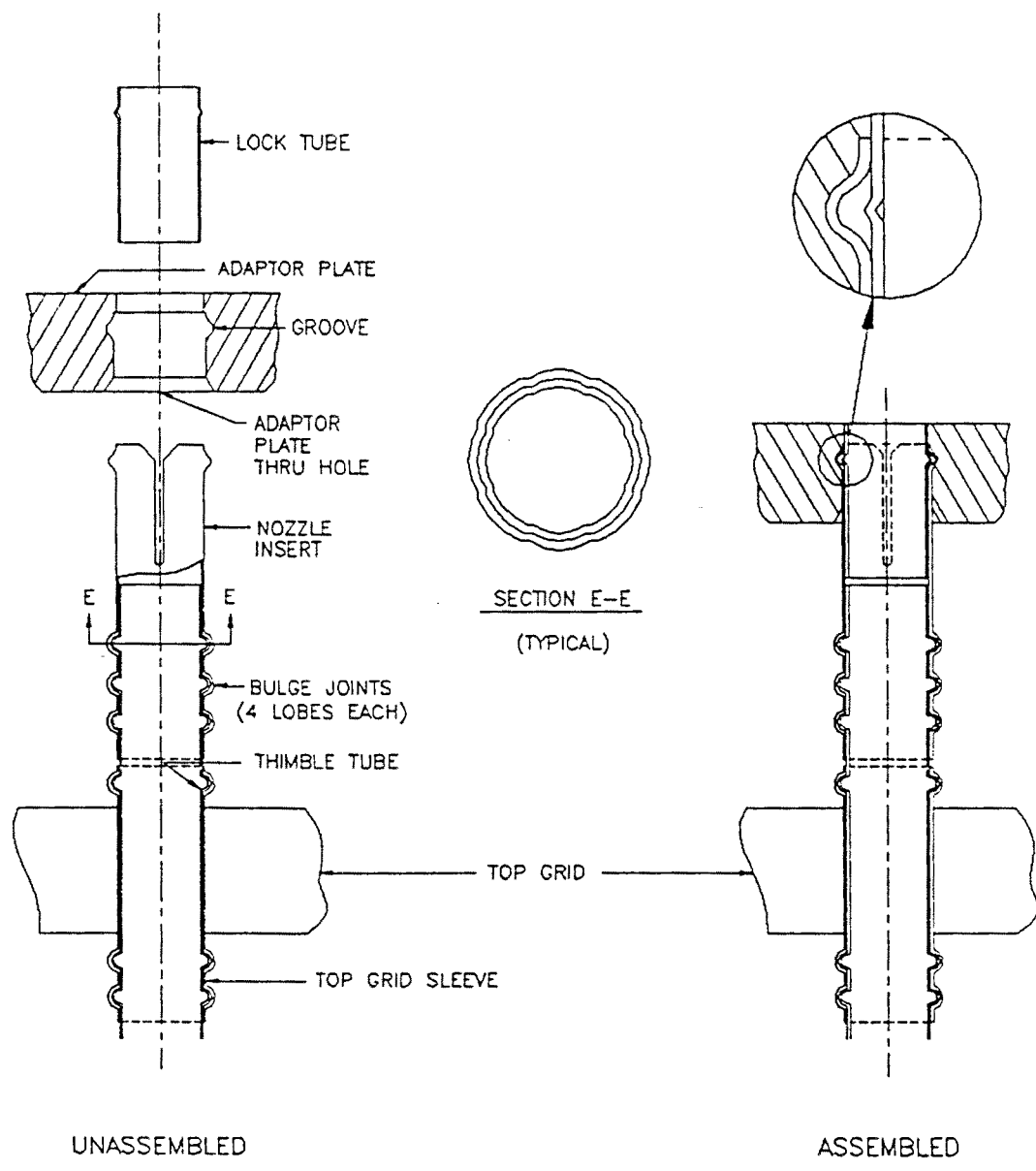
CALLAWAY PLANT
PLAN VIEW
FIGURE 4.2-4



DIMENSIONS ARE IN INCHES (NOMINAL)

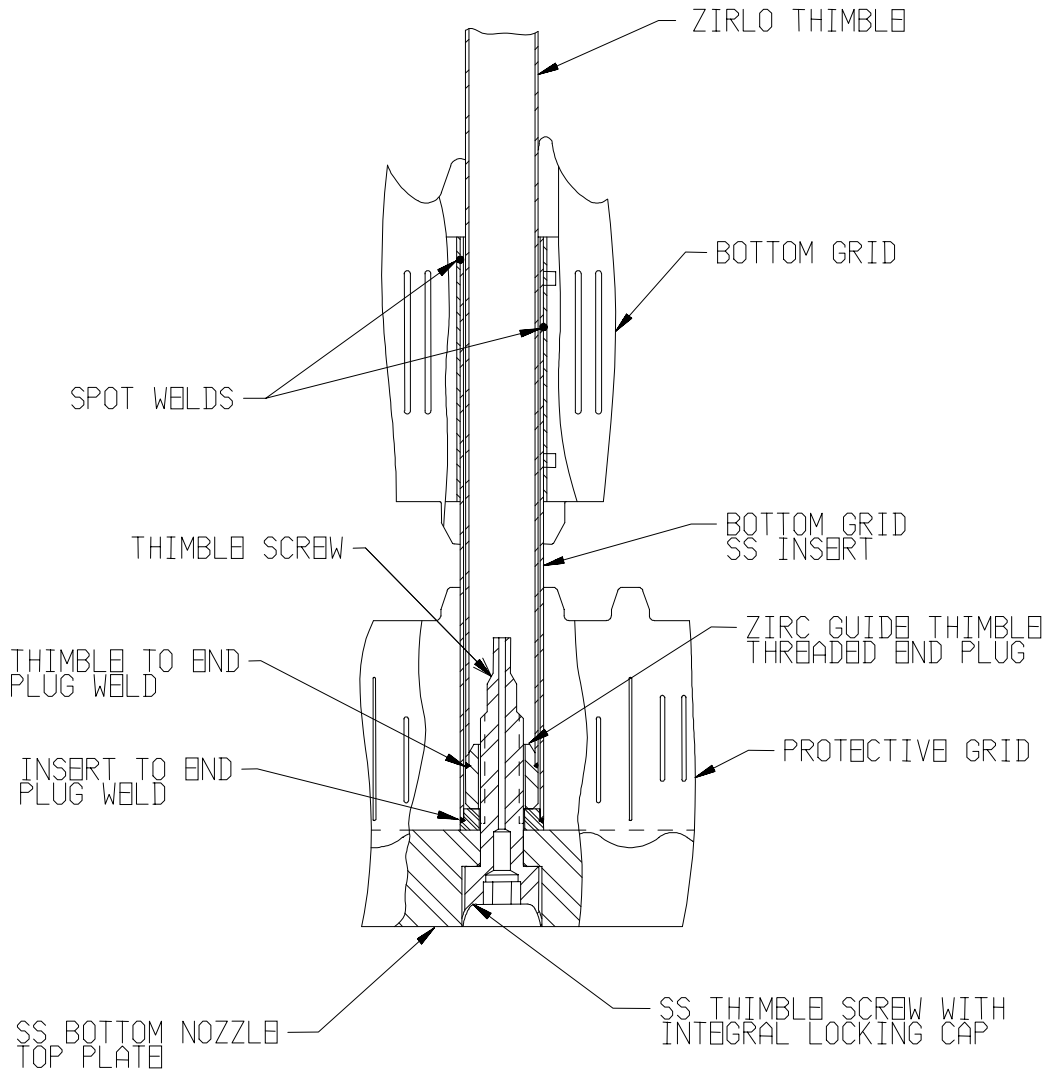
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CALLAWAY PLANT
GRID TO THIMBLE ATTACHMENT JOINTS
FIGURE 4.2-5



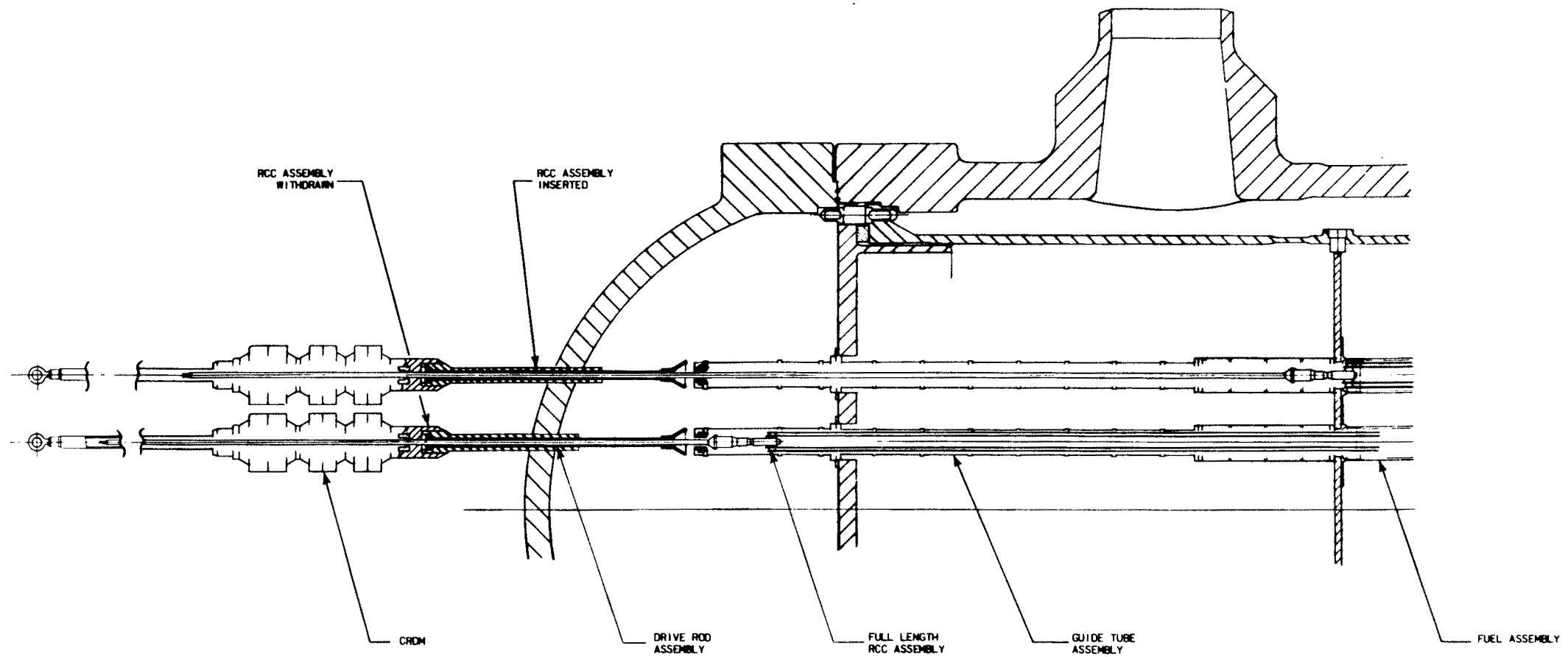
REV. OL-5
6/91

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



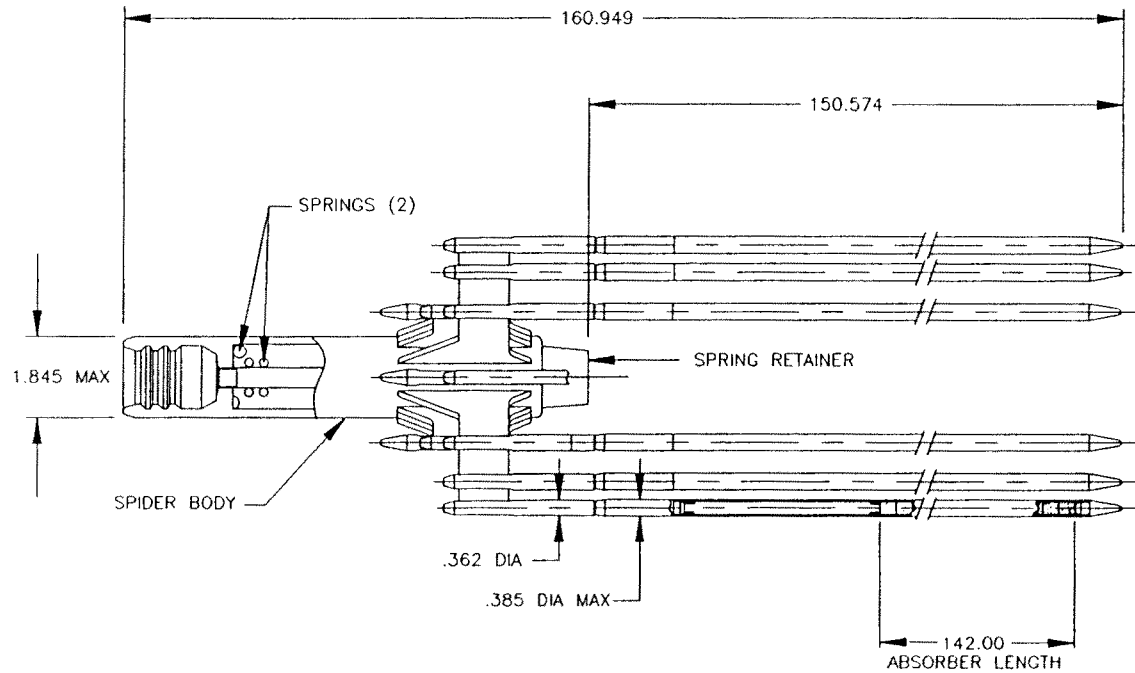
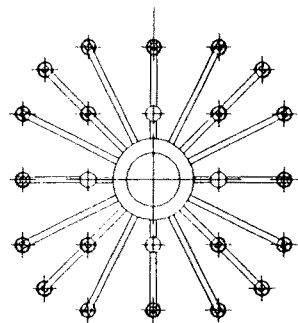
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CALLAWAY PLANT
GUIDE THIMBLE TO BOTTOM NOZZLE JOINT
FIGURE 4.2-7



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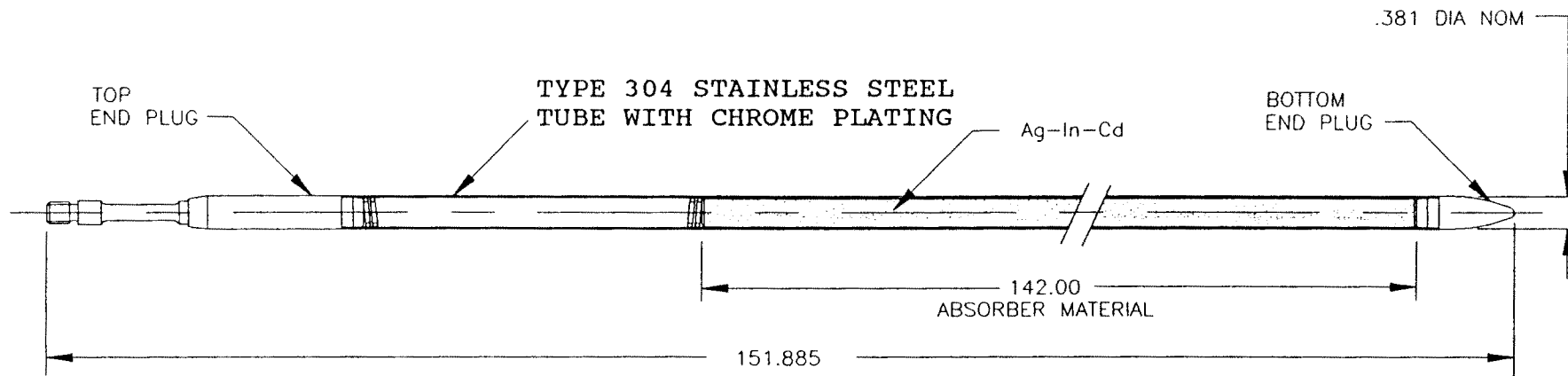
CALLAWAY PLANT FIGURE 4.2-8 ROD CLUSTER CONTROL AND DRIVE ROD ASSEMBLY WITH INTERFACING COMPONENTS



80% SILVER
15% INDIUM
5% CADMIUM

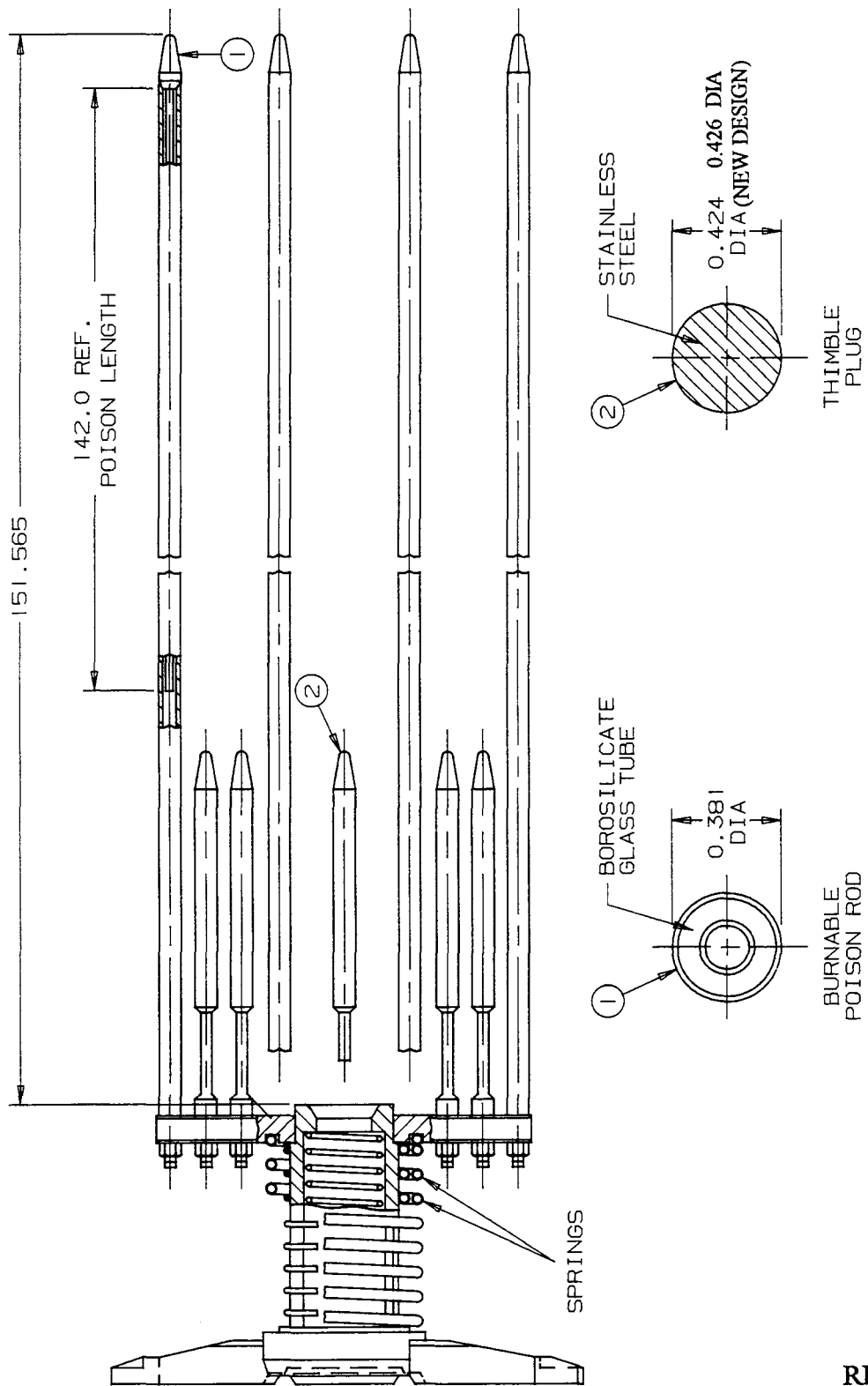
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CALLAWAY PLANT
FULL-LENGTH RCCA OUTLINE
FIGURE 4.2-9



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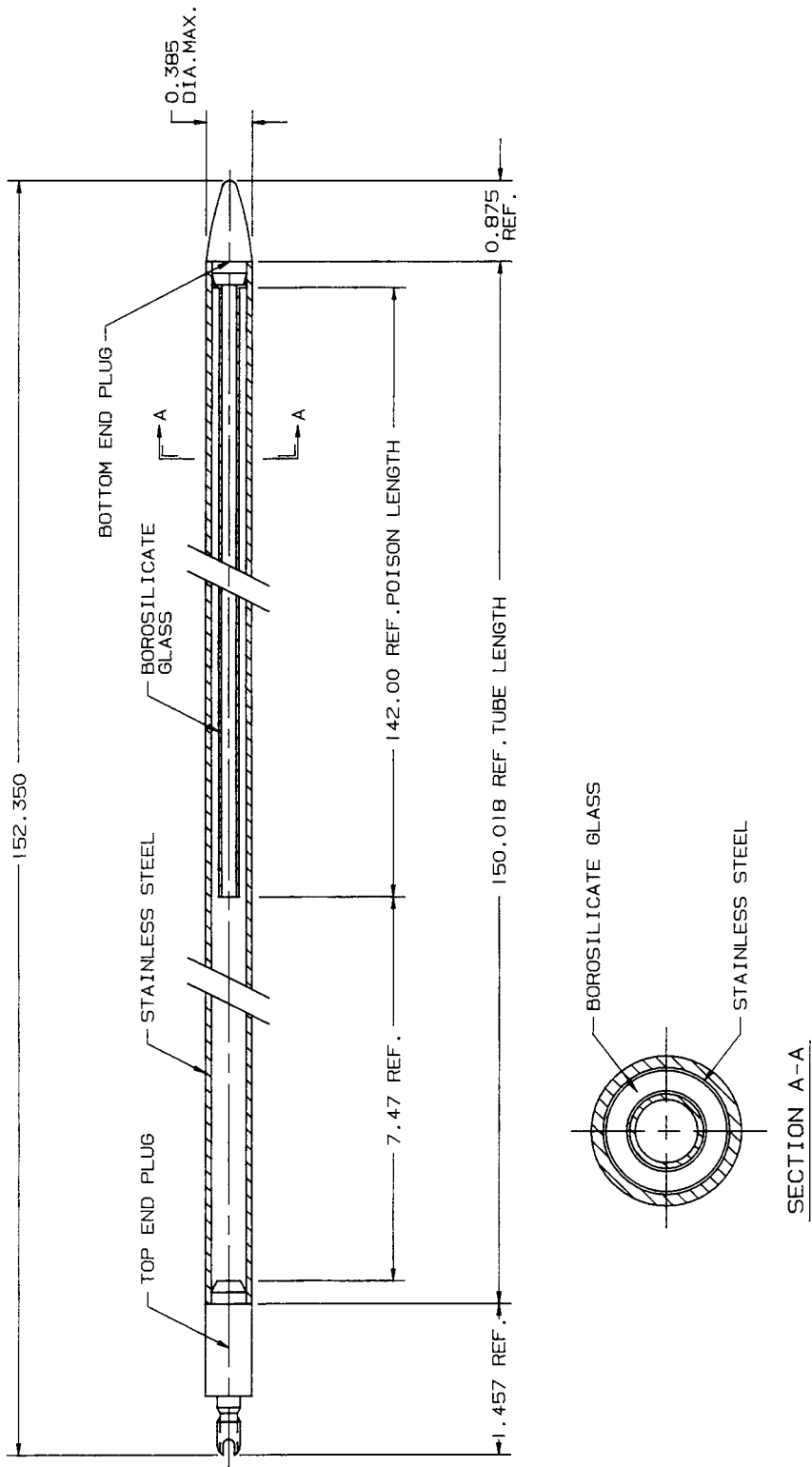
CALLAWAY PLANT
ABSORBER ROD
FIGURE 4.2-10



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5/94

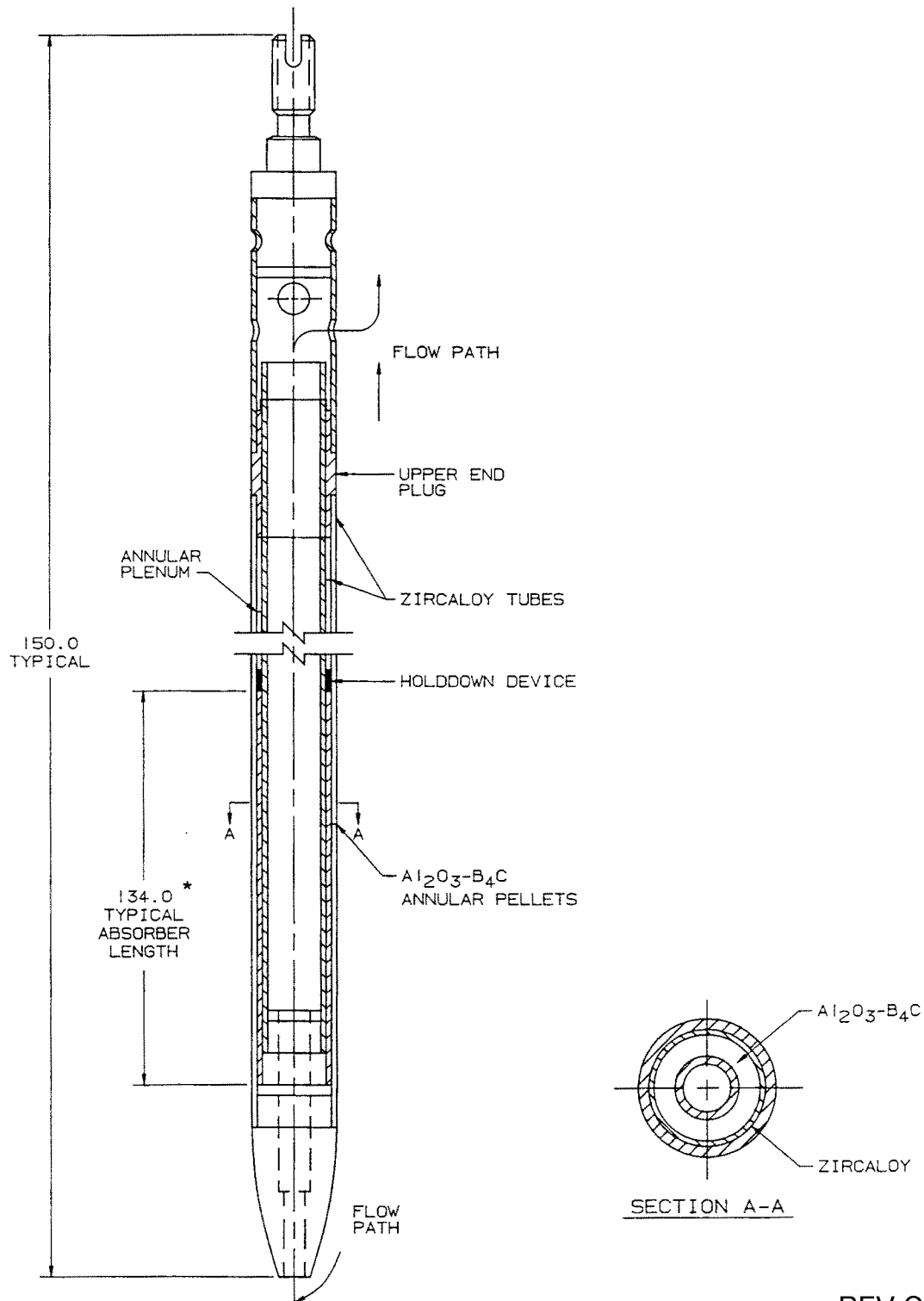
CALLAWAY PLANT

**FIGURE 4.2-11
BURNABLE ABSORBER
ASSEMBLY 17X17**



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<p>CALLAWAY PLANT</p> <p>FIGURE 4.2-12 BURNABLE ABSORBER ROD CROSS SECTION 17X17</p>



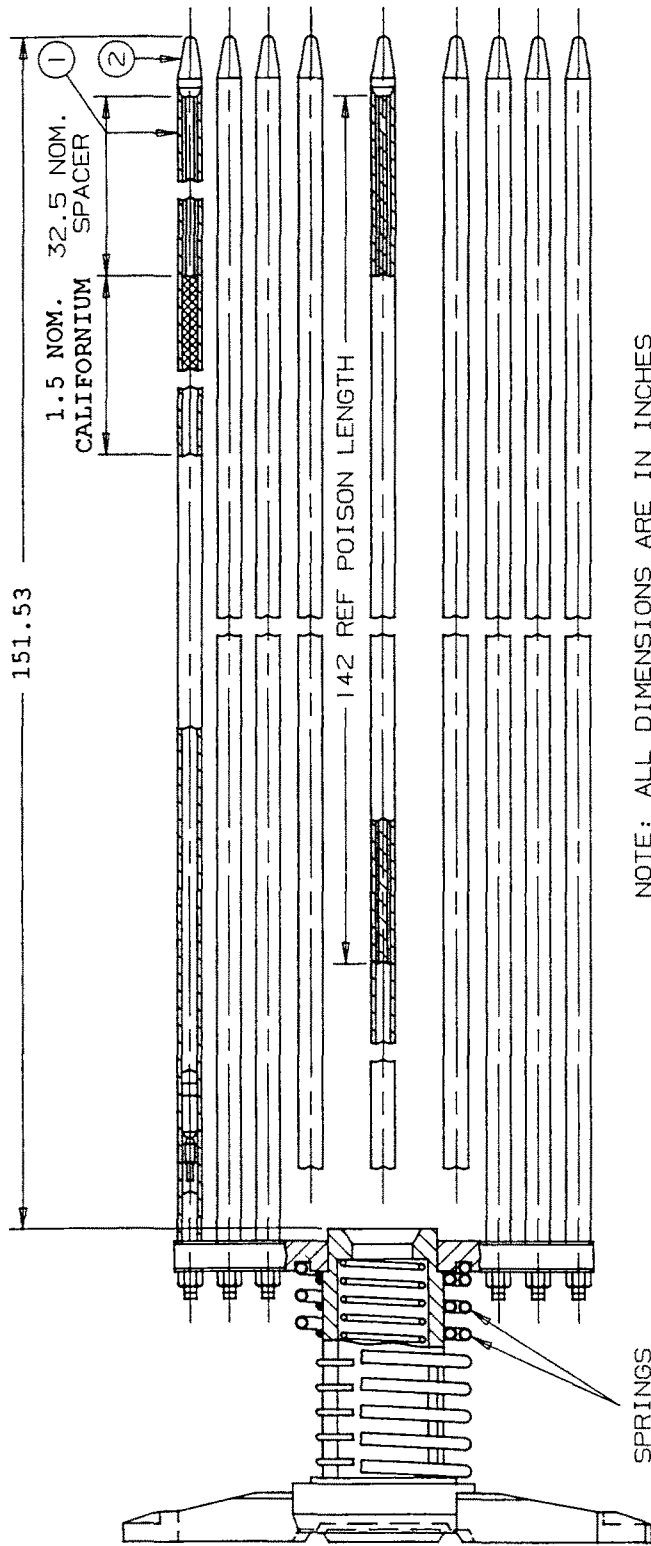
REV OL-13
05/03

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

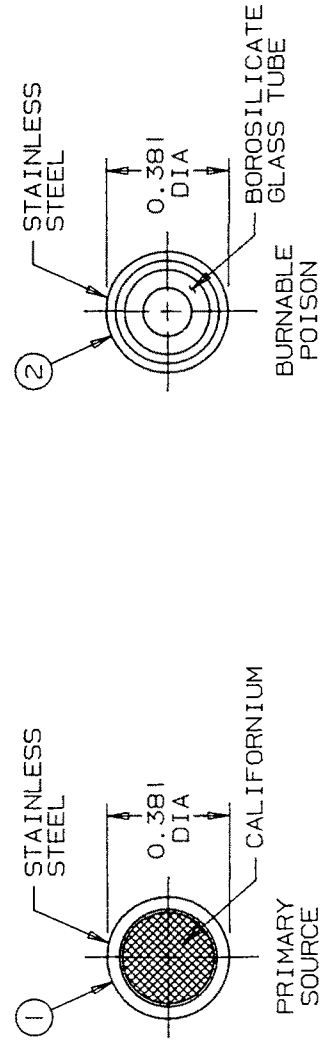
* 132.0 inches in Current
feed assemblies

014-A-20766-165

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



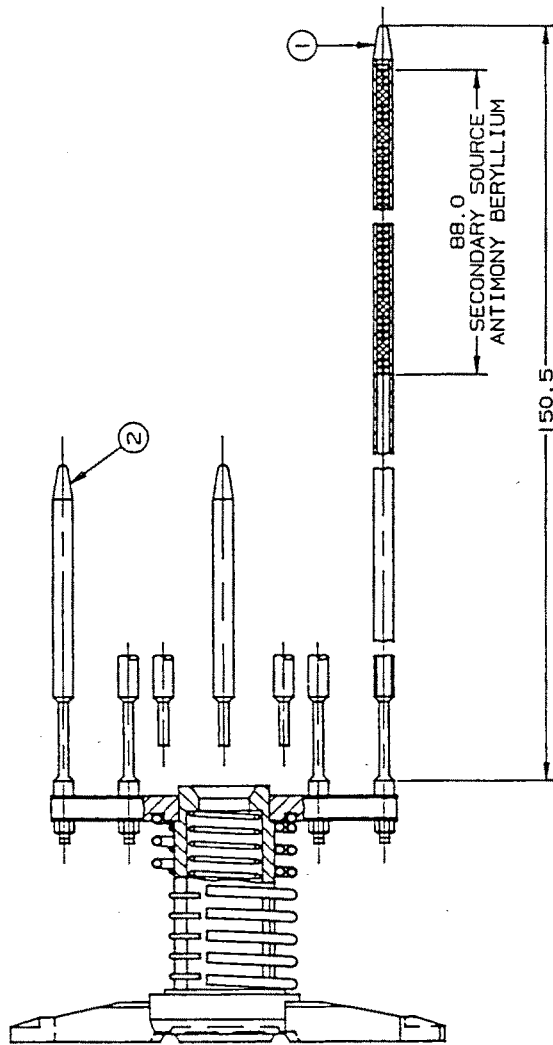
NOTE: ALL DIMENSIONS ARE IN INCHES



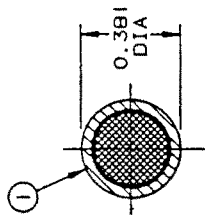
NOTE: See Figure 4.2-15A for new spring design

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<p>CALLAWAY PLANT</p> <p>FIGURE 4.2-13 PRIMARY SOURCE ASSEMBLY 17X17</p>
--

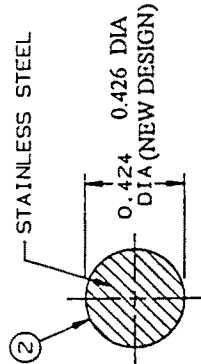


NOTE: ALL DIMENSIONS ARE IN INCHES



SECONDARY SOURCE

(QUANTITY-4)



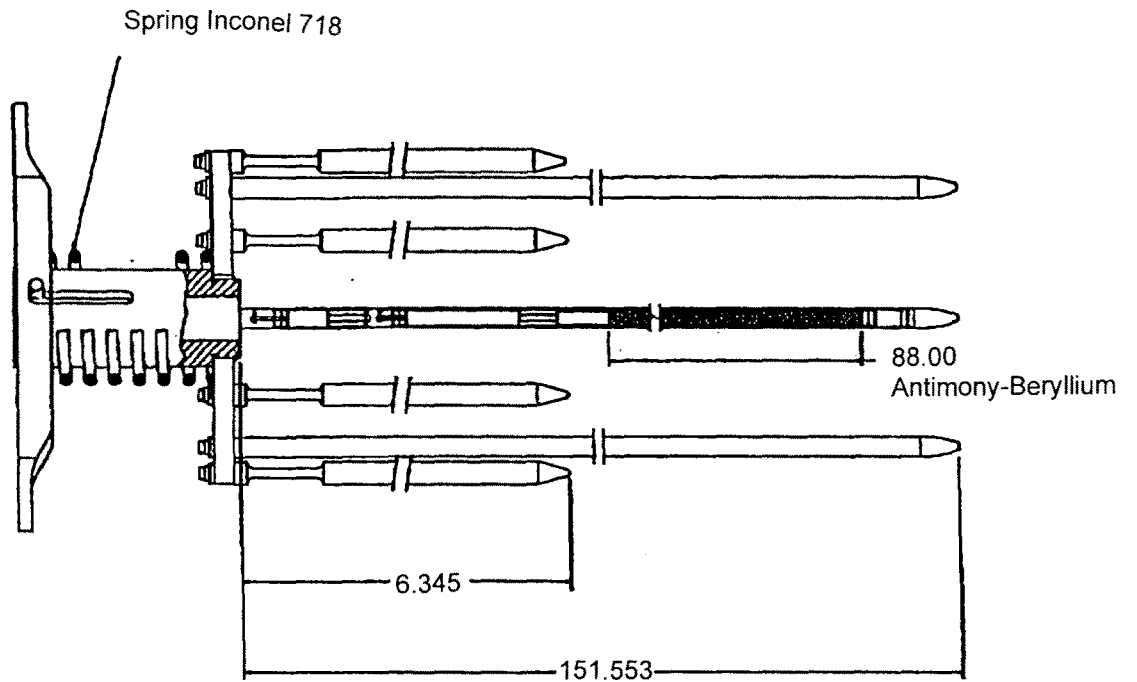
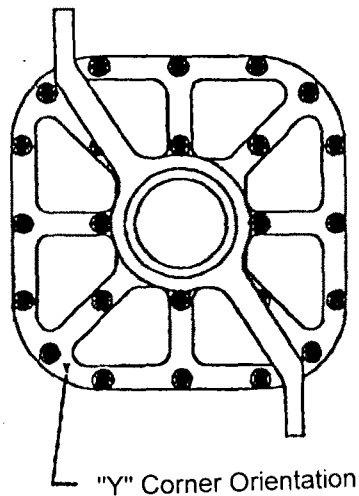
THIMBLE PLUG

(QUANTITY-20)

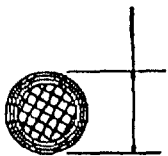
REV. OL-7
5/94

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

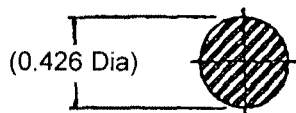
CALLAWAY PLANT
<p>FIGURE 4.2-14 SECONDARY SOURCE ASSEMBLY 17X17</p>



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



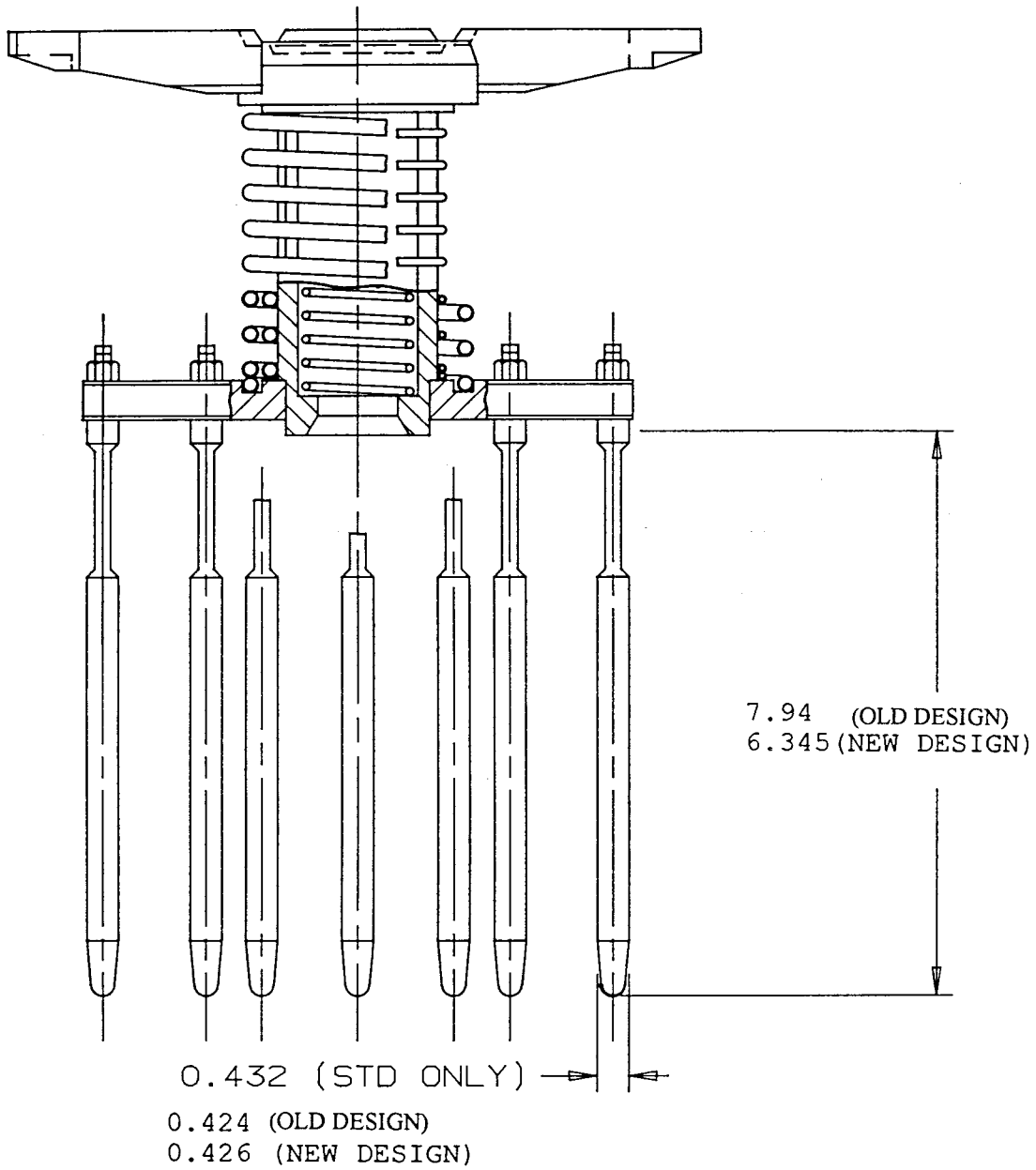
DOUBLE ENCAPSULATED
SECONDARY SOURCE ROD



THIMBLE PLUG

REV OL-11
5/00

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

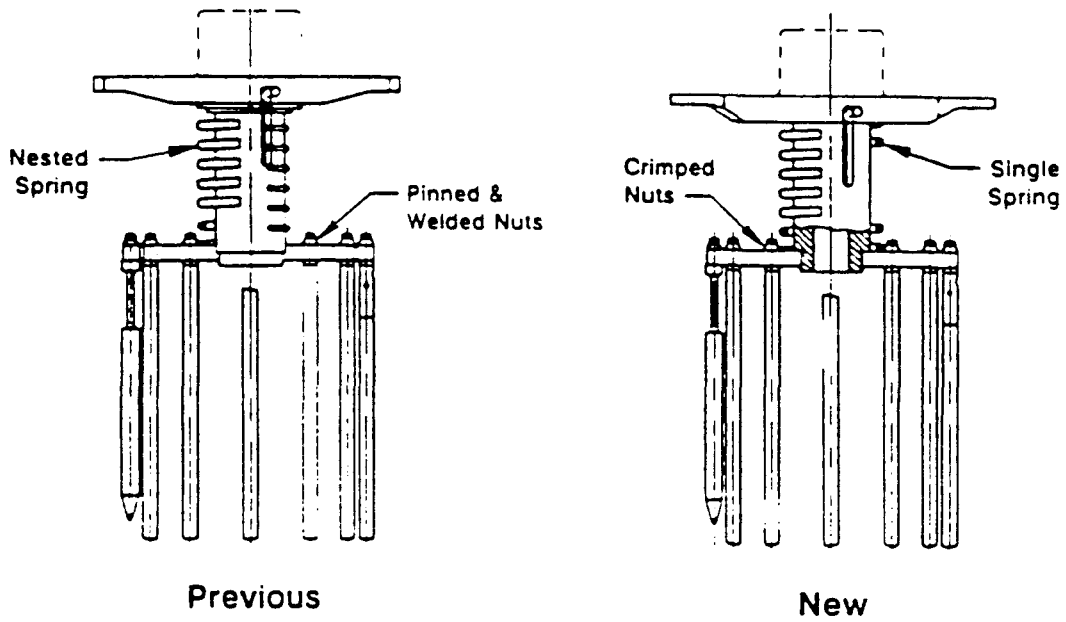


NOTE: See Figure 4.2-15A
for new spring design

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CALLAWAY PLANT
FIGURE 4.2-15 THIMBLE PLUG ASSEMBLY

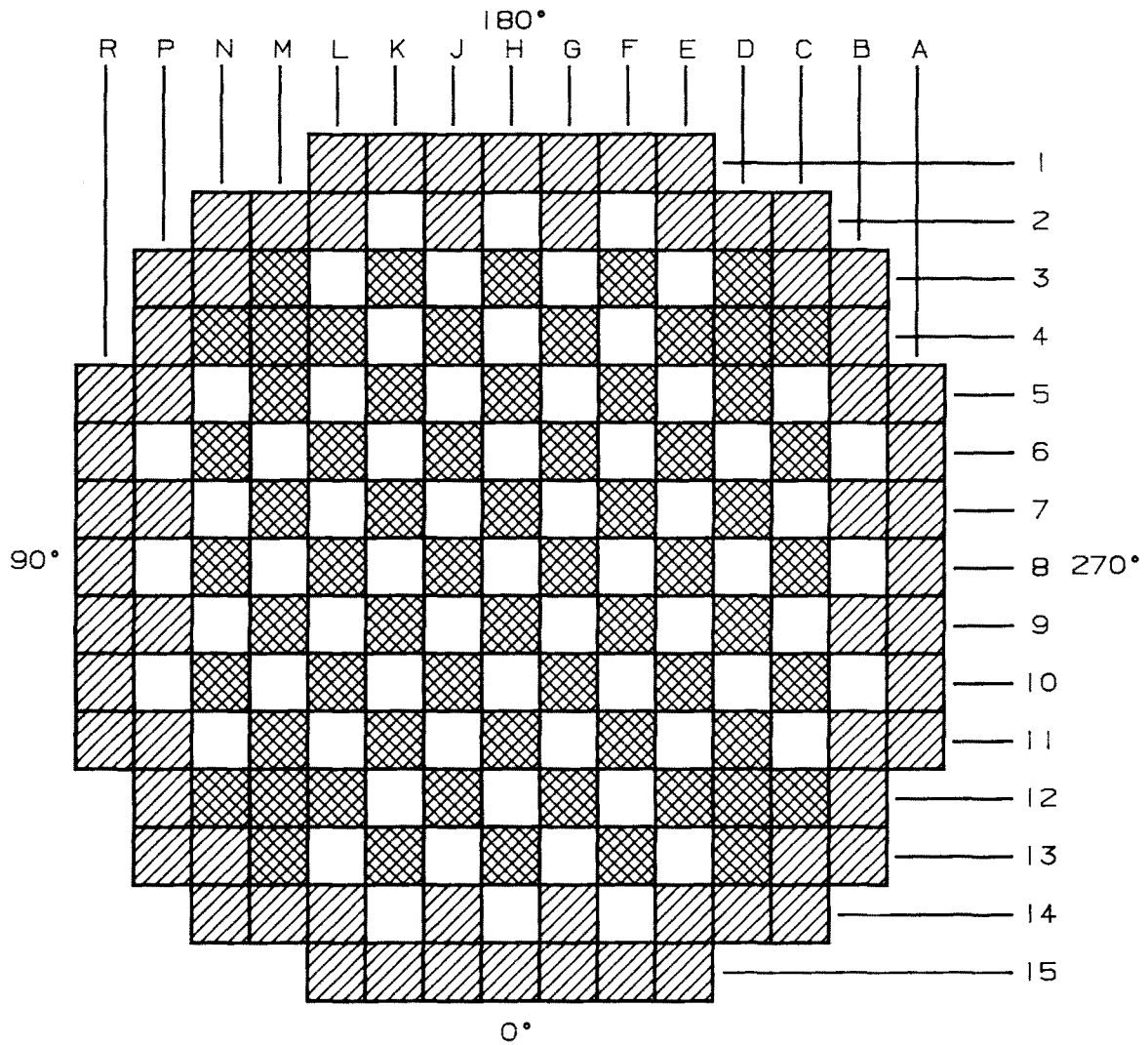
17 X 17






Holddown Assembly Updates - 17 x 17

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CALLAWAY PLANT
MODIFIED SPRING DESIGN
FIGURE 4.2-15A



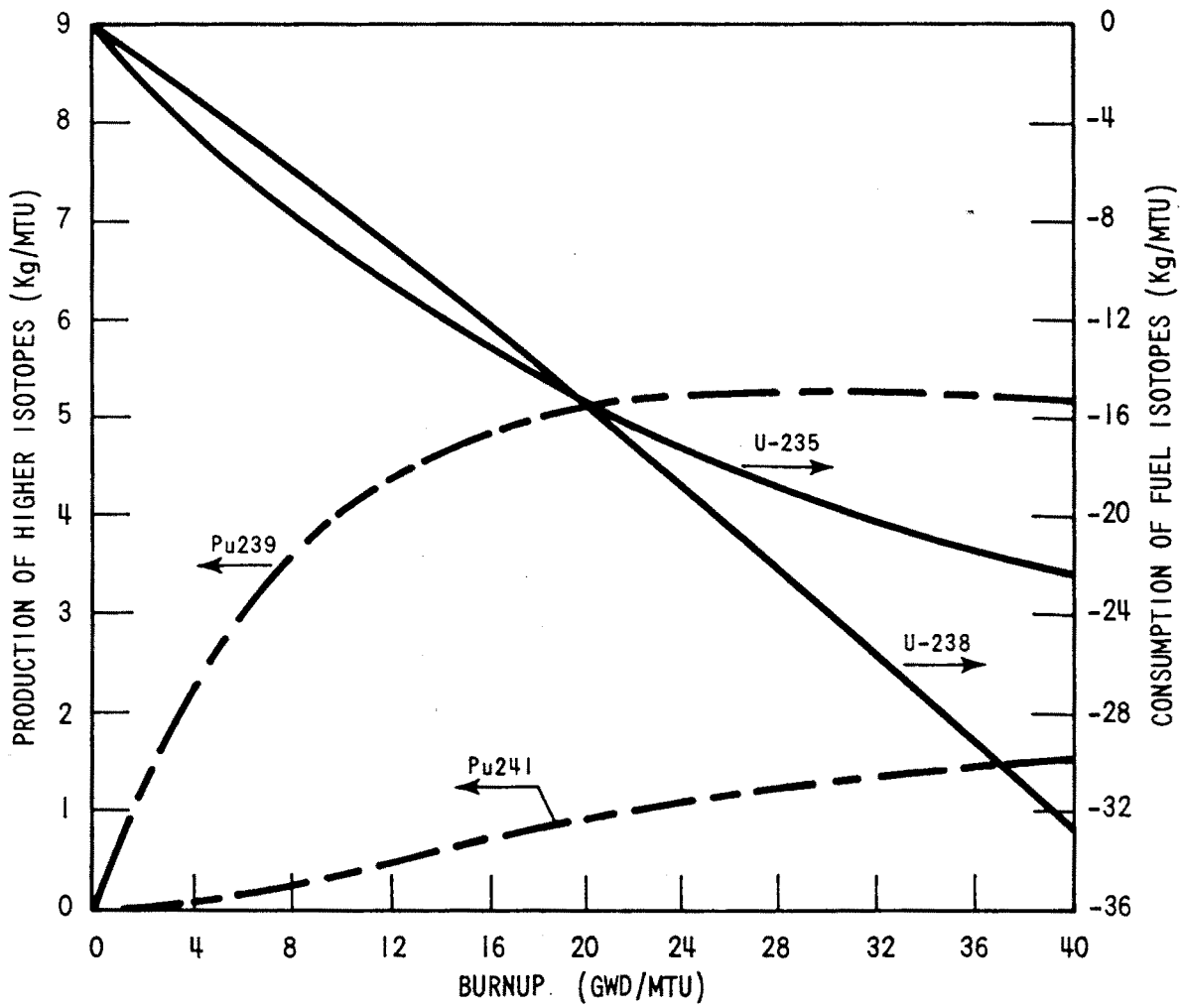
FIRST CORE

-  REGION 1
-  REGION 2
-  REGION 3

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**FIGURE 4.3-1
FUEL LOADING ARRANGEMENT**

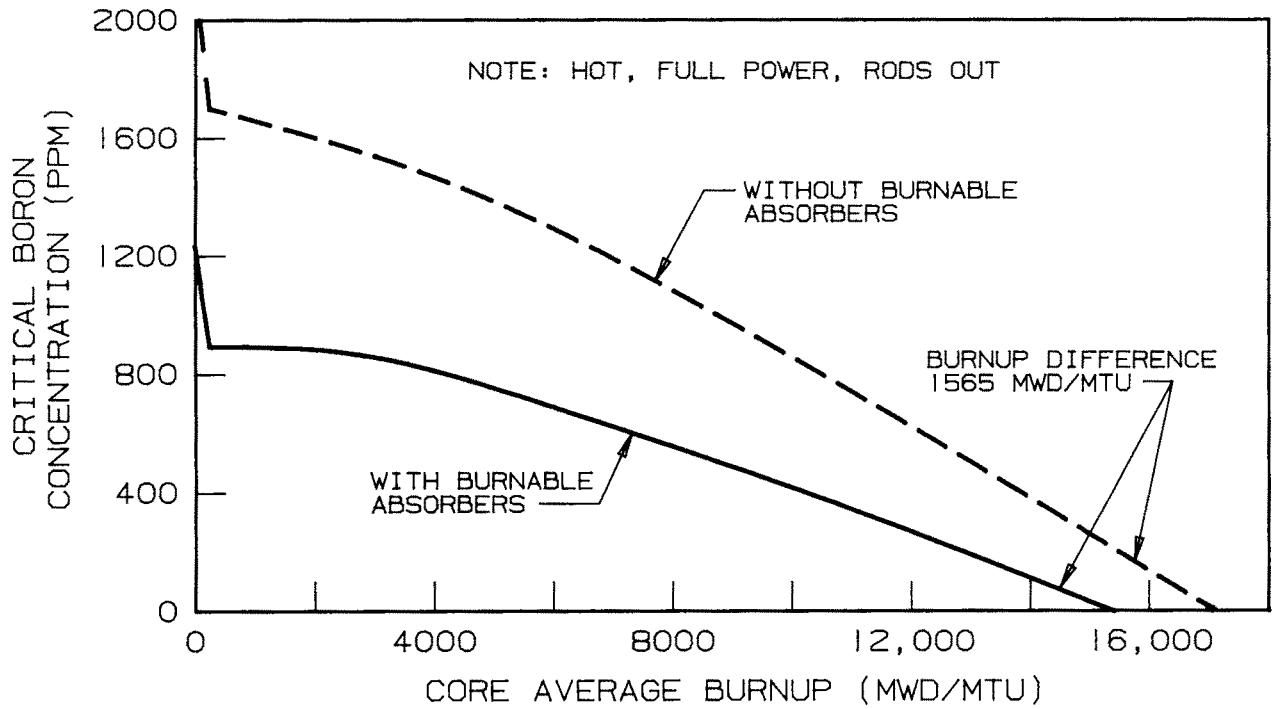


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FIGURE 4.3-2

PRODUCTION AND CONSUMPTION OF HIGHER ISOTOPES

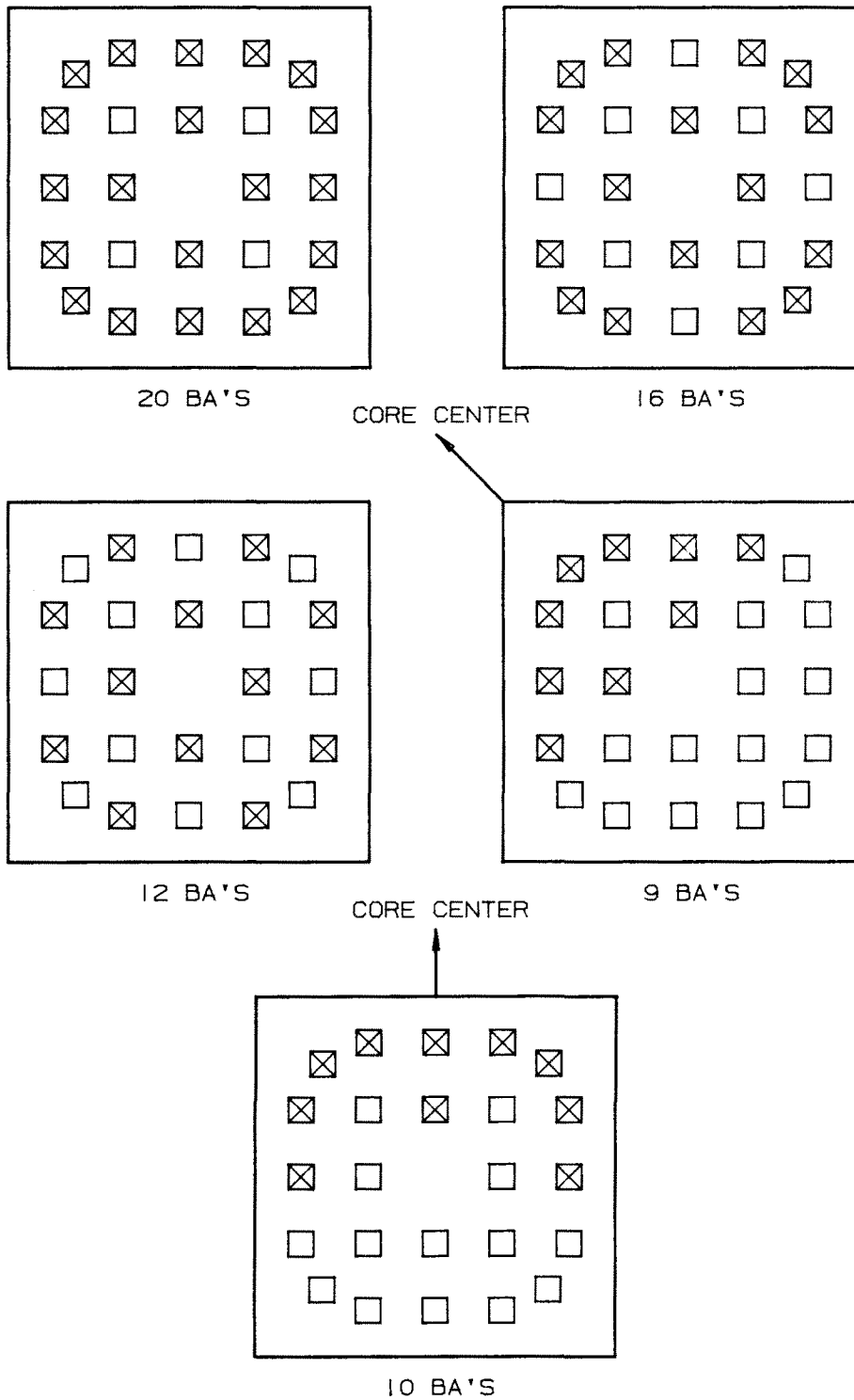


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FIGURE 4.3.3A
BORON CONCENTRATION VERSUS FIRST
CYCLE BURNUP WITH AND WITHOUT
BURNABLE ABSORBER RODS

Figure 4.3-3B Deleted.

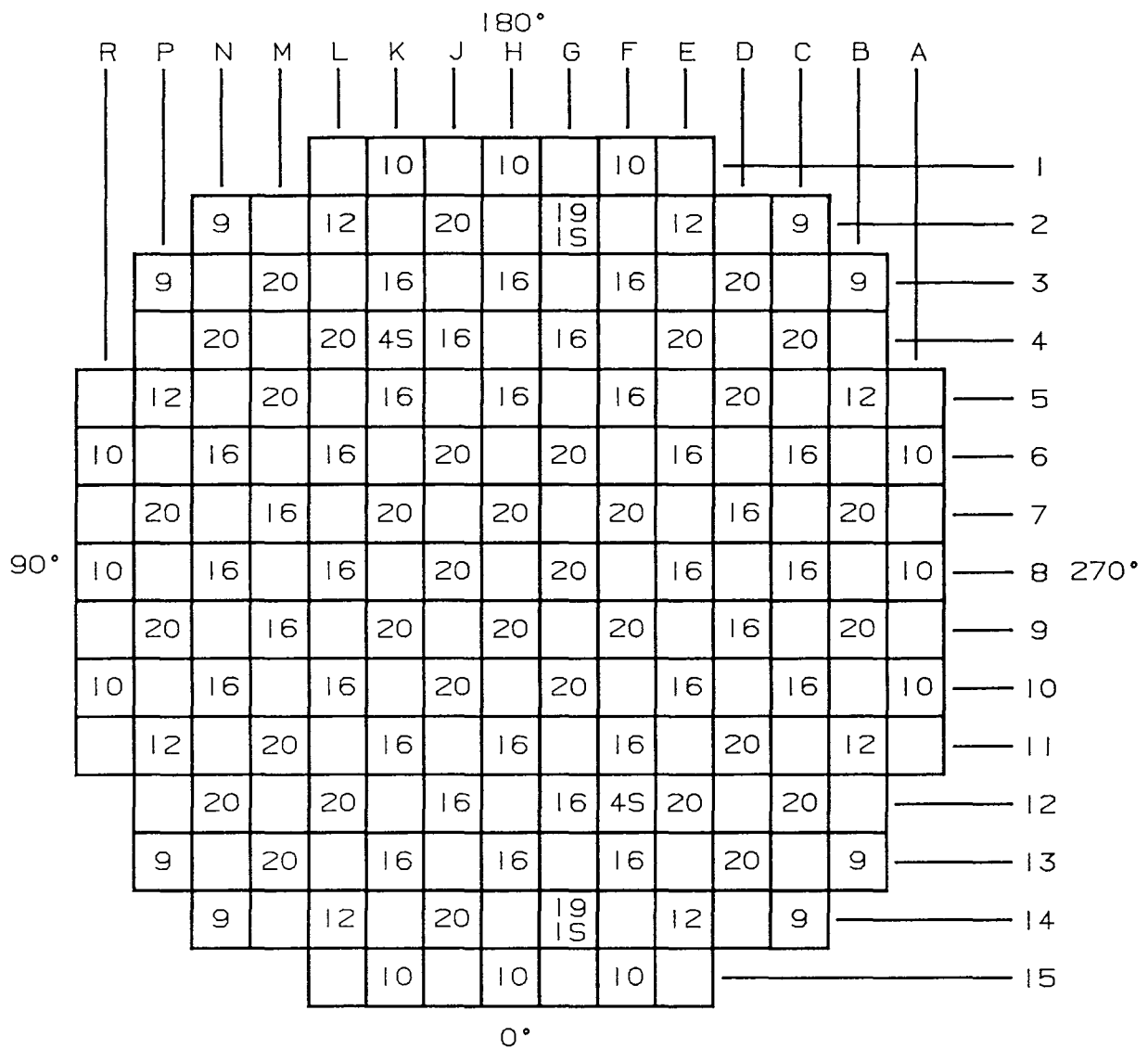


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FIGURE 4.3-4A
BURNABLE ABSORBER ROD
ARRANGEMENT WITHIN AN ASSEMBLY

Figure 4.3-4B Deleted.



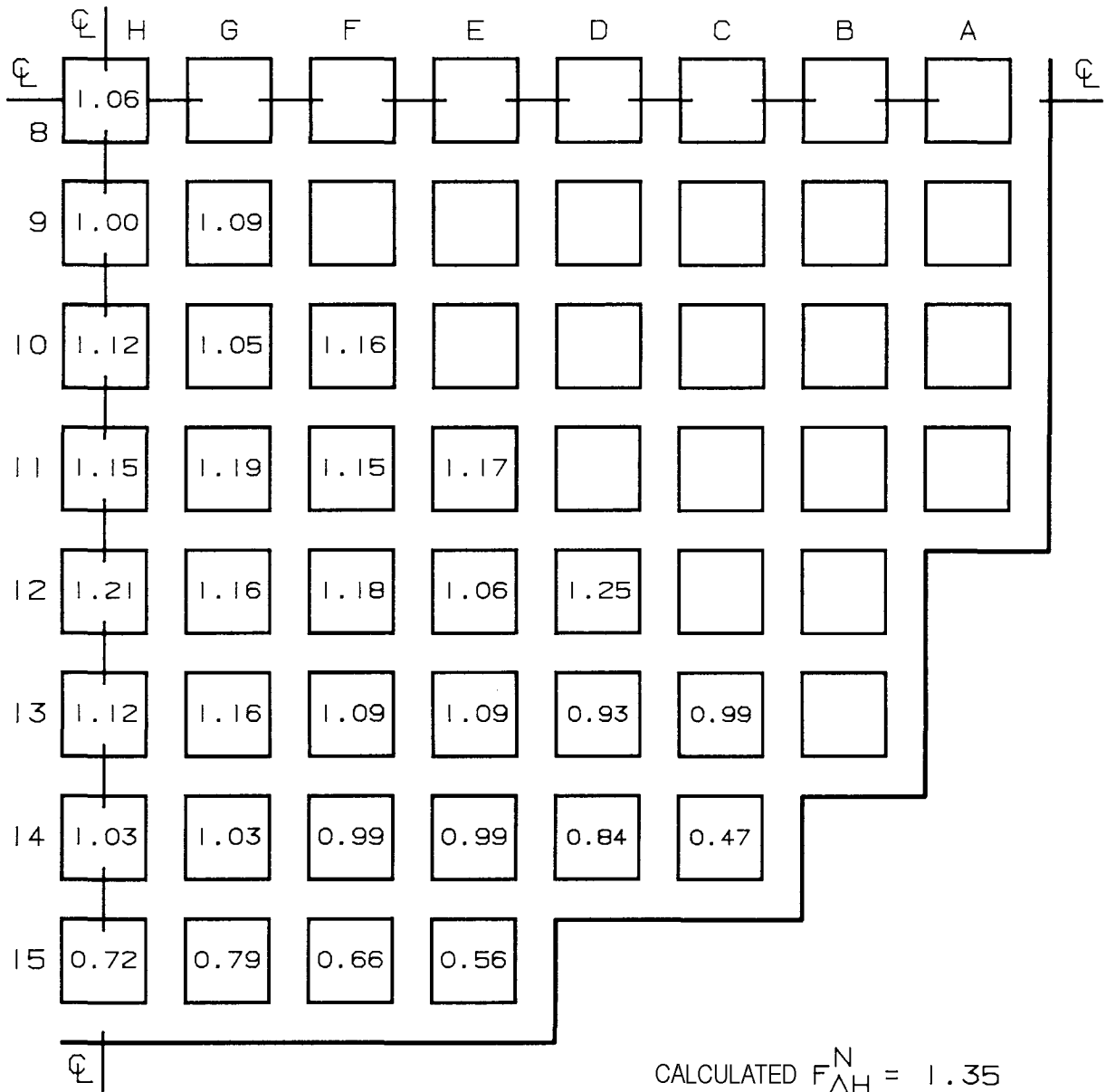
NUMBER INDICATES NUMBER OF BURNABLE ABSORBER RODS
 IS INDICATES PRIMARY SOURCE ROD
 4S INDICATES FOUR SECONDARY SOURCE RODS

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

Figure 4.3-5B Deleted.



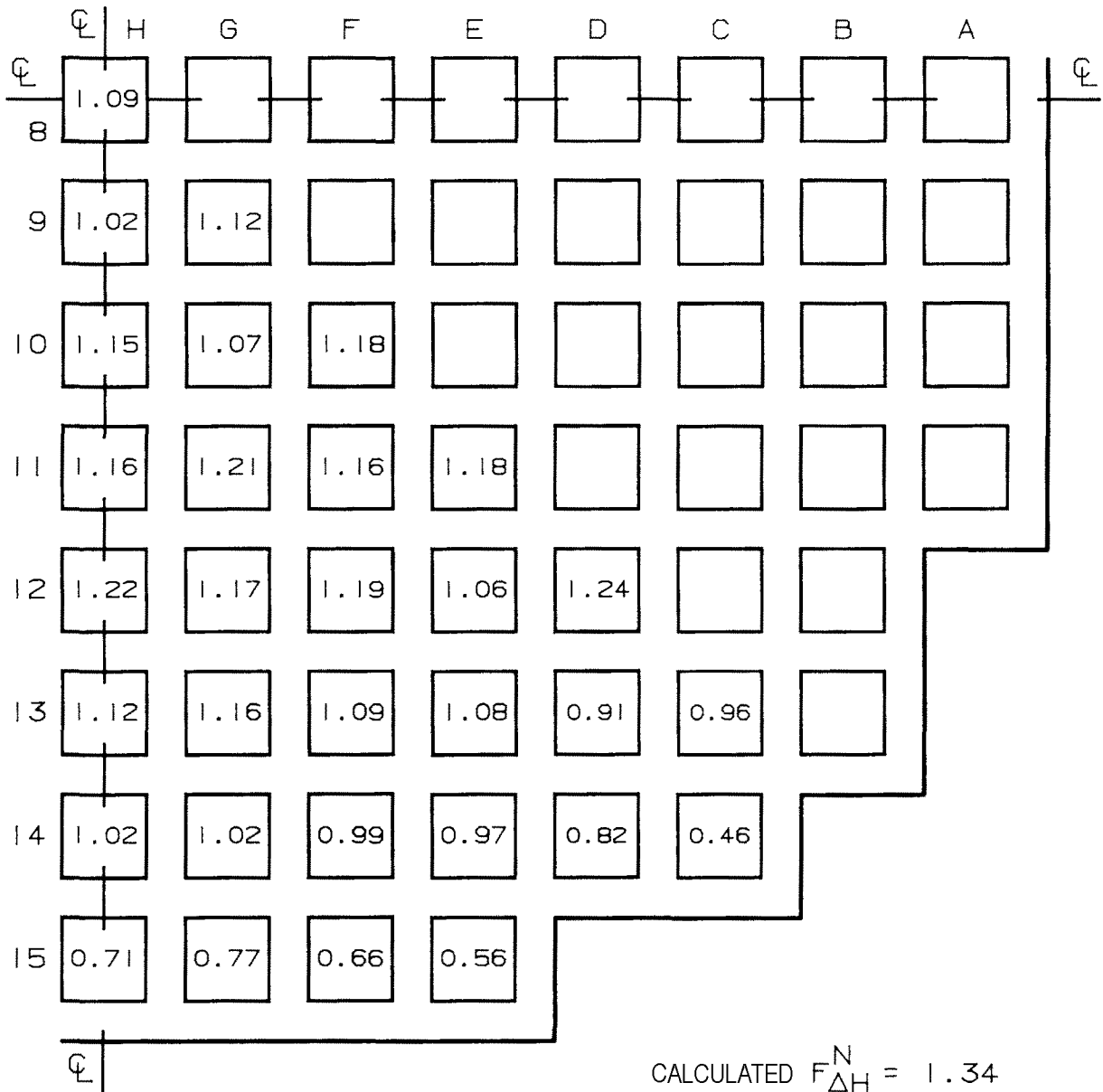
KEY: VALUE REPRESENTS ASSEMBLY
RELATIVE POWER

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

Figure 4.3-6B Deleted.



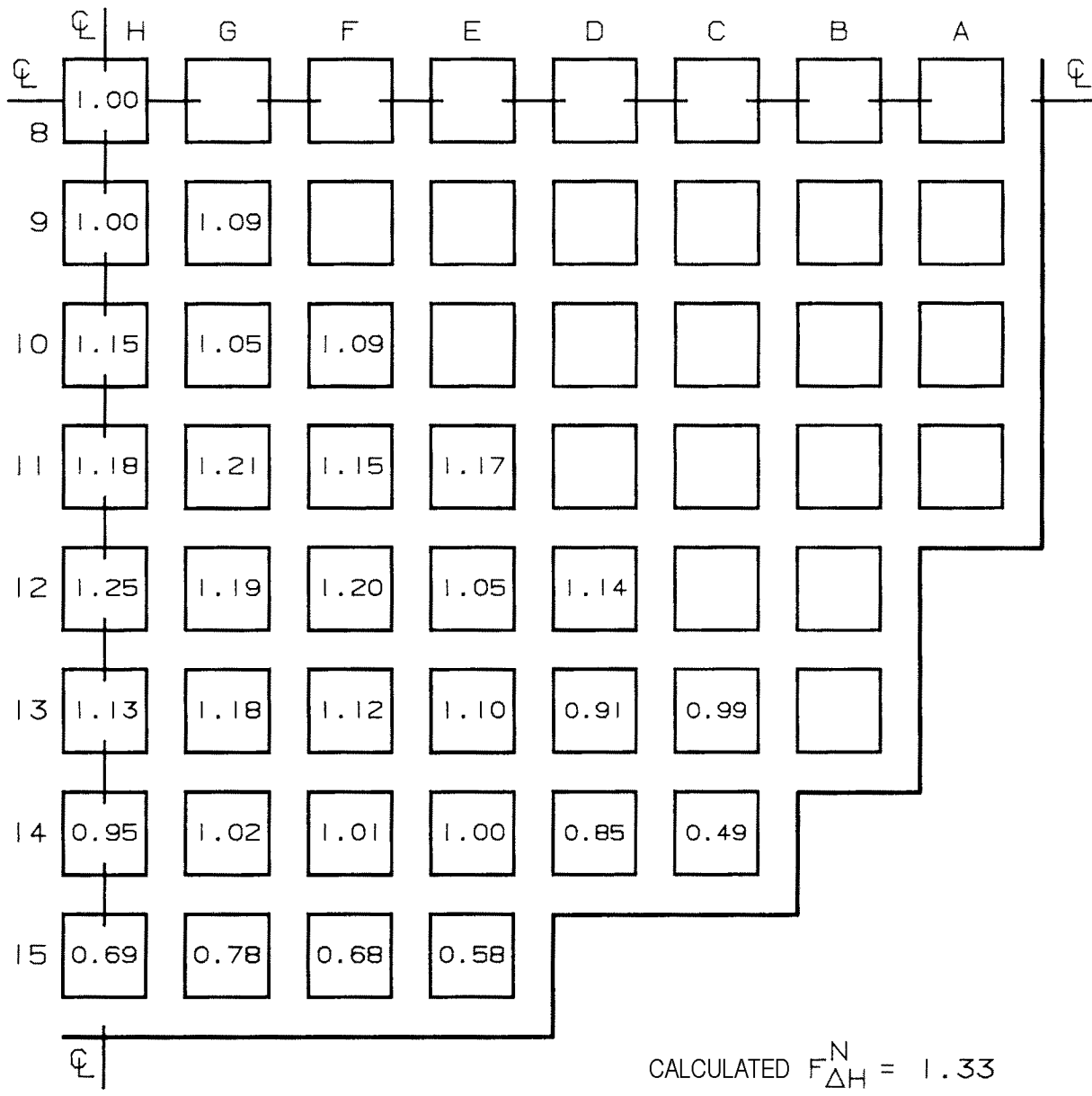
KEY: VALUE REPRESENTS ASSEMBLY
RELATIVE POWER

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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.

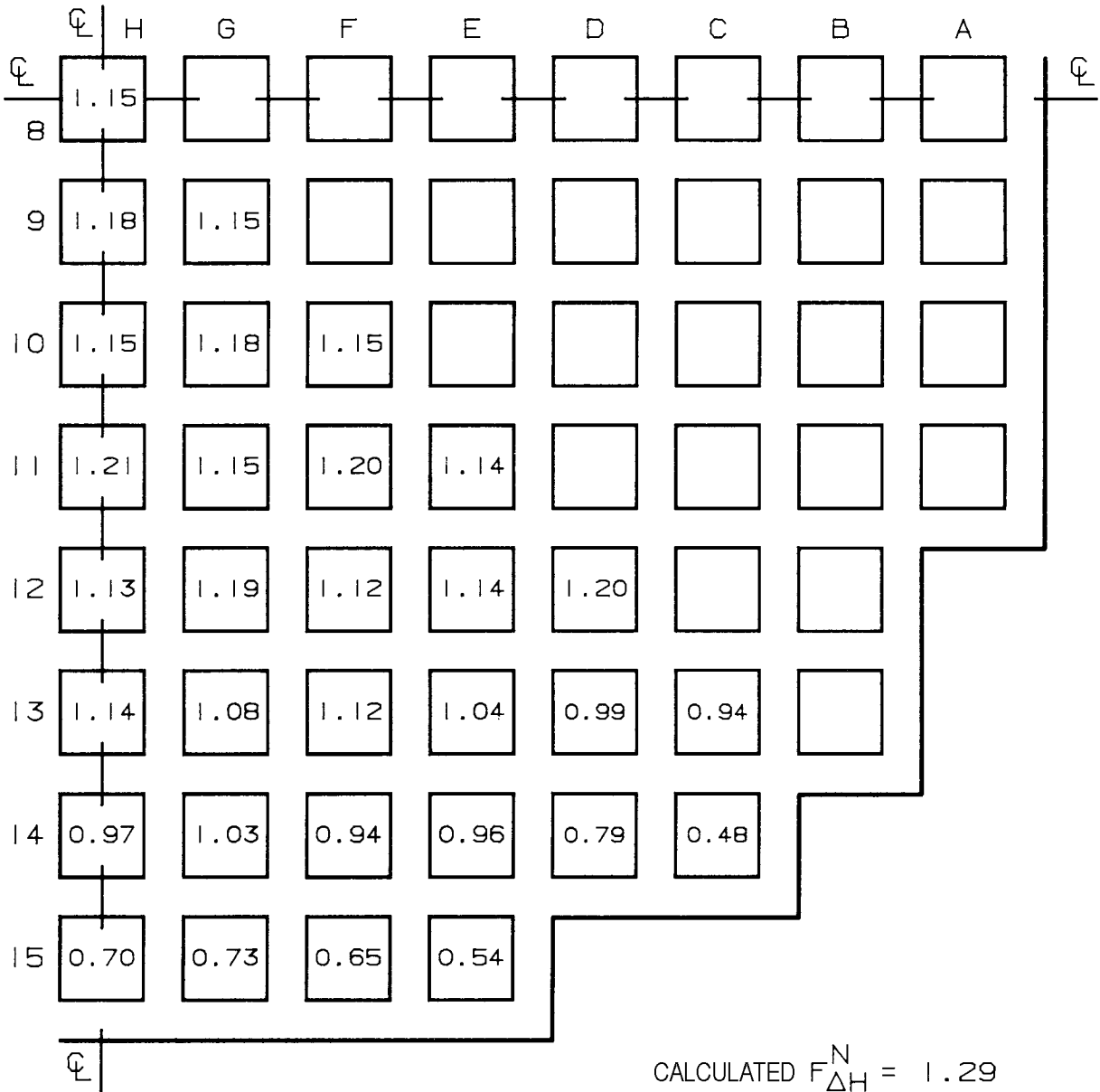


KEY: VALUE REPRESENTS ASSEMBLY
RELATIVE POWER

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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.



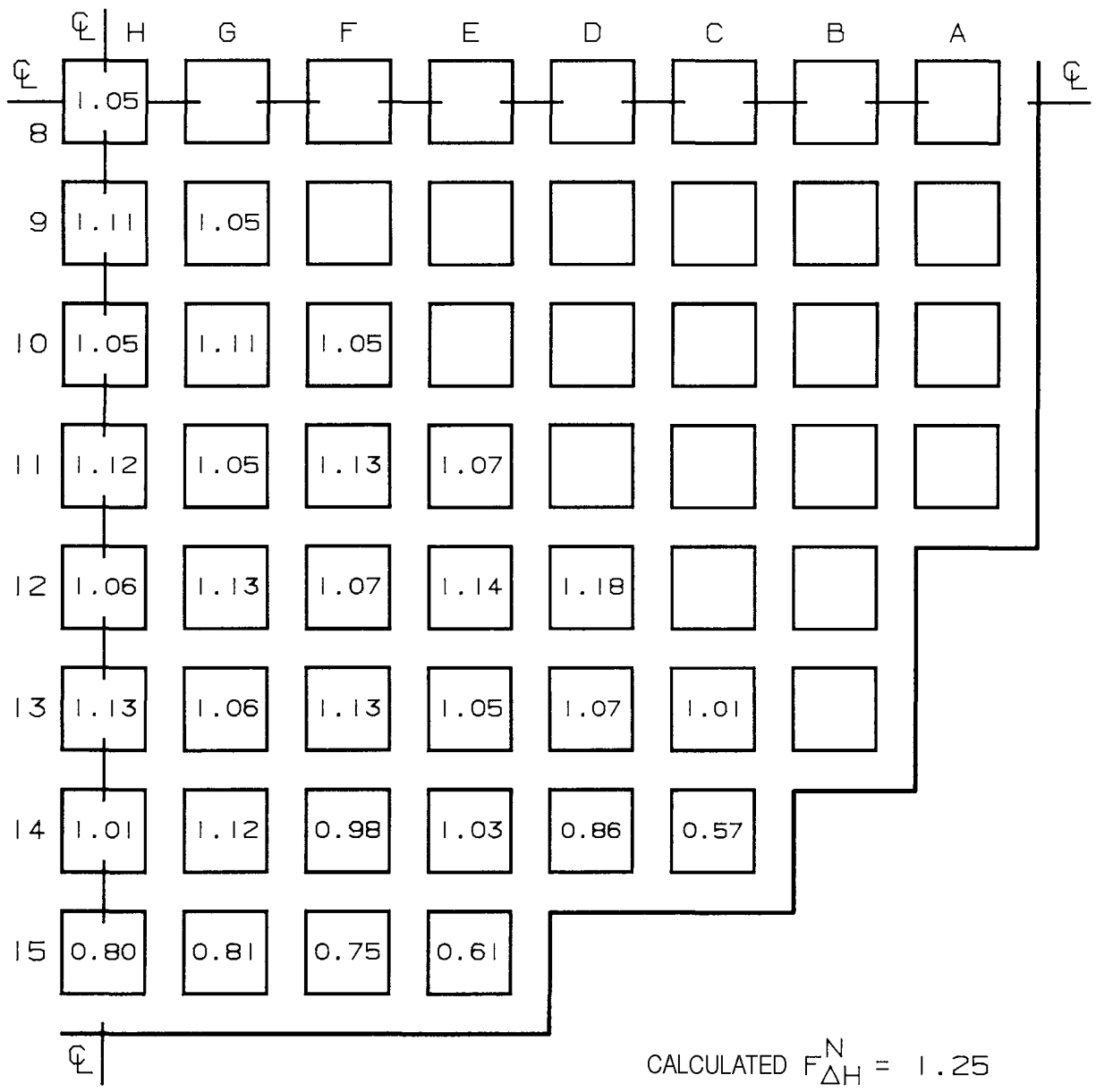
KEY: VALUE REPRESENTS ASSEMBLY
RELATIVE POWER

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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.



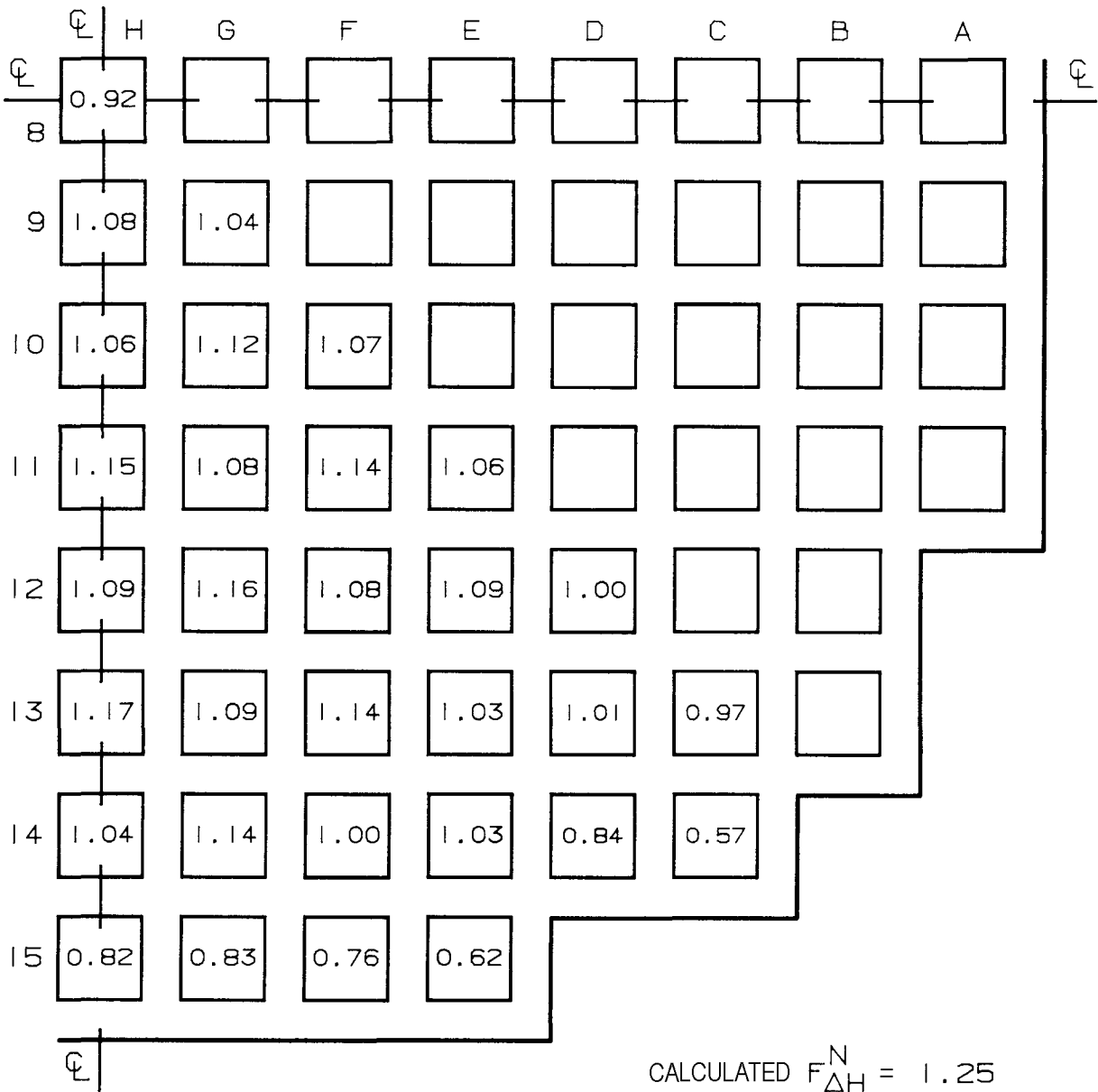
KEY: VALUE REPRESENTS ASSEMBLY
RELATIVE POWER

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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.



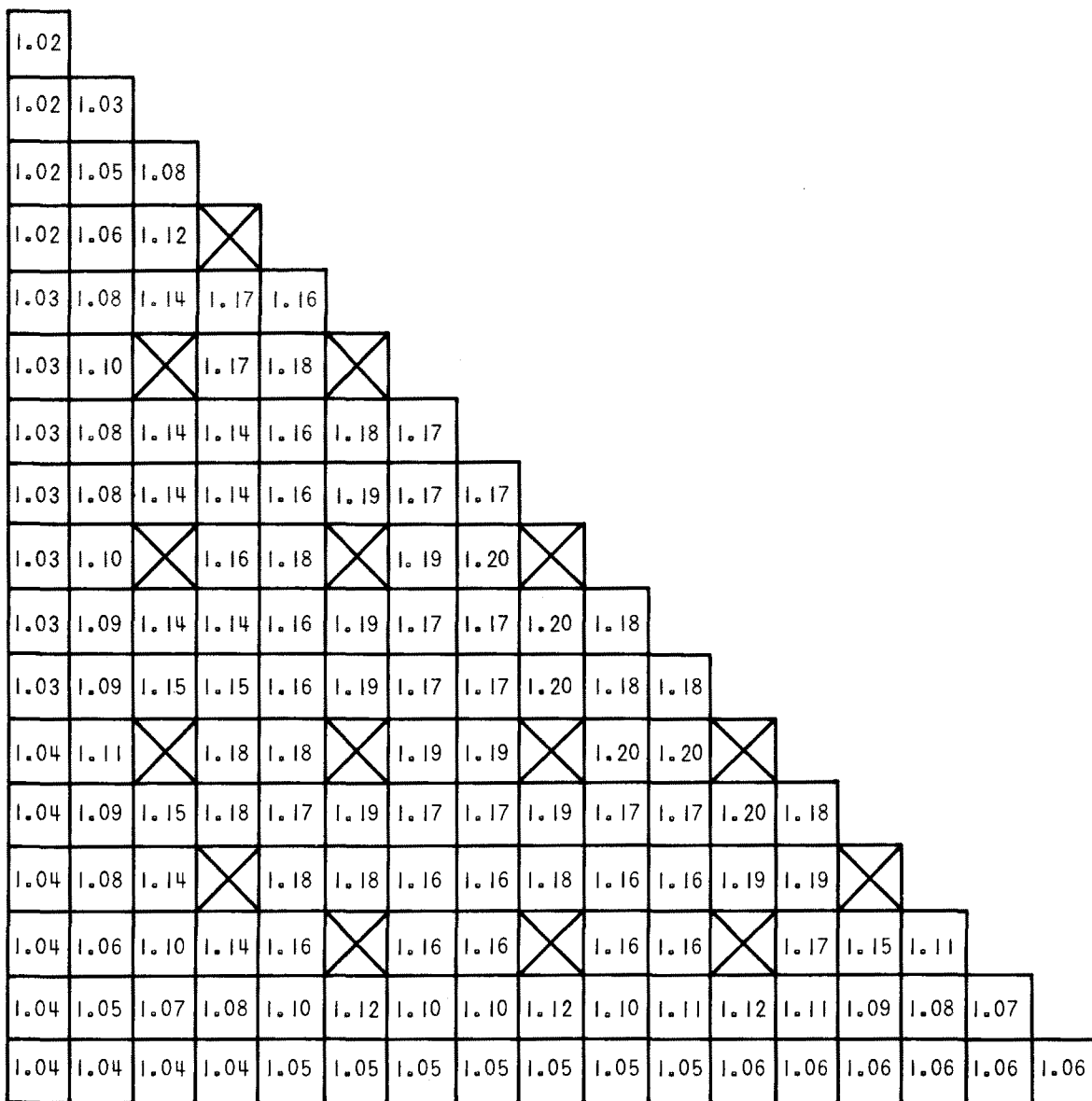
KEY: VALUE REPRESENTS ASSEMBLY
RELATIVE POWER

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CALLAWAY PLANT

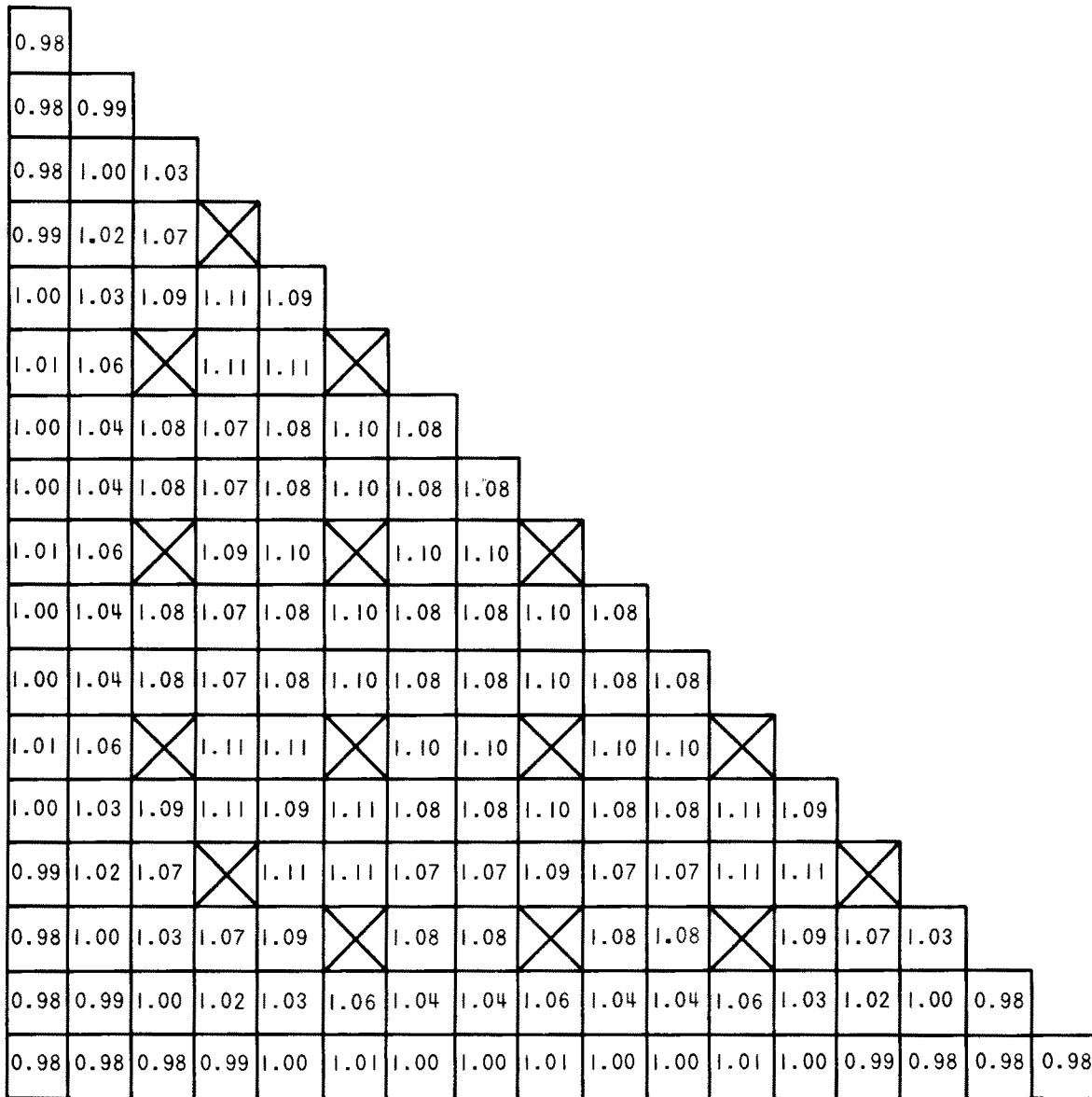
FIGURE 4.3-11 A
TYPICAL NORMALIZED POWER DENSITY DISTRIBUTION
NEAR END-OF-LIFE, GROUP D 28 PERCENT INSERTED,
HOT FULL POWER, EQUILIBRIUM XENON
(CYCLE 1)

Figure 4.3-11B Deleted.



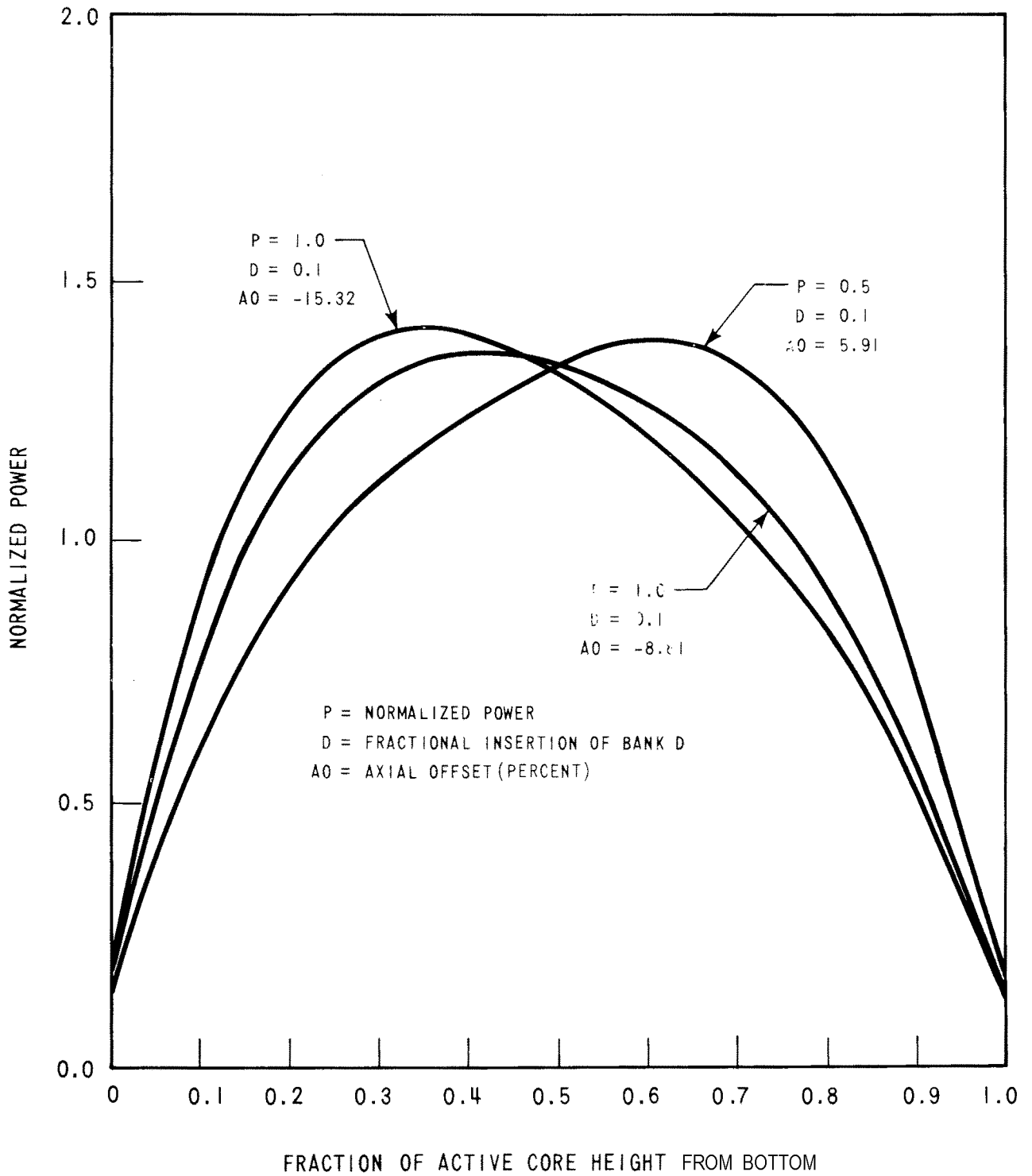
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CALLAWAY PLANT
FIGURE 4.3-12
**RODWISE POWER DISTRIBUTION IN A
TYPICAL ASSEMBLY NEAR BEGINNING-
OF-LIFE, HOT FULL POWER,
EQUILIBRIUM XENON; UNRODDED CORE**



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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

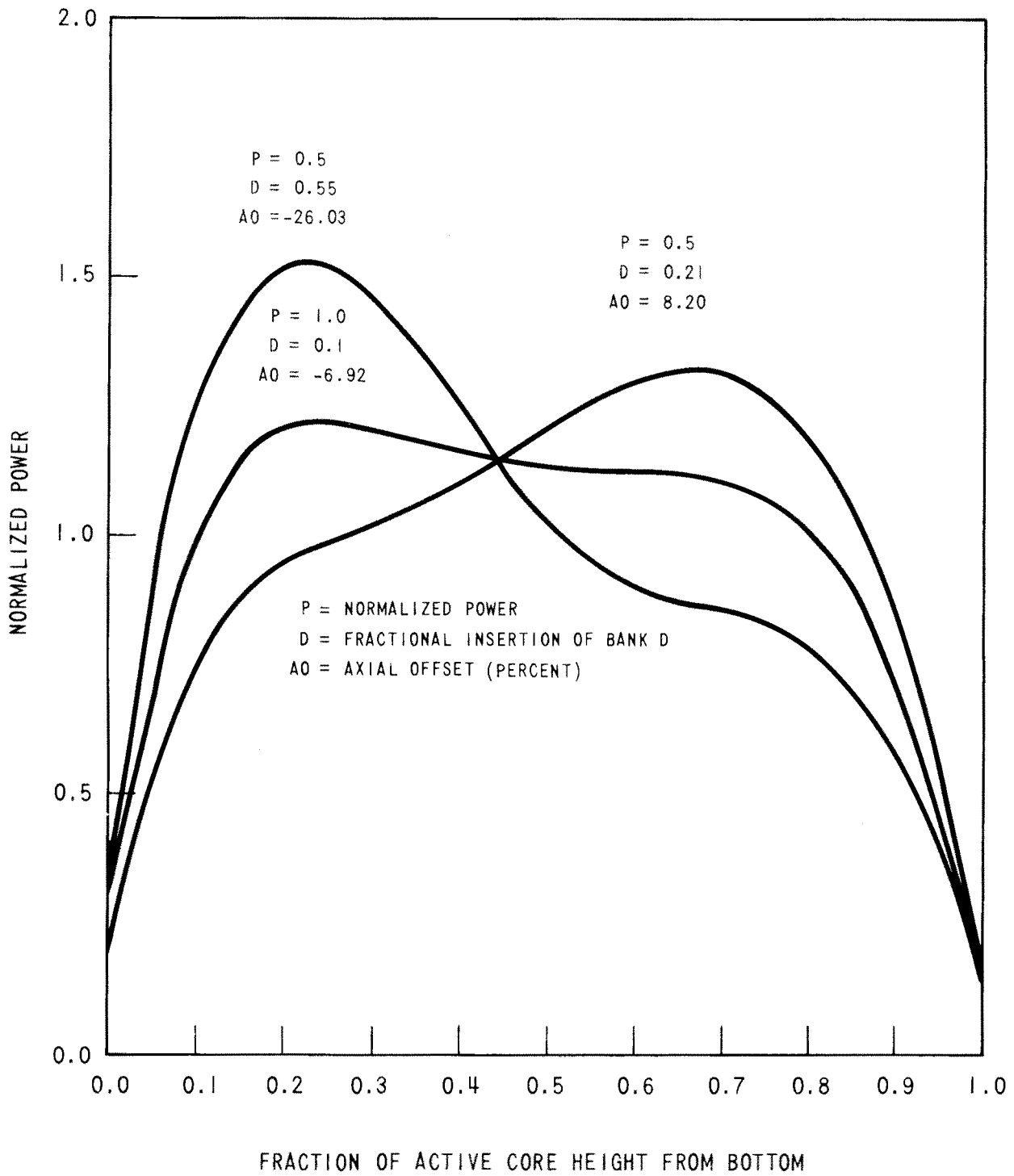


REV OL-13
05/03

CALLAWAY PLANT

FIGURE 4.3-14

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

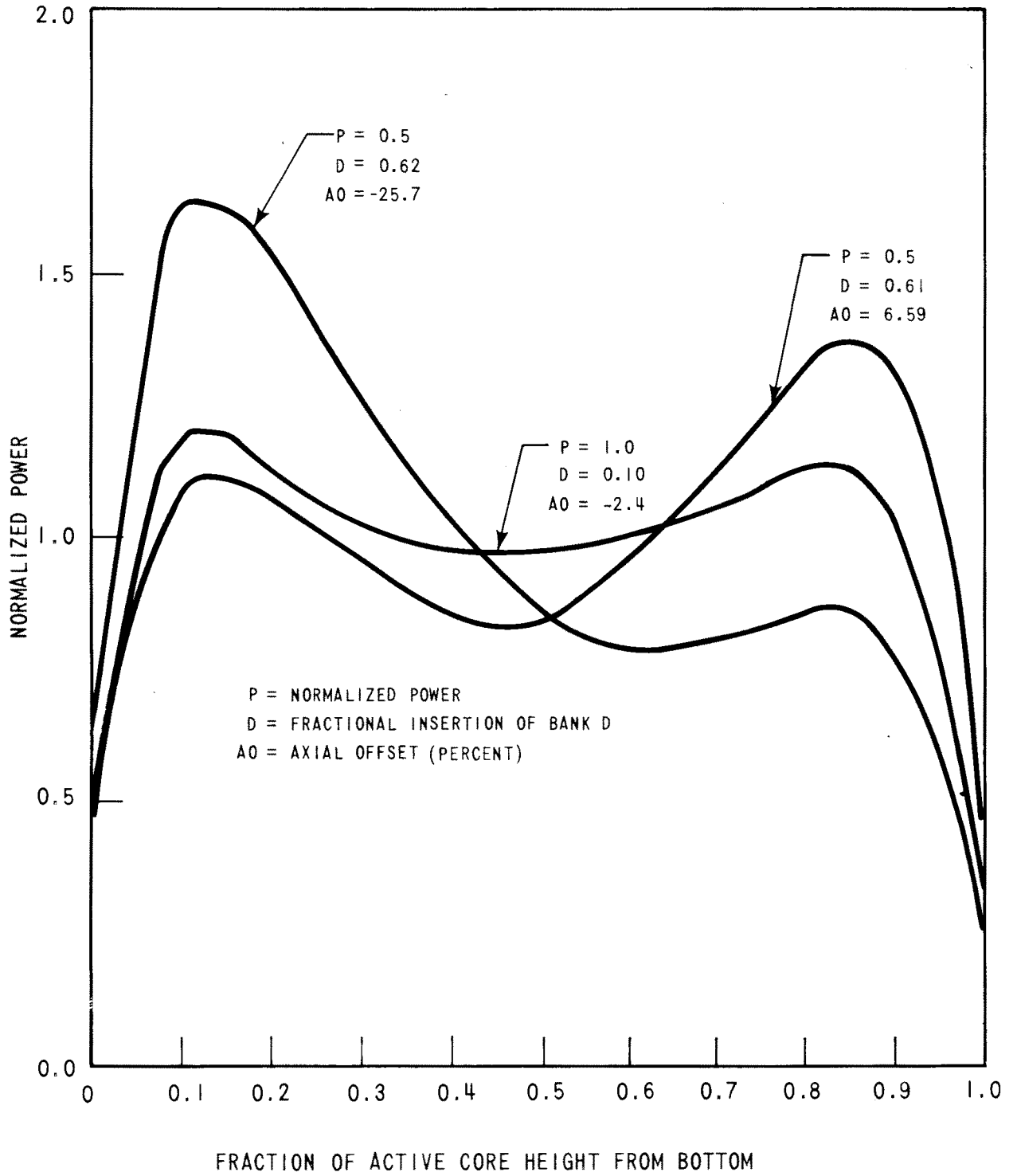


REV OL-13
05/03

CALLAWAY PLANT

FIGURE 4.3-15

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

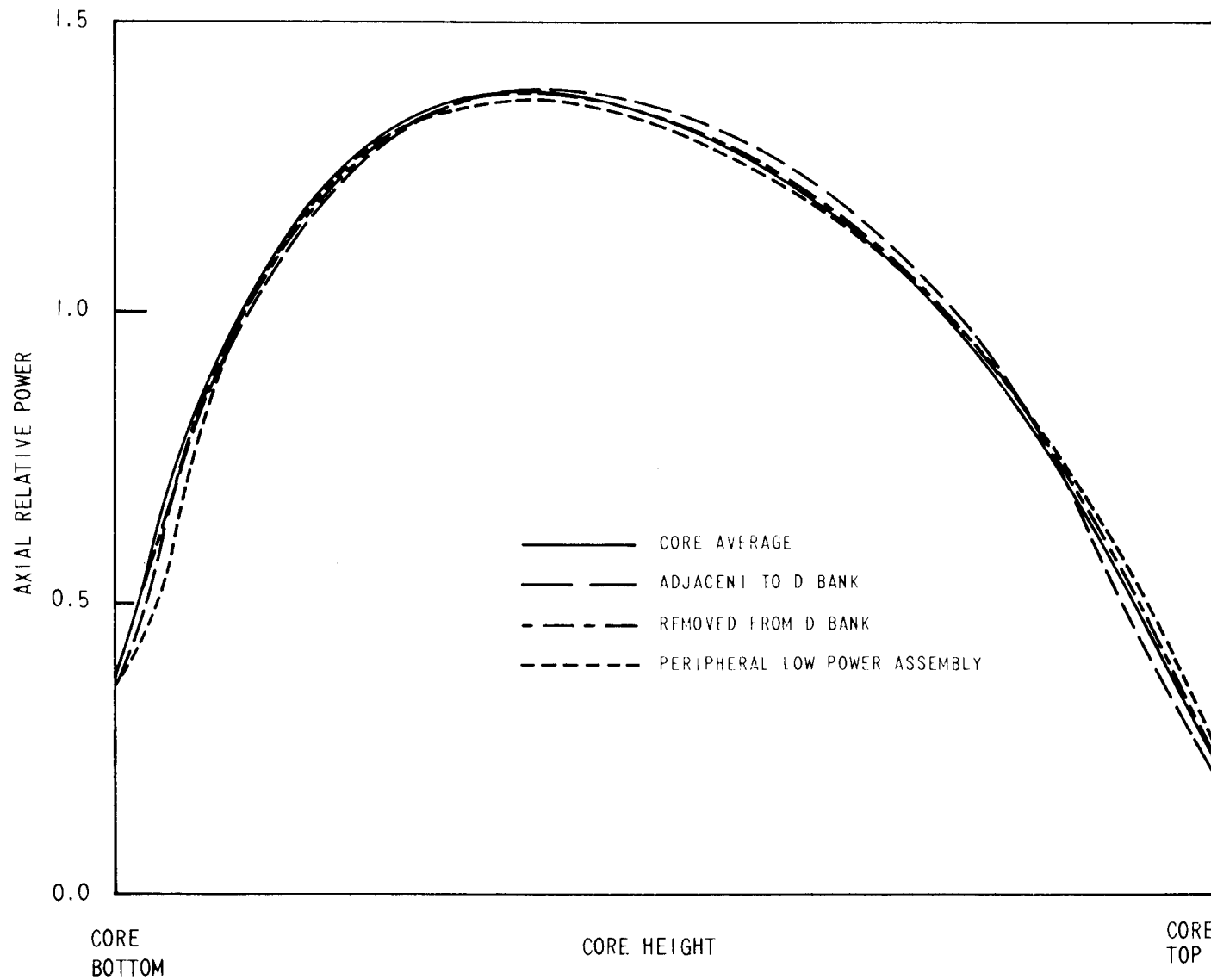


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FIGURE 4.3-16

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



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CALLAWAY PLANT

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

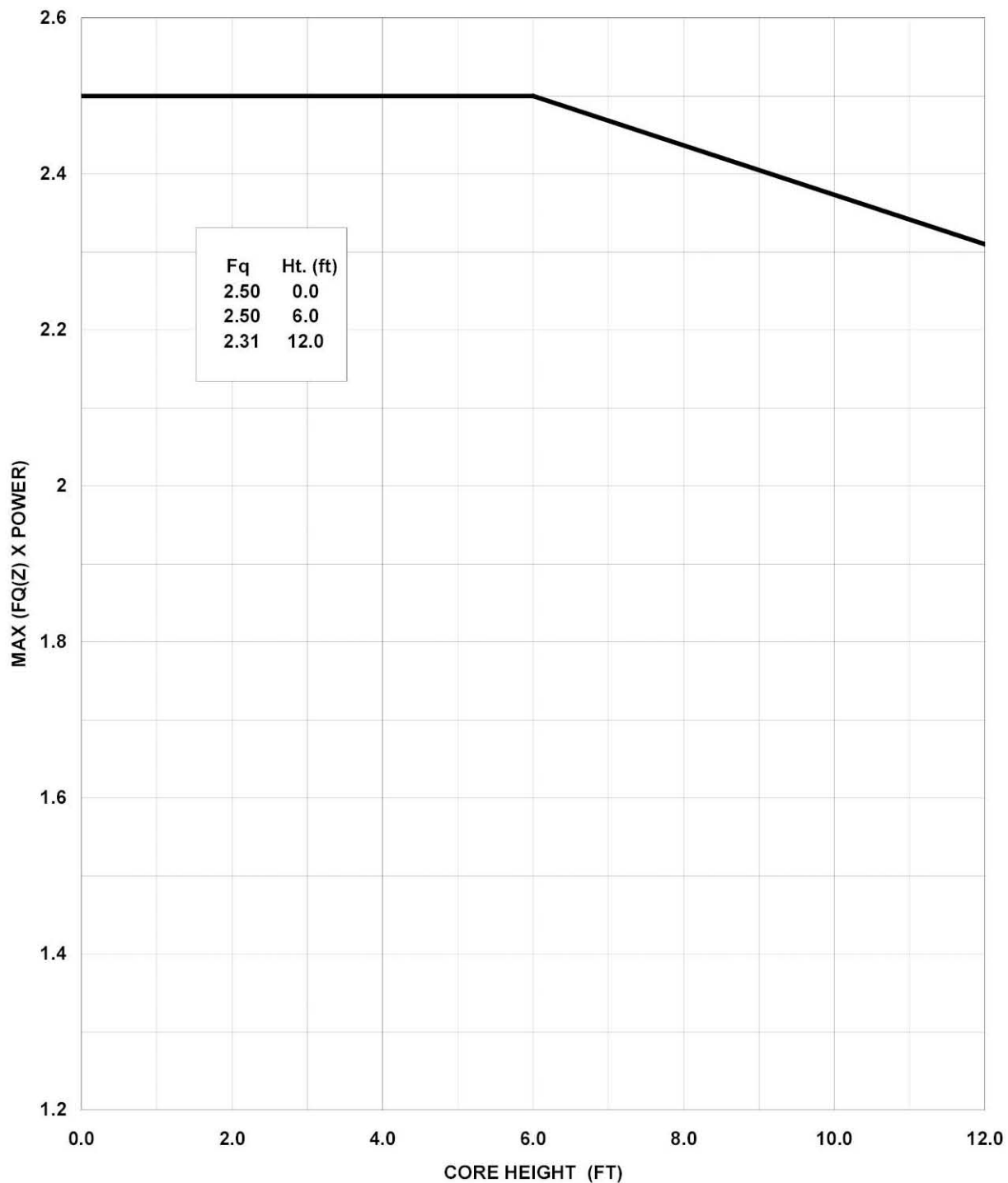
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Figure 4.3-19 has been deleted.

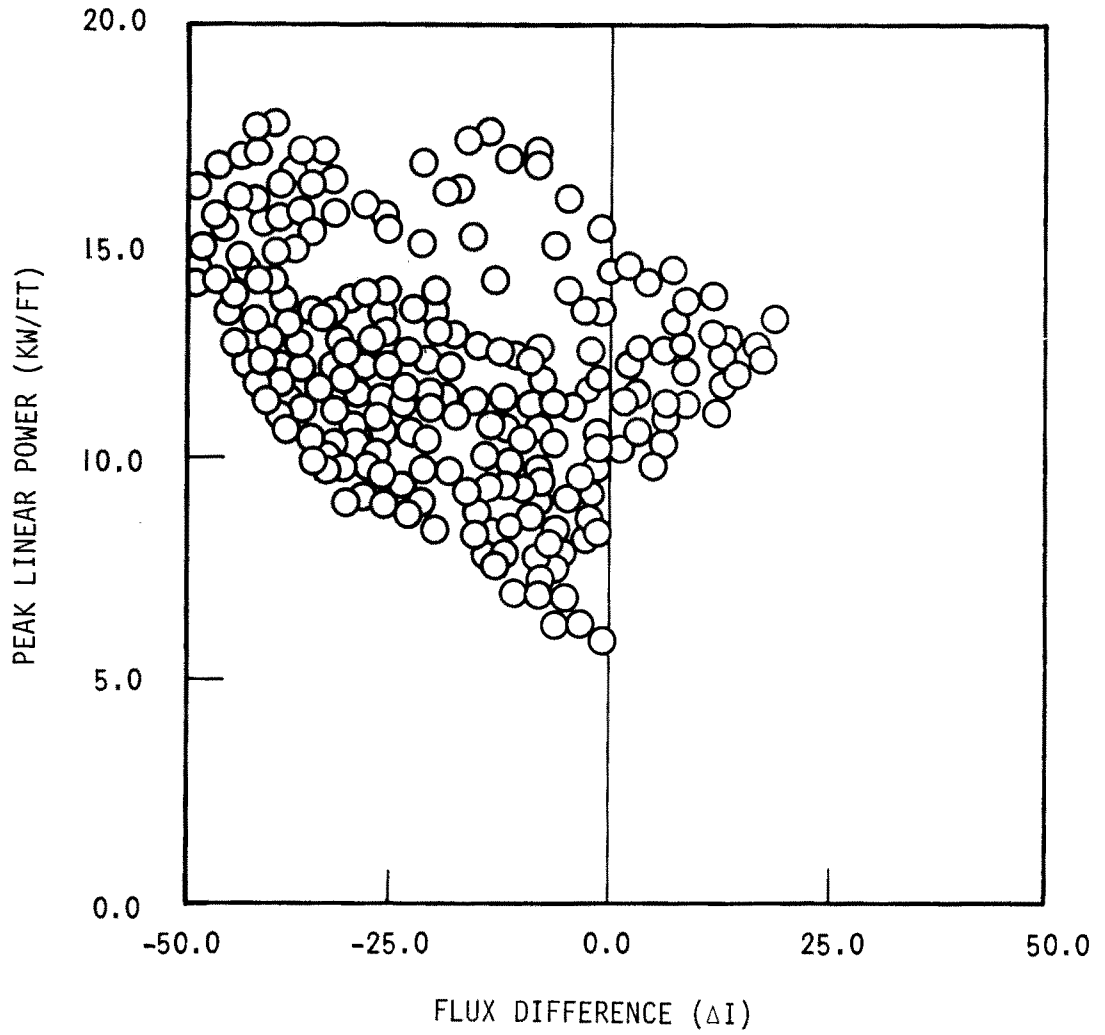
CALLAWAY - SP

FIGURE 4.3-20 HAS BEEN DELETED

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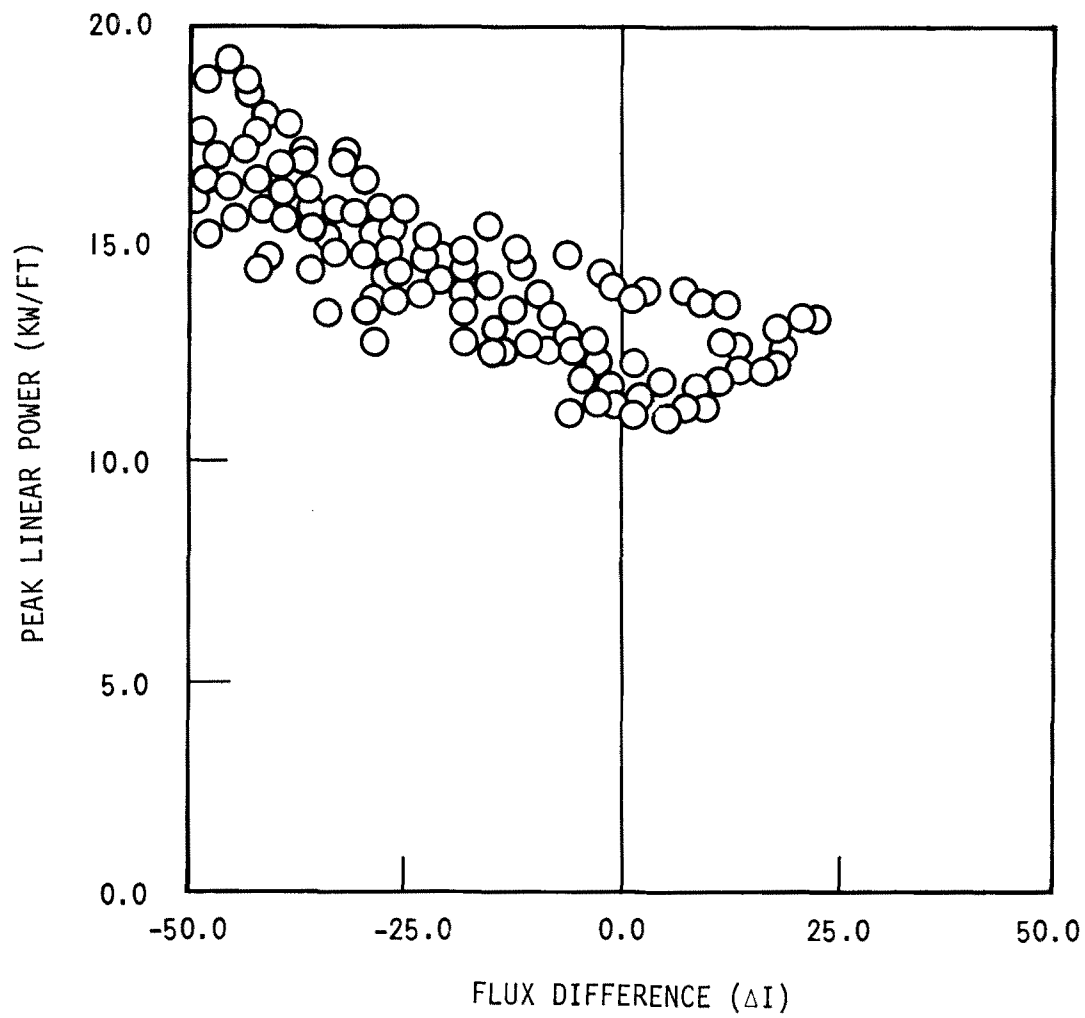


CALLAWAY PLANT
 FIGURE 4.3-21
 MAXIMUM F_0 X POWER VERSUS
 AXIAL HEIGHT DURING NORMAL
 OPERATION
 REV. 14 10/09



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FIGURE 4.3-22
PEAK LINEAR POWER DURING CONTROL ROD MALFUNCTION OVERPOWER TRANSIENTS

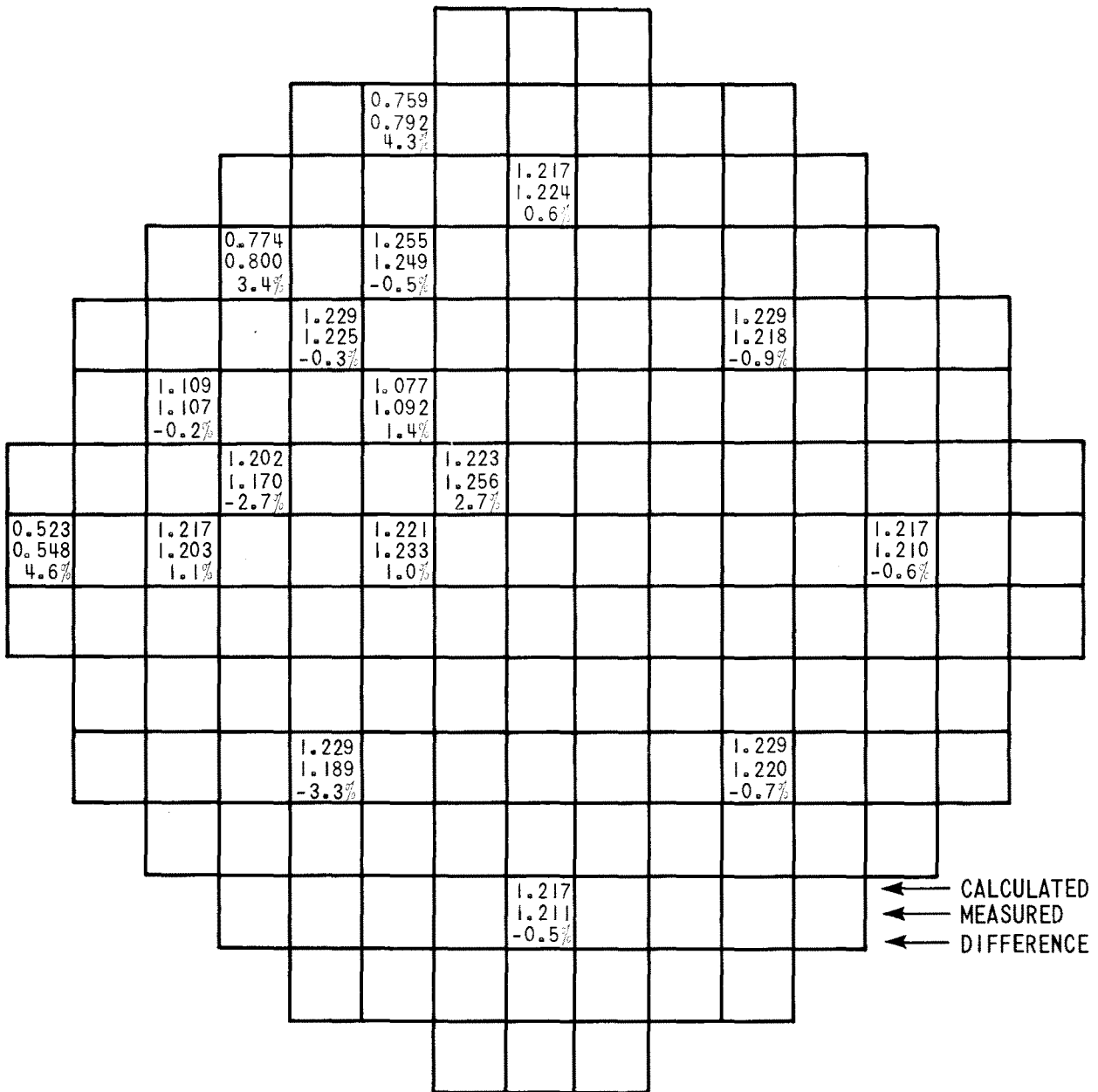


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FIGURE 4.3-23

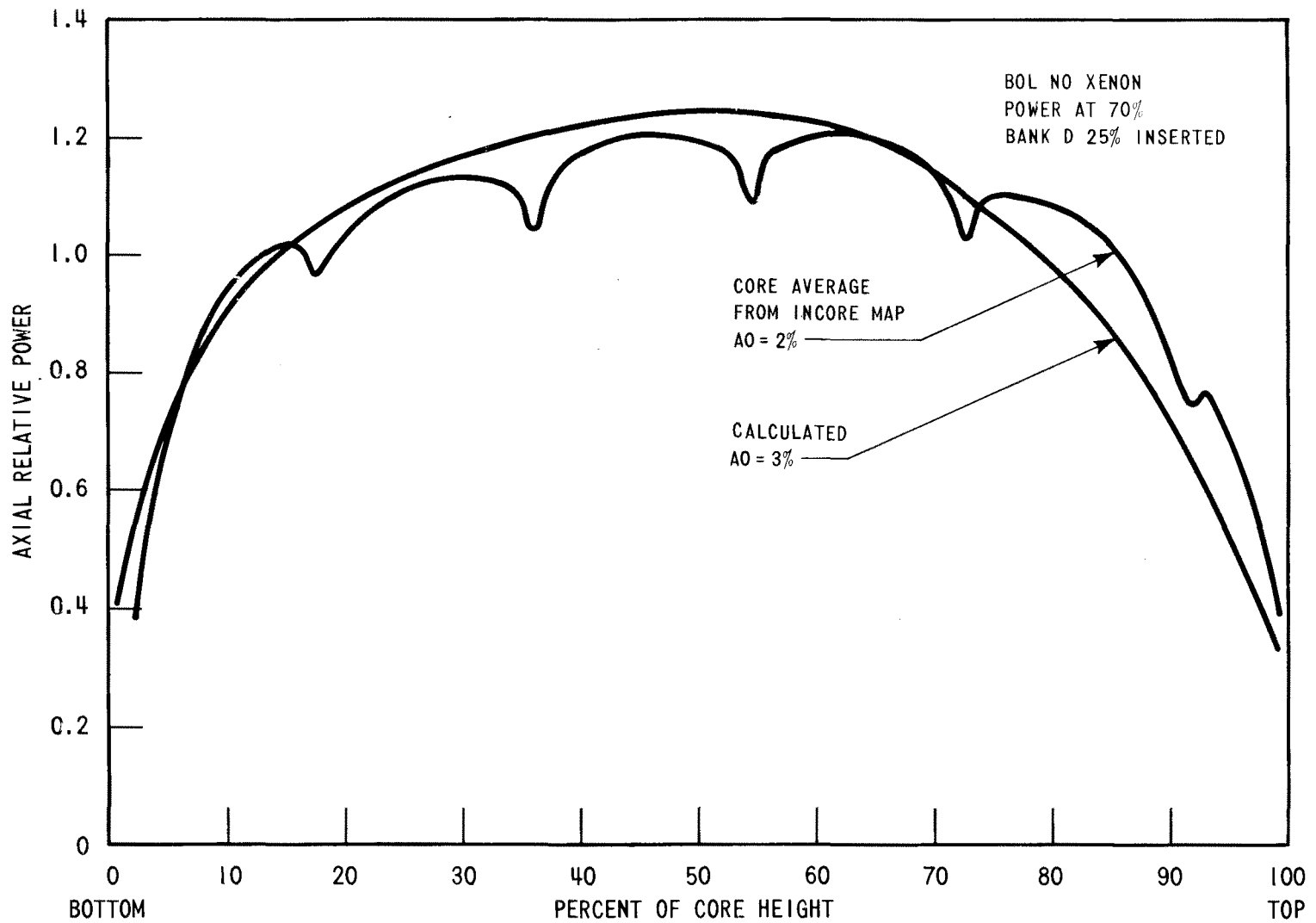
PEAK LINEAR POWER DURING
BORATION/DILUTION OVERPOWER
TRANSIENTS



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

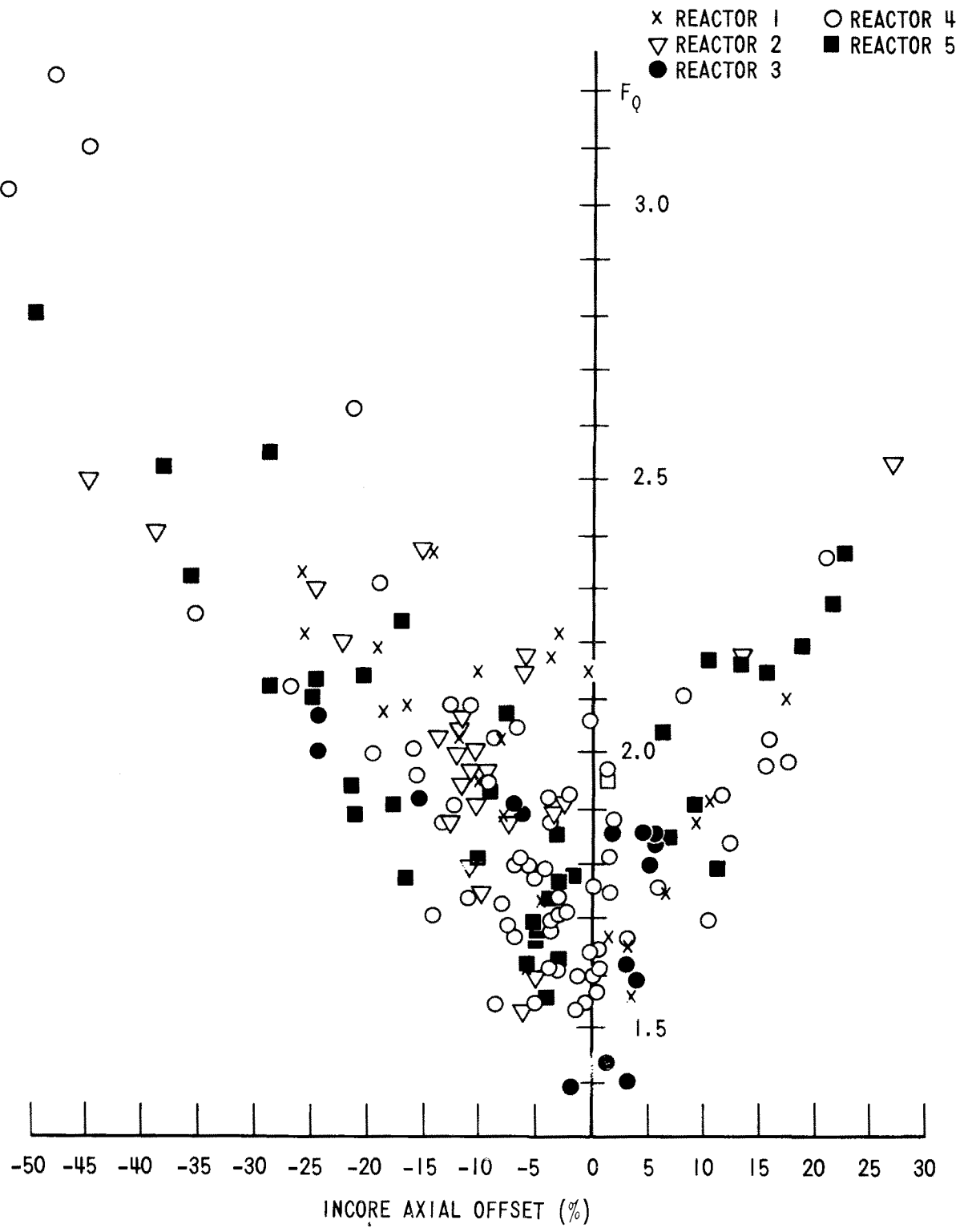


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FIGURE 4.3-25

COMPARISON OF TYPICAL CALCULATED
AND MEASURED AXIAL SHAPES

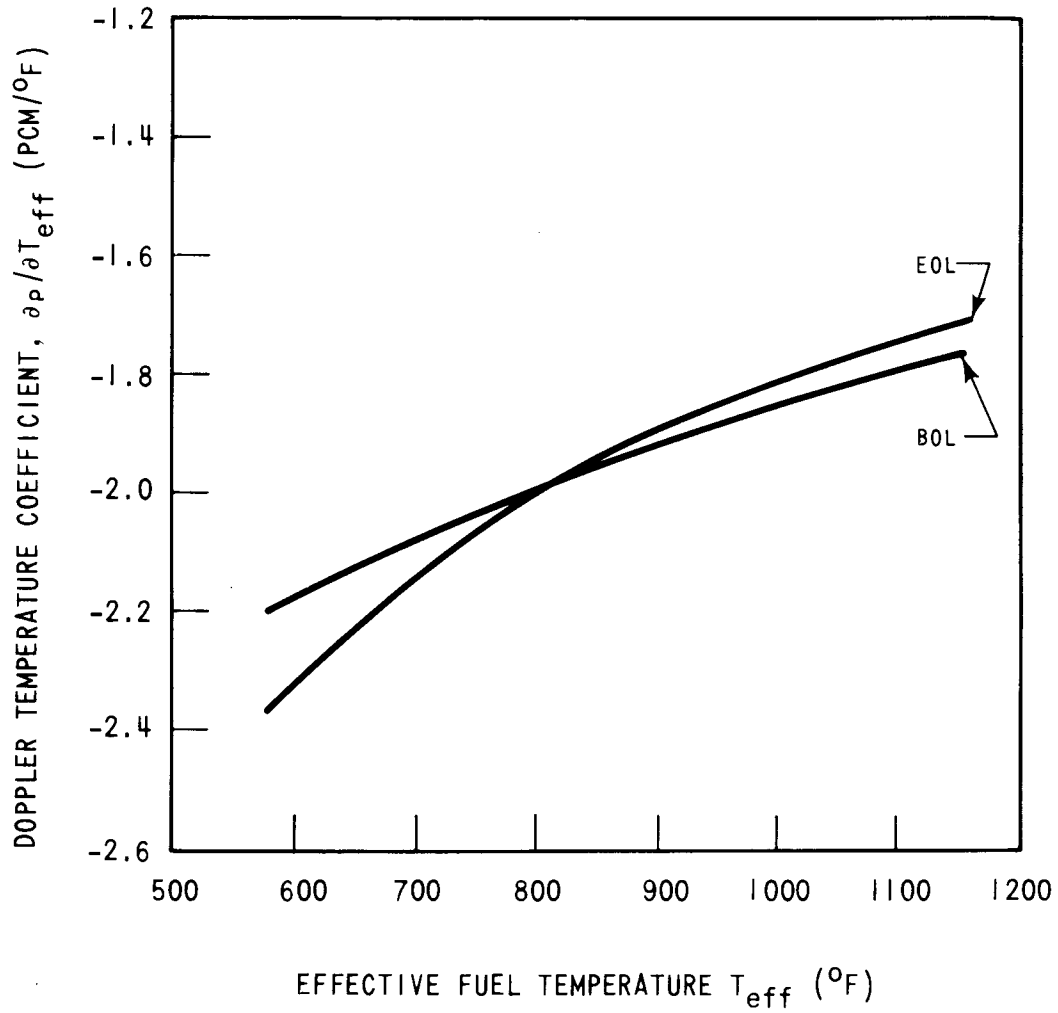


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FIGURE 4.3-26

MEASURED VALUES OF F_Q FOR
FULL POWER ROD CONFIGURATIONS

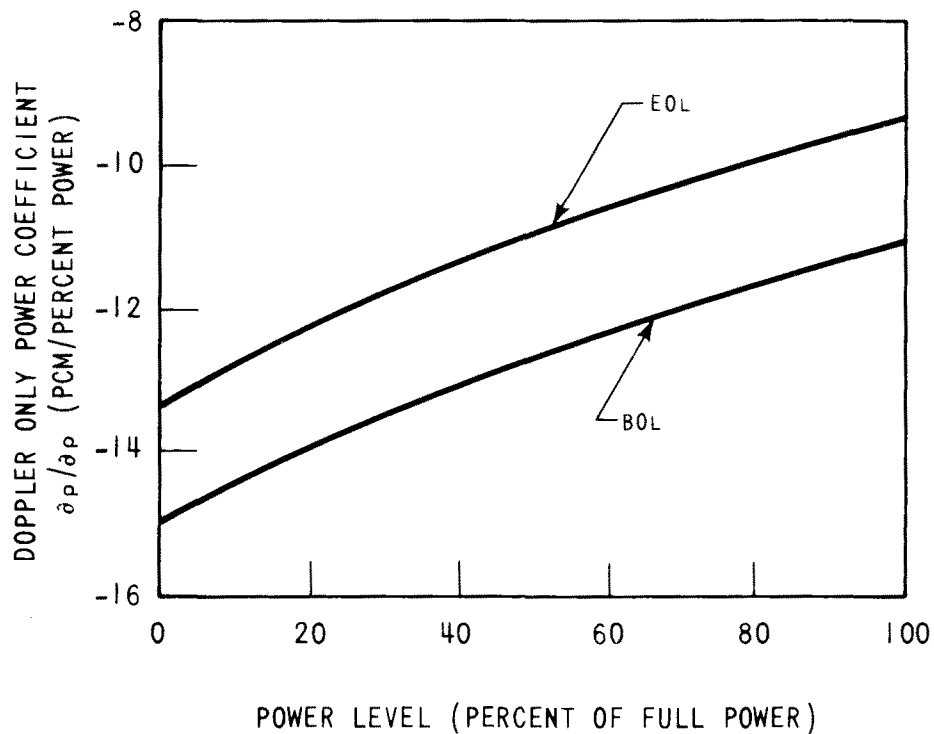


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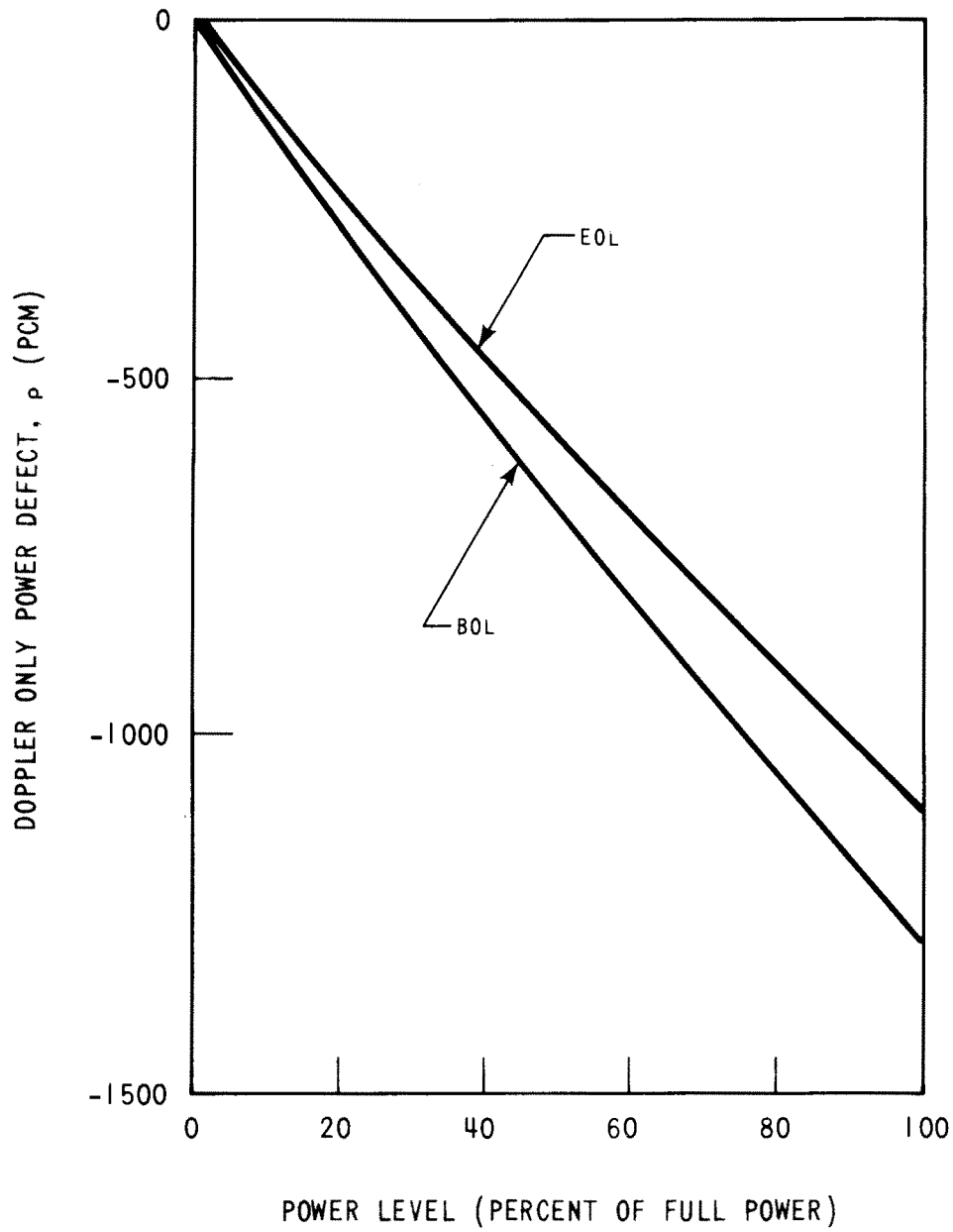
FIGURE 4.3-27

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

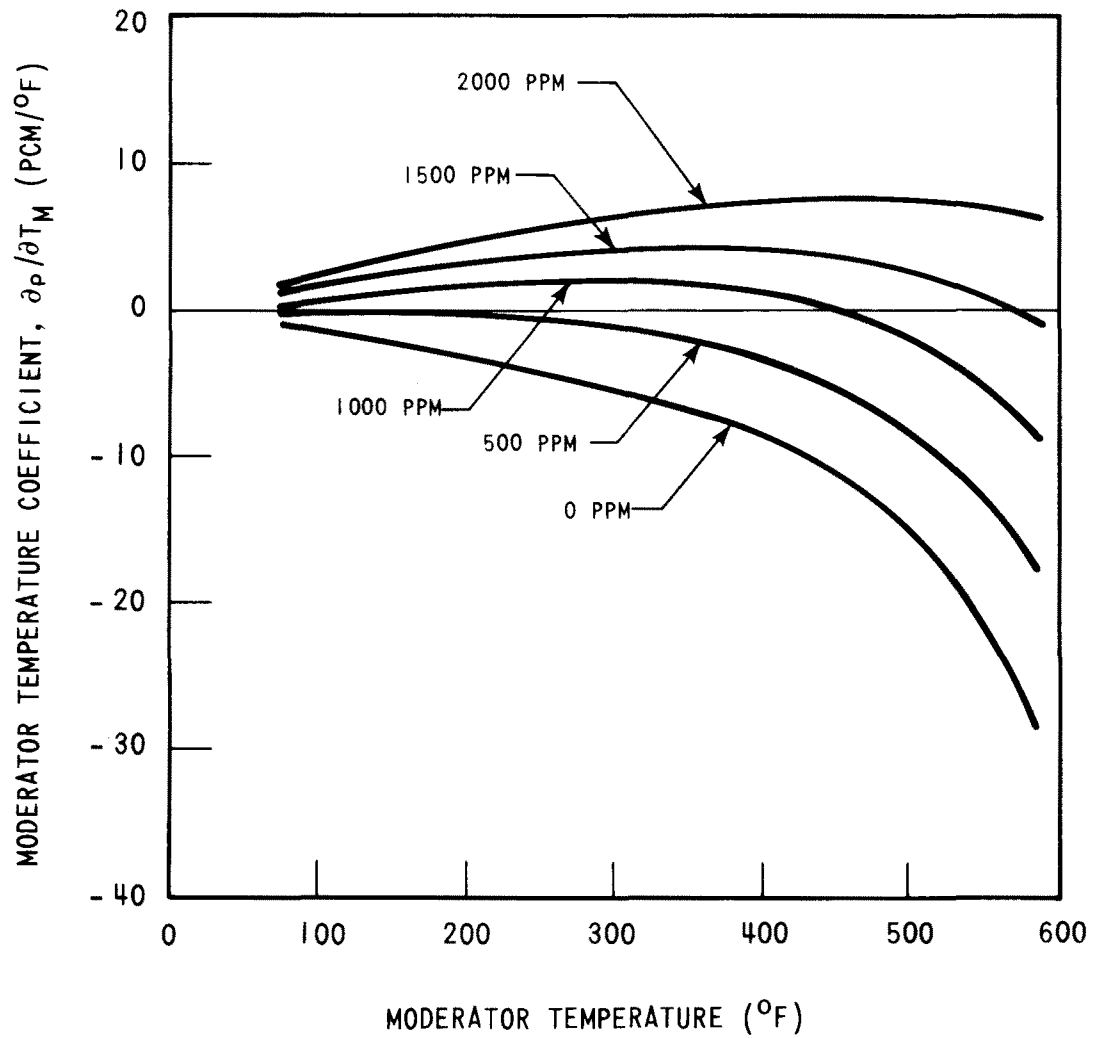


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FIGURE 4.3-29

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

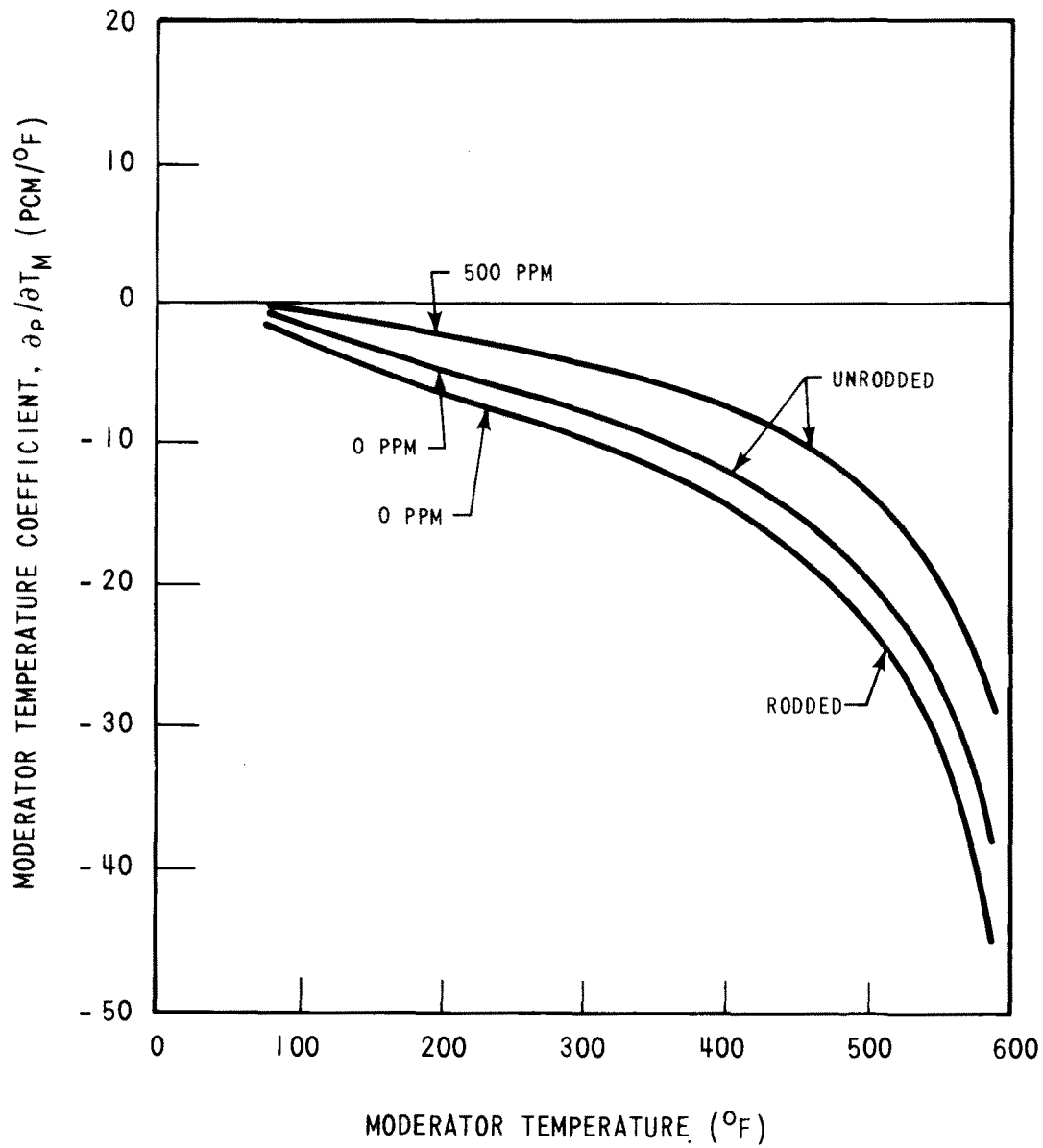


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FIGURE 4.3-30

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

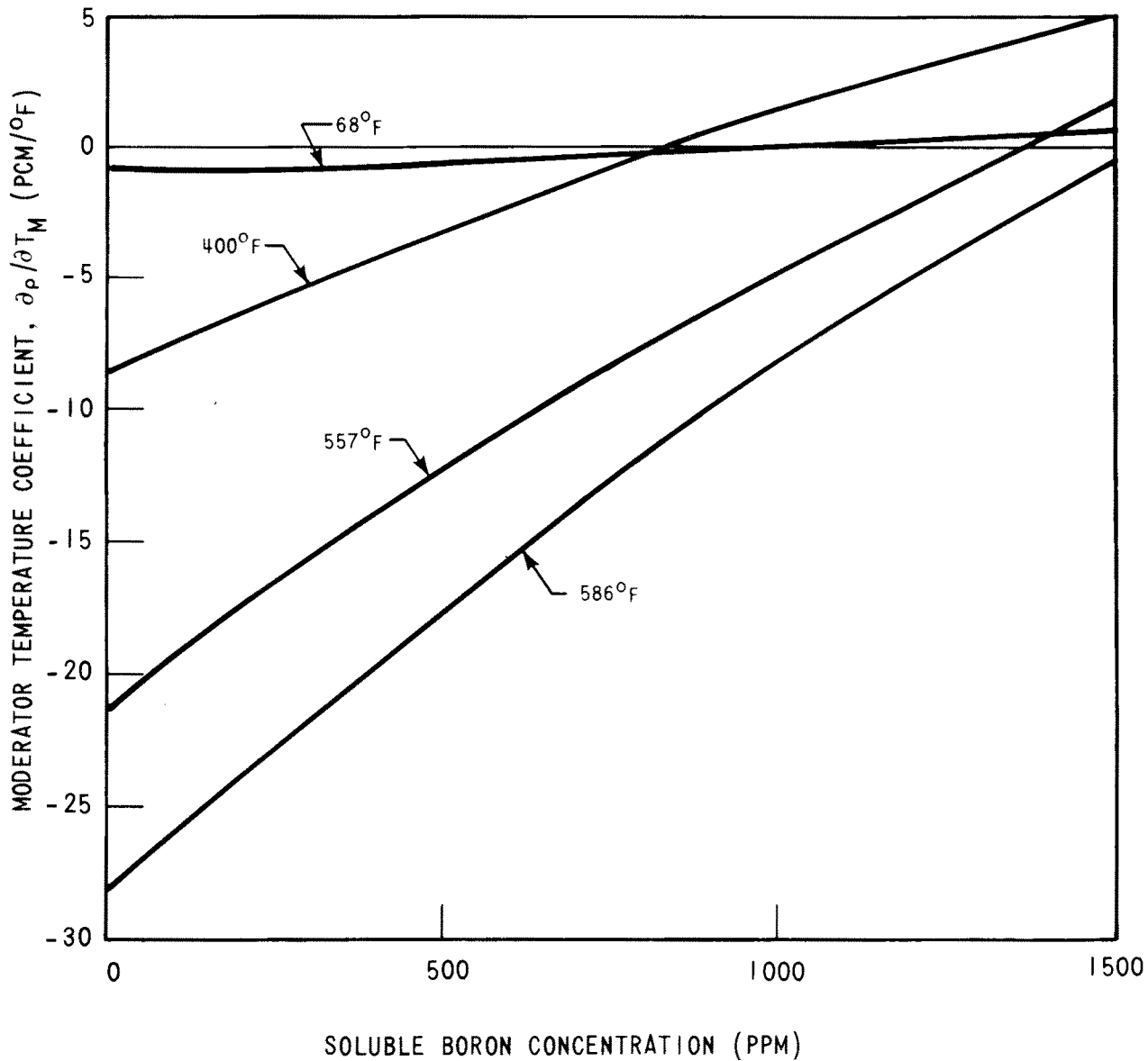


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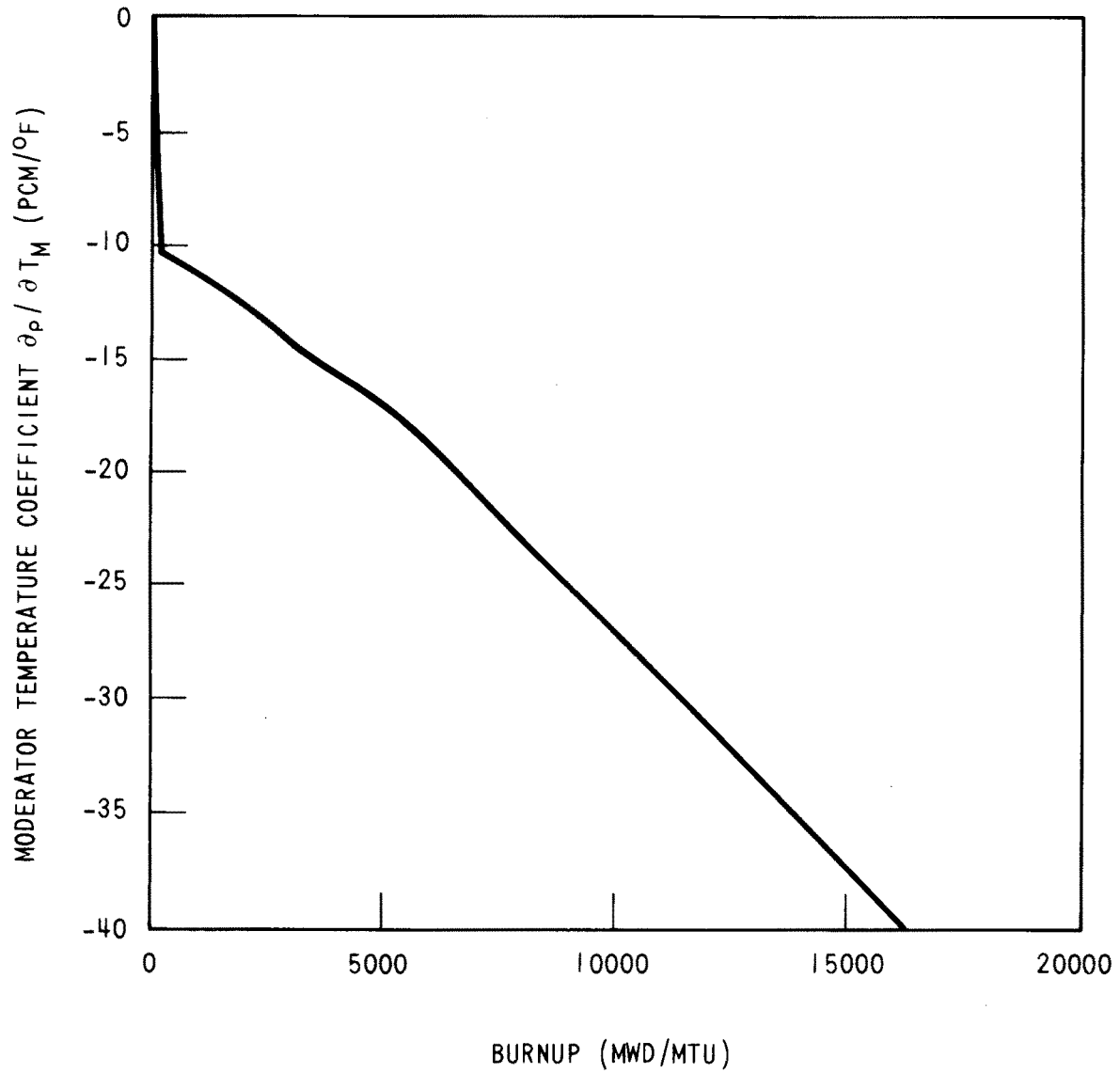
FIGURE 4.3-31

TYPICAL MODERATOR TEMPERATURE
COEFFICIENT AT EOL, CYCLE 1



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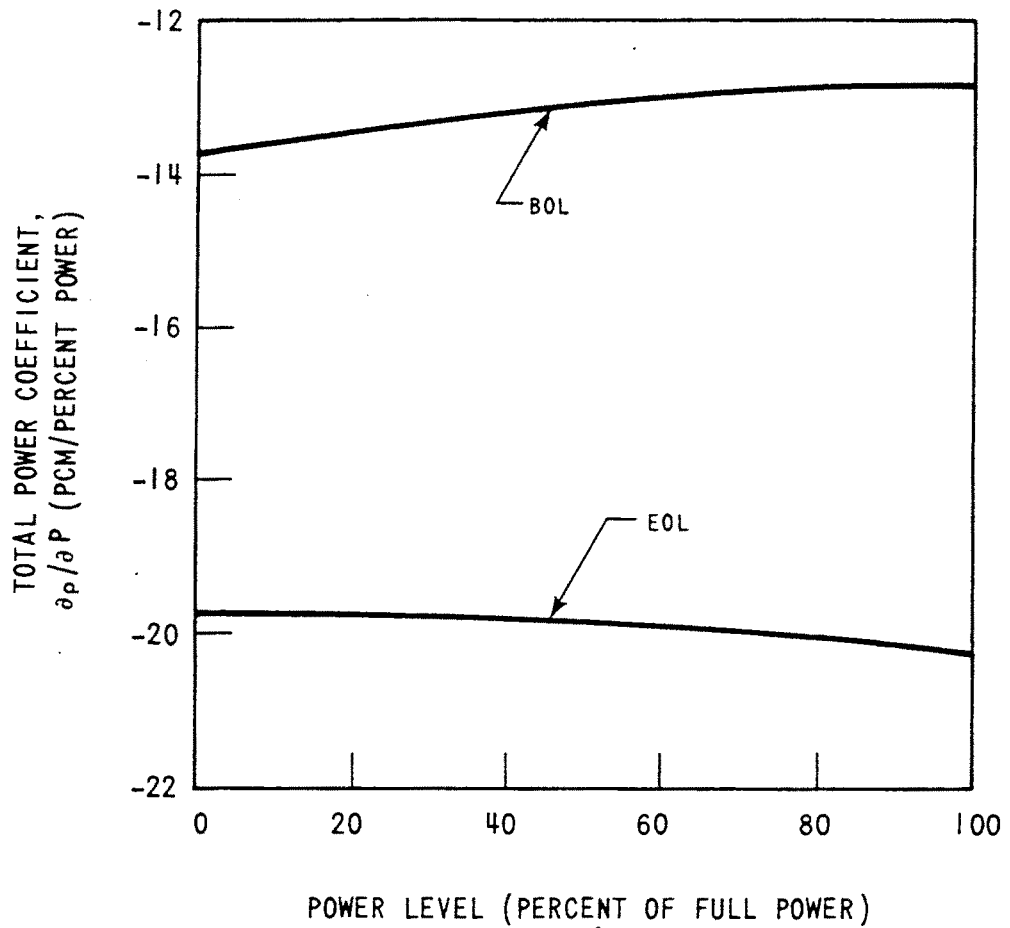
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FIGURE 4.3-32
TYPICAL MODERATOR TEMPERATURE COEFFICIENT AS A FUNCTION OF BORON CONCENTRATION AT BOL, CYCLE 1, NO RODS



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

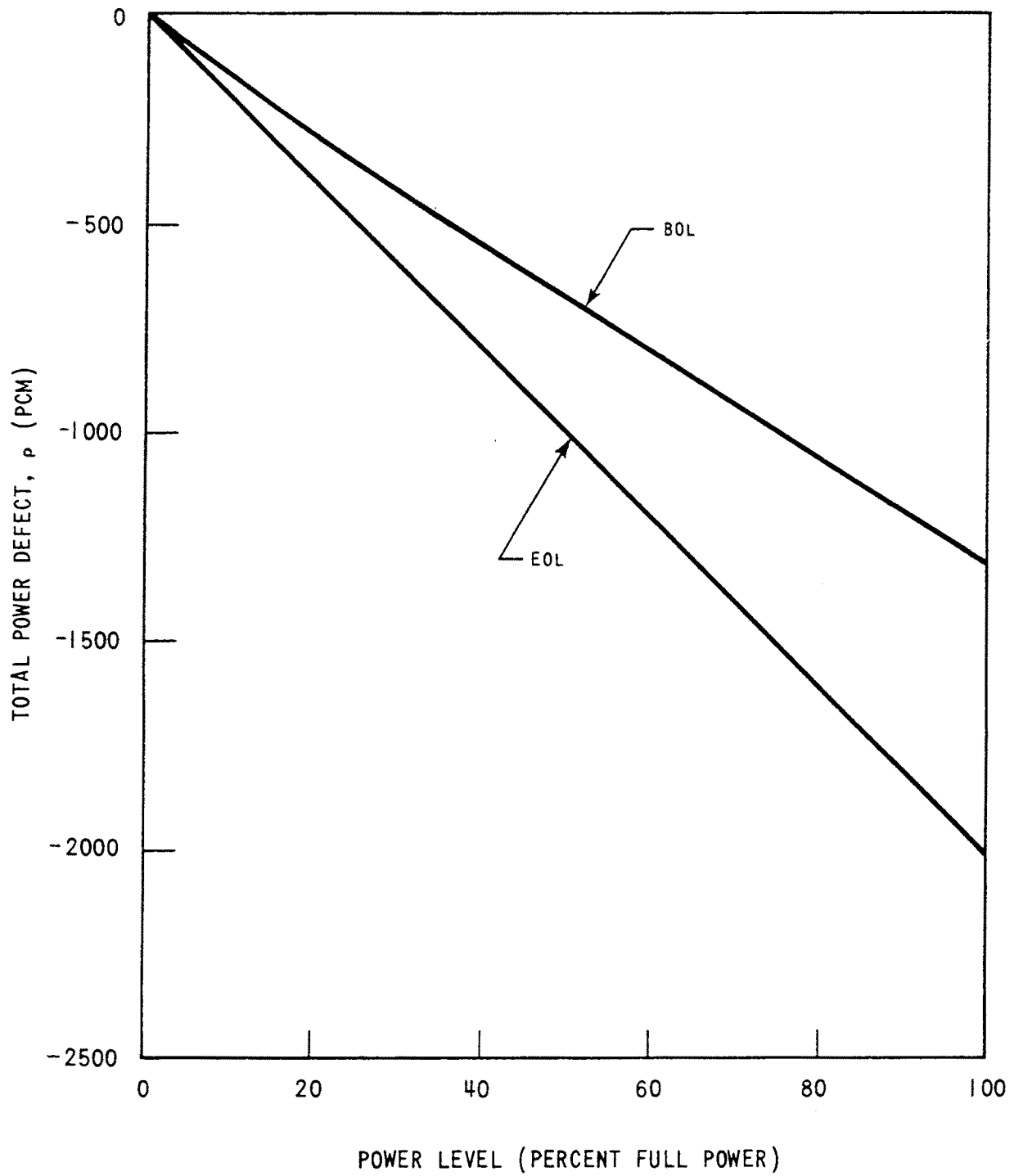


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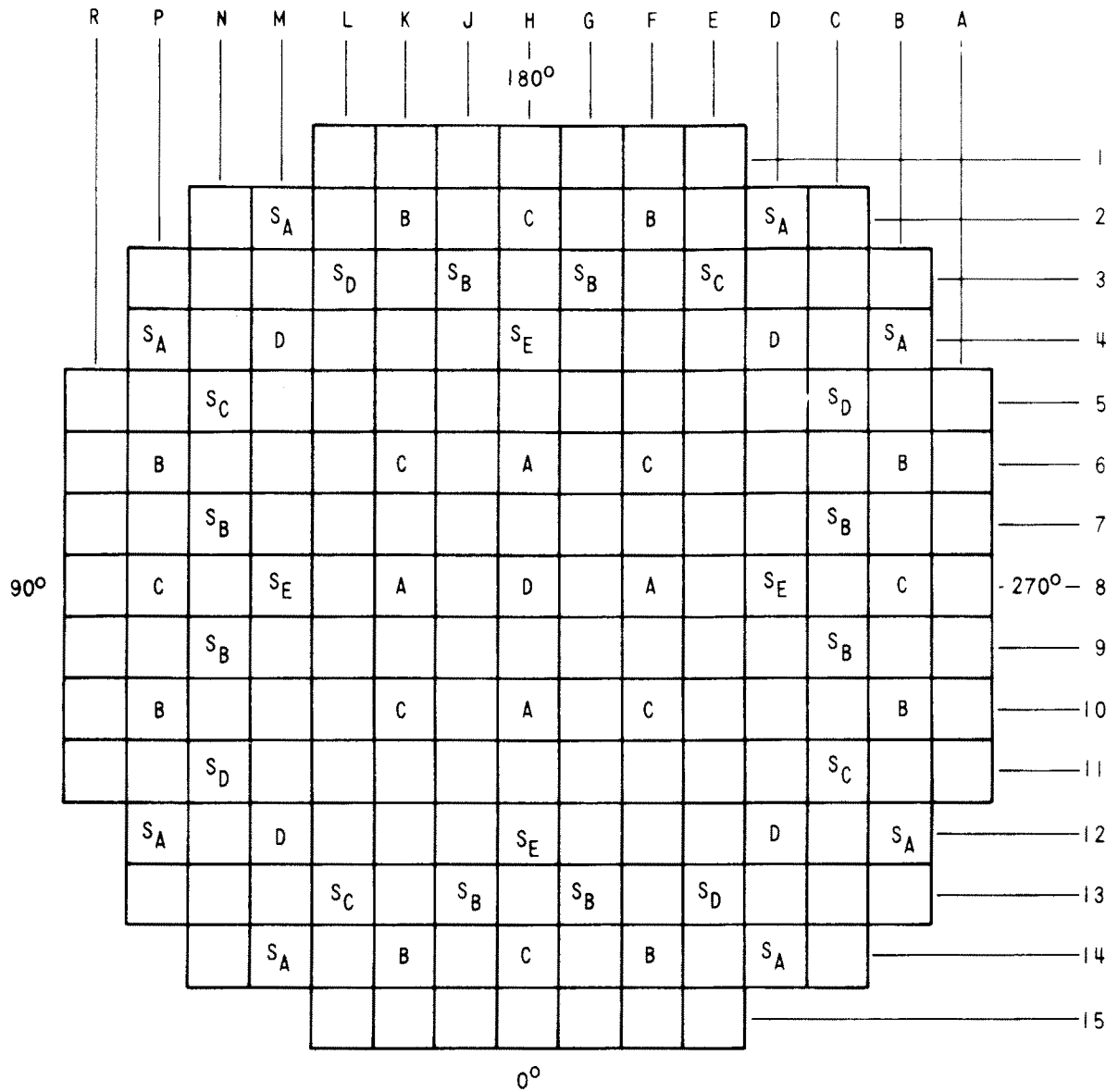
FIGURE 4.3-34

TYPICAL TOTAL POWER COEFFICIENT
AT BOL AND EOL, CYCLE 1



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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
SA	8
SB	8
SC	4
SD	4
SE	4
TOTAL	28

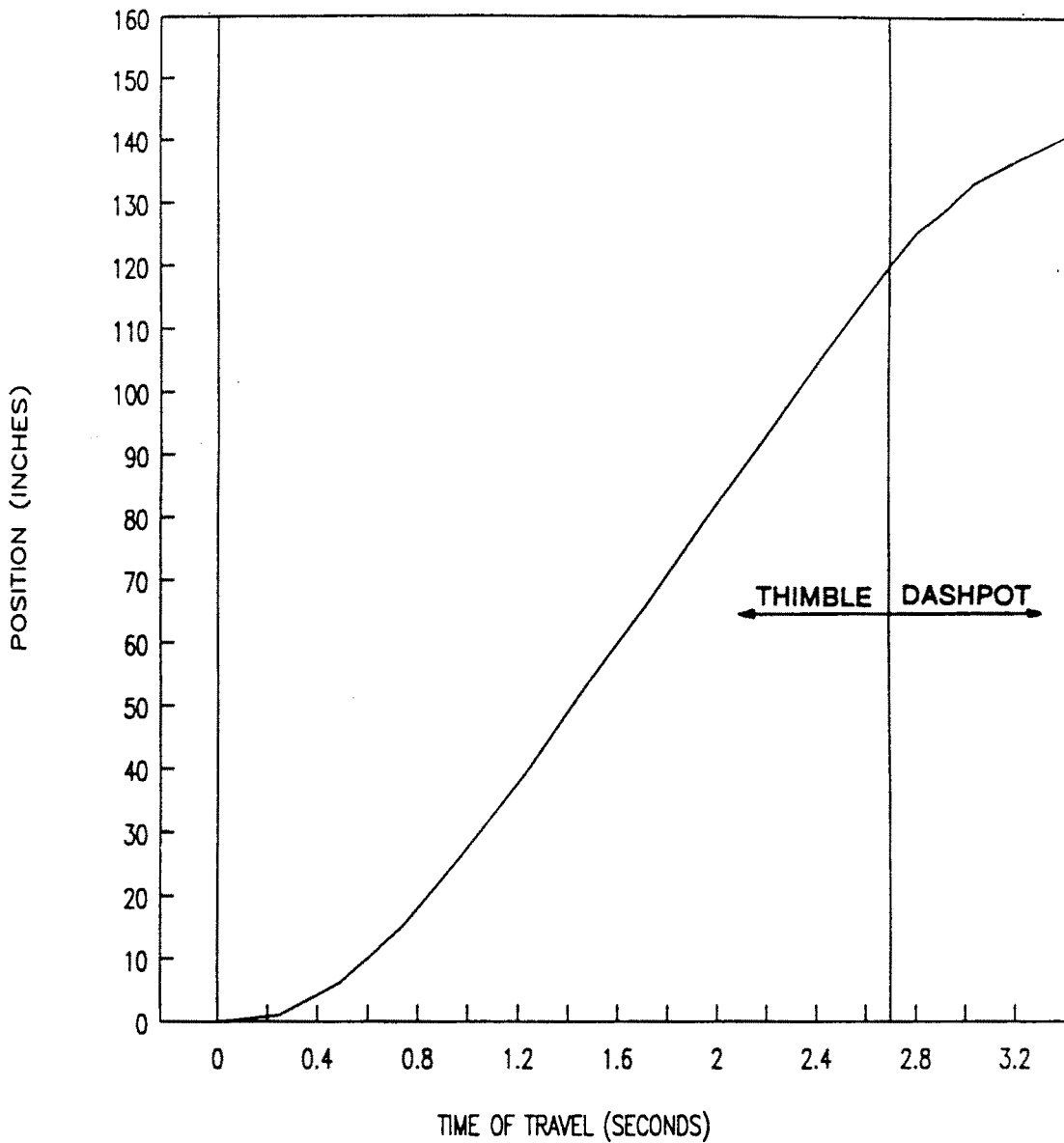
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FIGURE 4.3-36
ROD CLUSTER CONTROL ASSEMBLY
PATTERN

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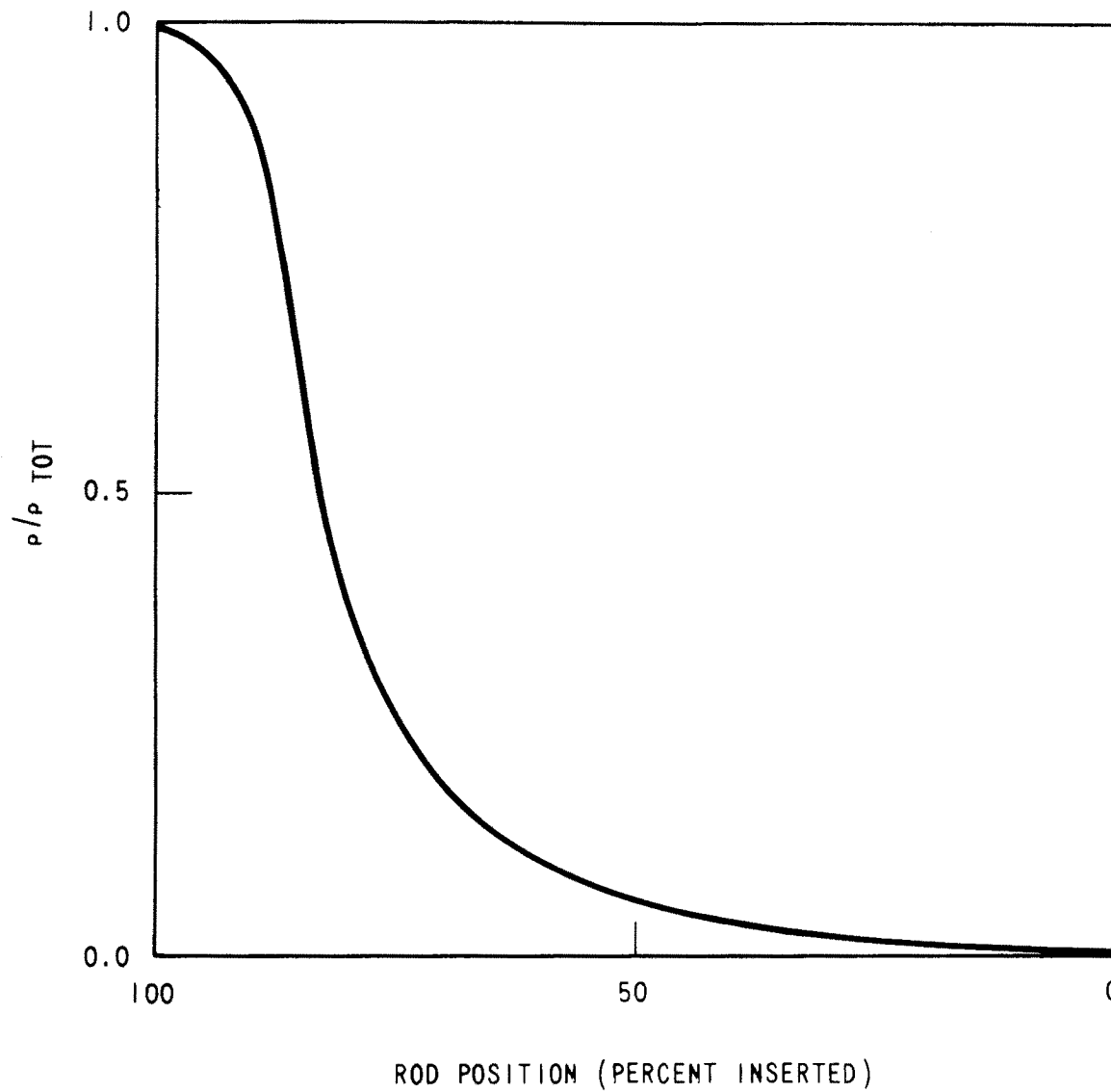
FIGURE 4.3-37 HAS BEEN DELETED

REV. OL-5
6/91



REV. OL-5
6/91

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FIGURE 4.3-38
DESIGN TRIP CURVE

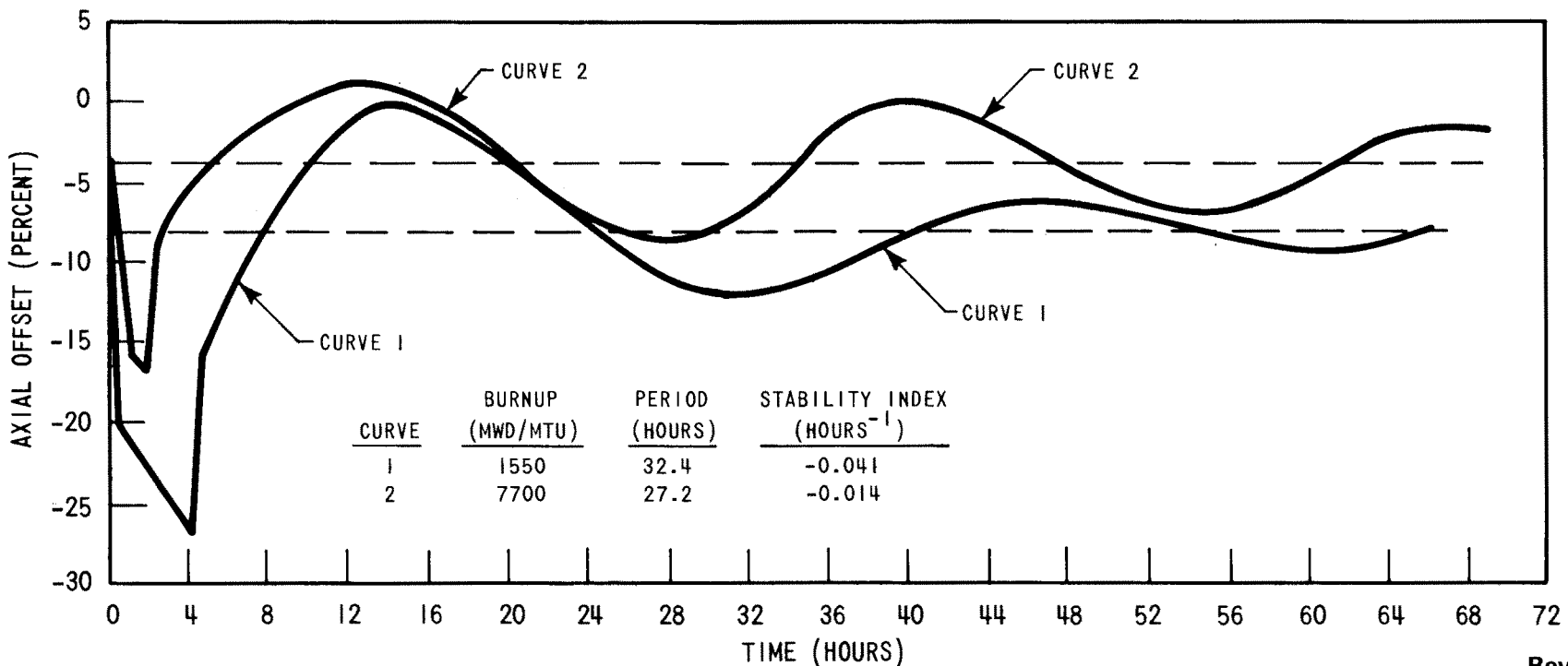


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FIGURE 4.3-39

TYPICAL NORMALIZED ROD WORTH
VERSUS PERCENT INSERTION, ALL
RODS OUT BUT ONE

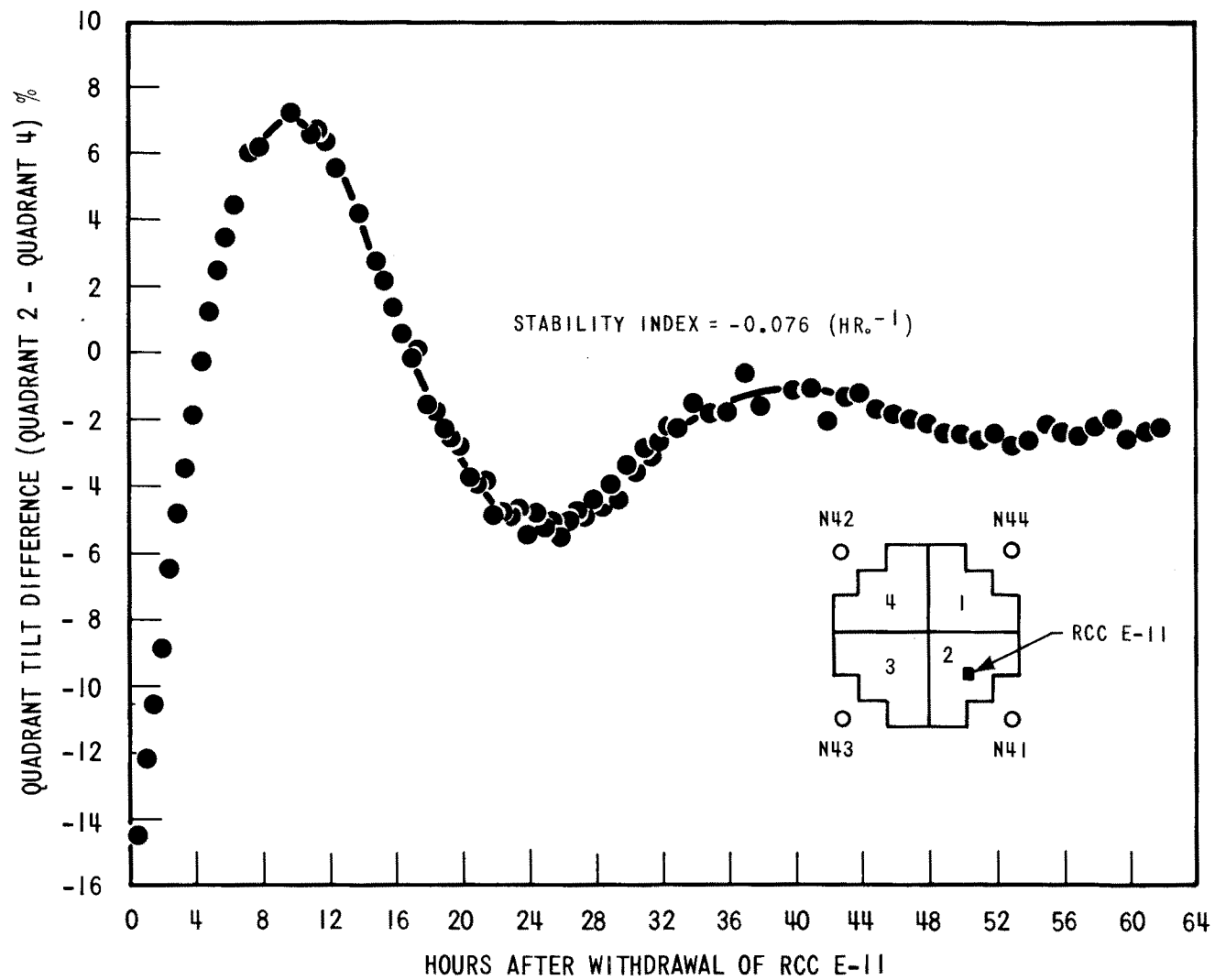


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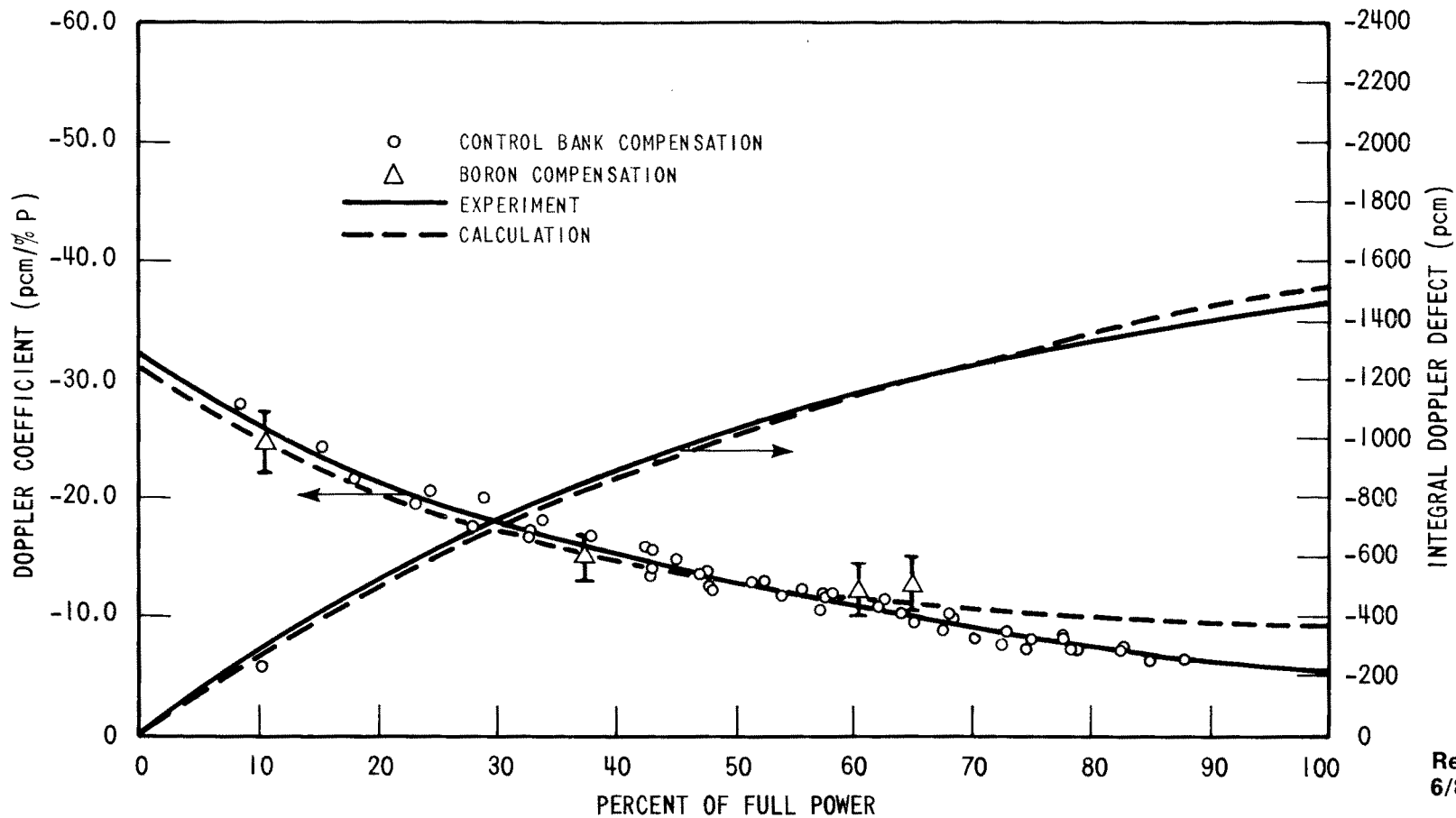
FIGURE 4.3-40

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

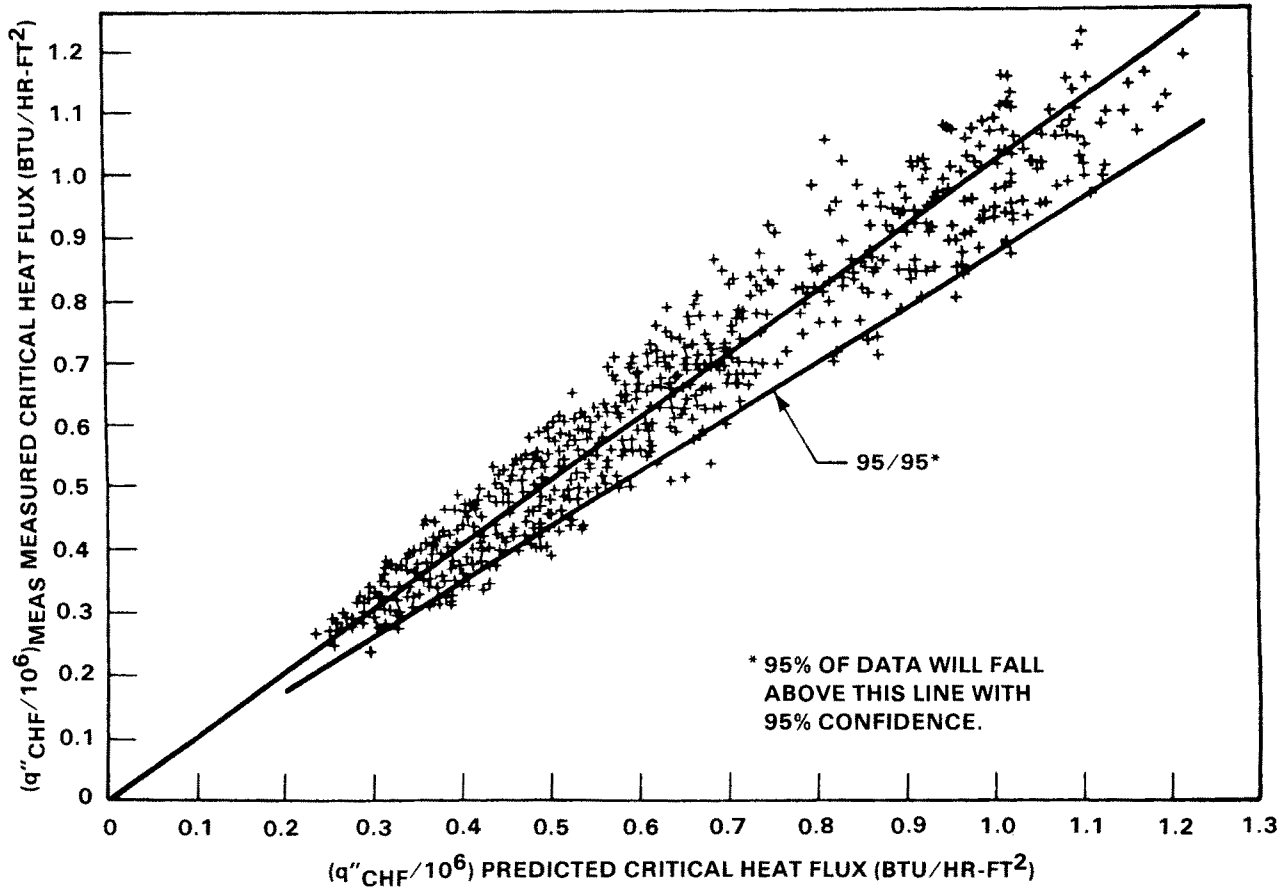
FIGURE 4.3-45 HAS BEEN DELETED

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Figure 4.4-1 Deleted.

Figure 4.4-1a Deleted

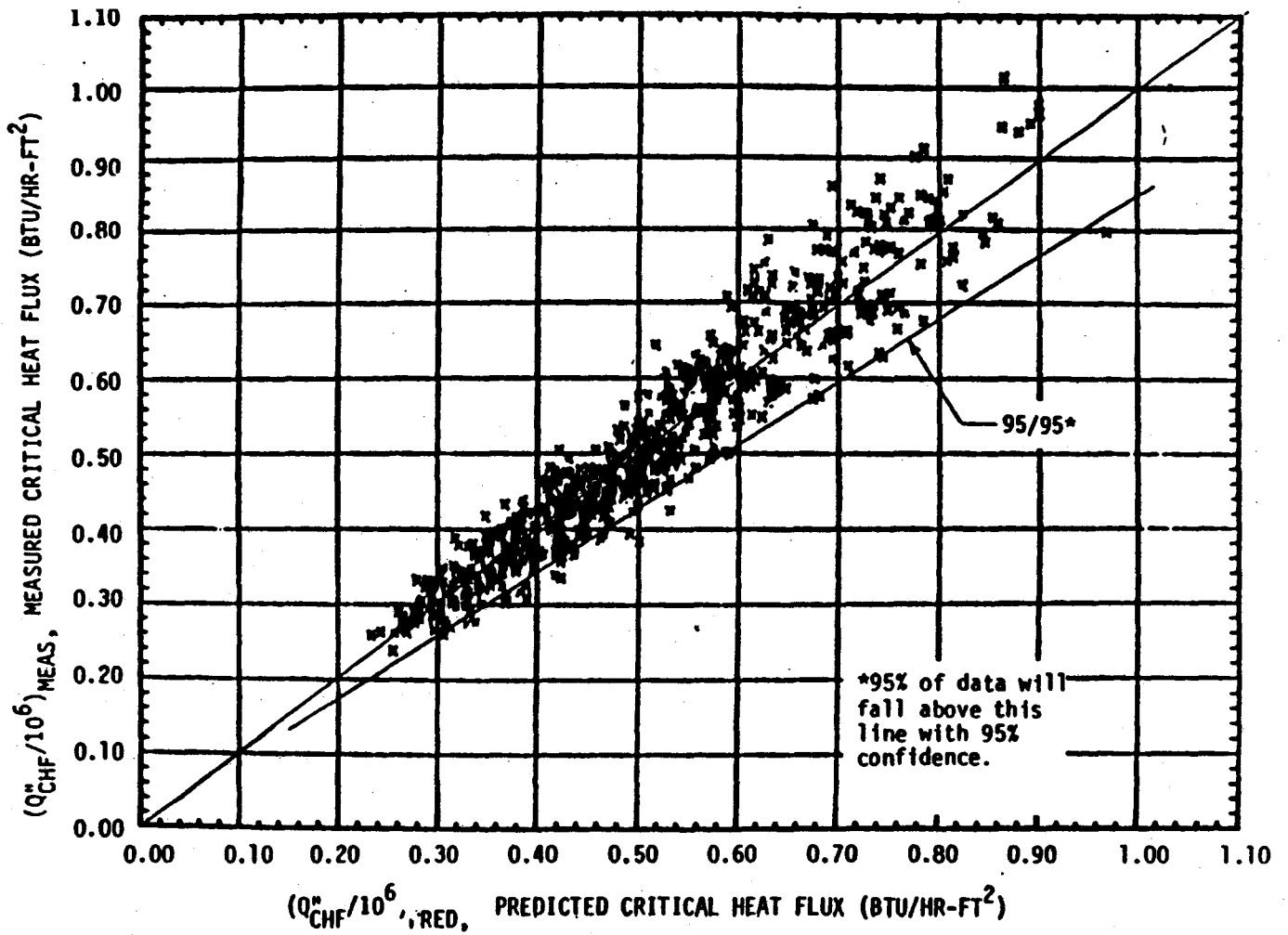
Figure 4.4-2 Deleted.



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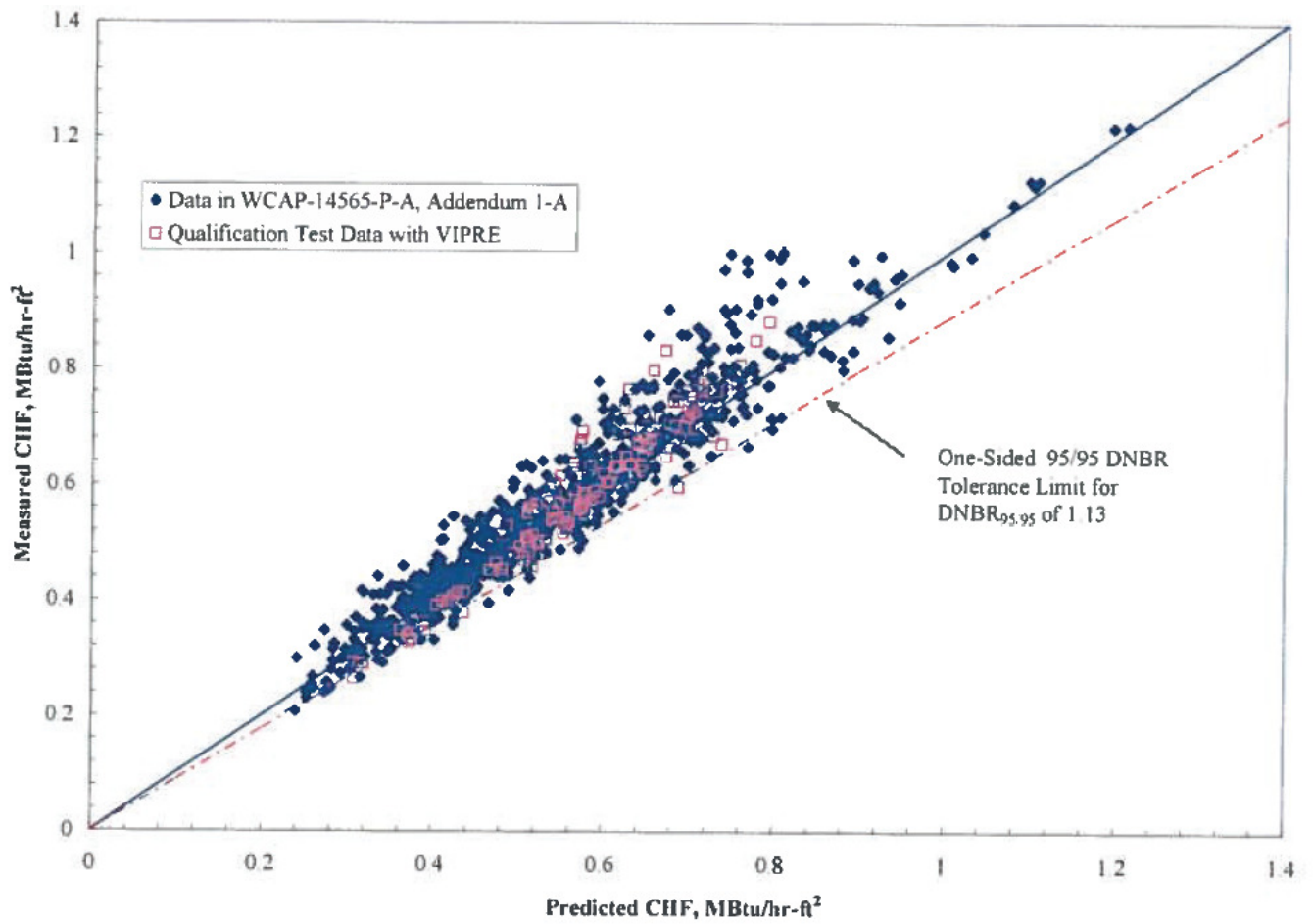
**FIGURE 4.4-2a
MEASURED VERSUS PREDICTED CRITICAL
HEAT FLUX - WRB-1 CORRELATION**



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 10/06

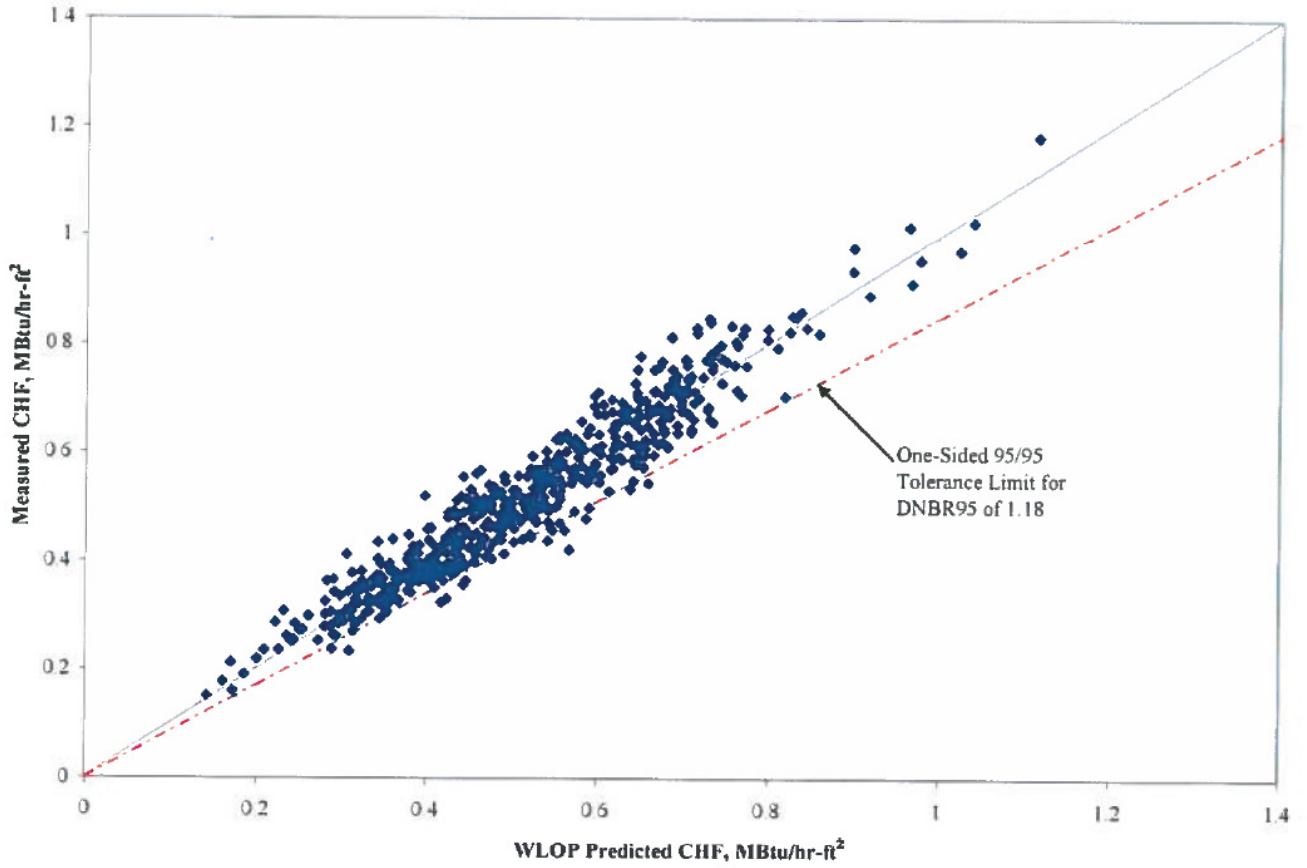
CALLAWAY PLANT
FIGURE 4.4-2b MEASURED VERSUS PREDICTED CRITICAL HEAT FLUX WRB-2 CORRELATION

Figure 4.4-3 Deleted.



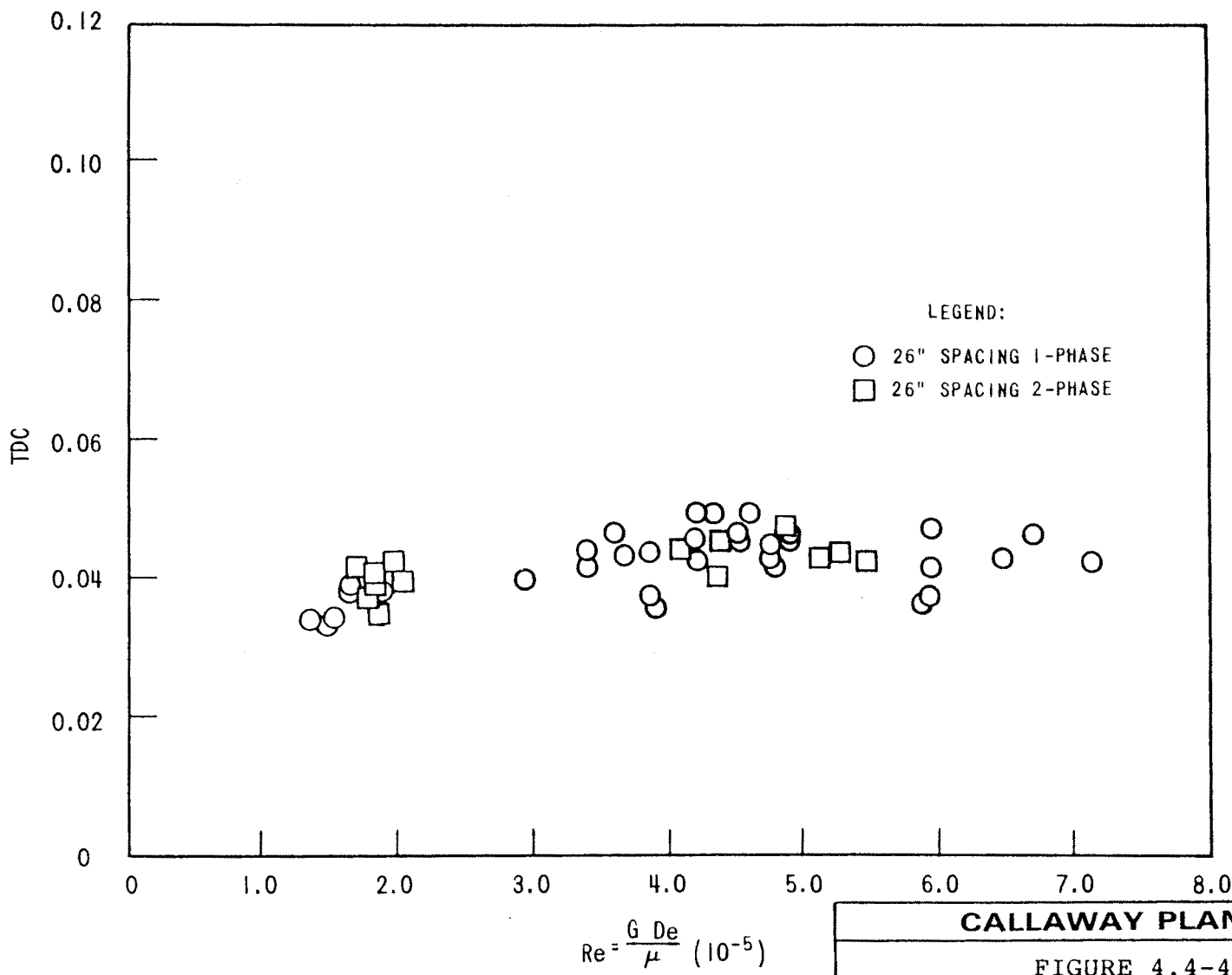
Rev. OL-21d
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FIGURE 4.4-3a MEASURED VERSUS PREDICTED CRITICAL HEAT FLUX – ABB-NV CORRELATION



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4/16

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

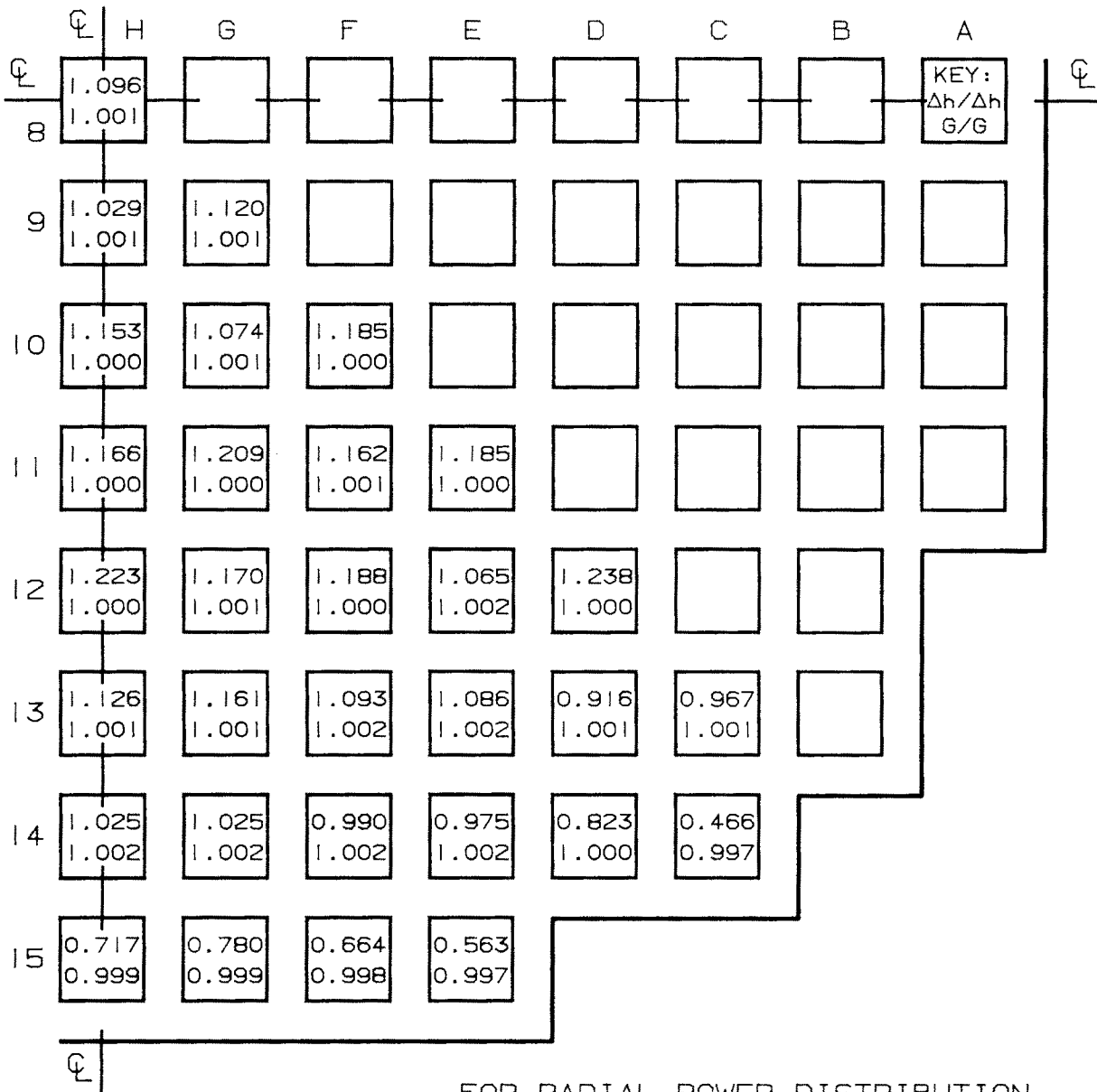


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FIGURE 4.4-4

TDC VERSUS REYNOLDS NUMBER
FOR 26 INCH GRID SPACING



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

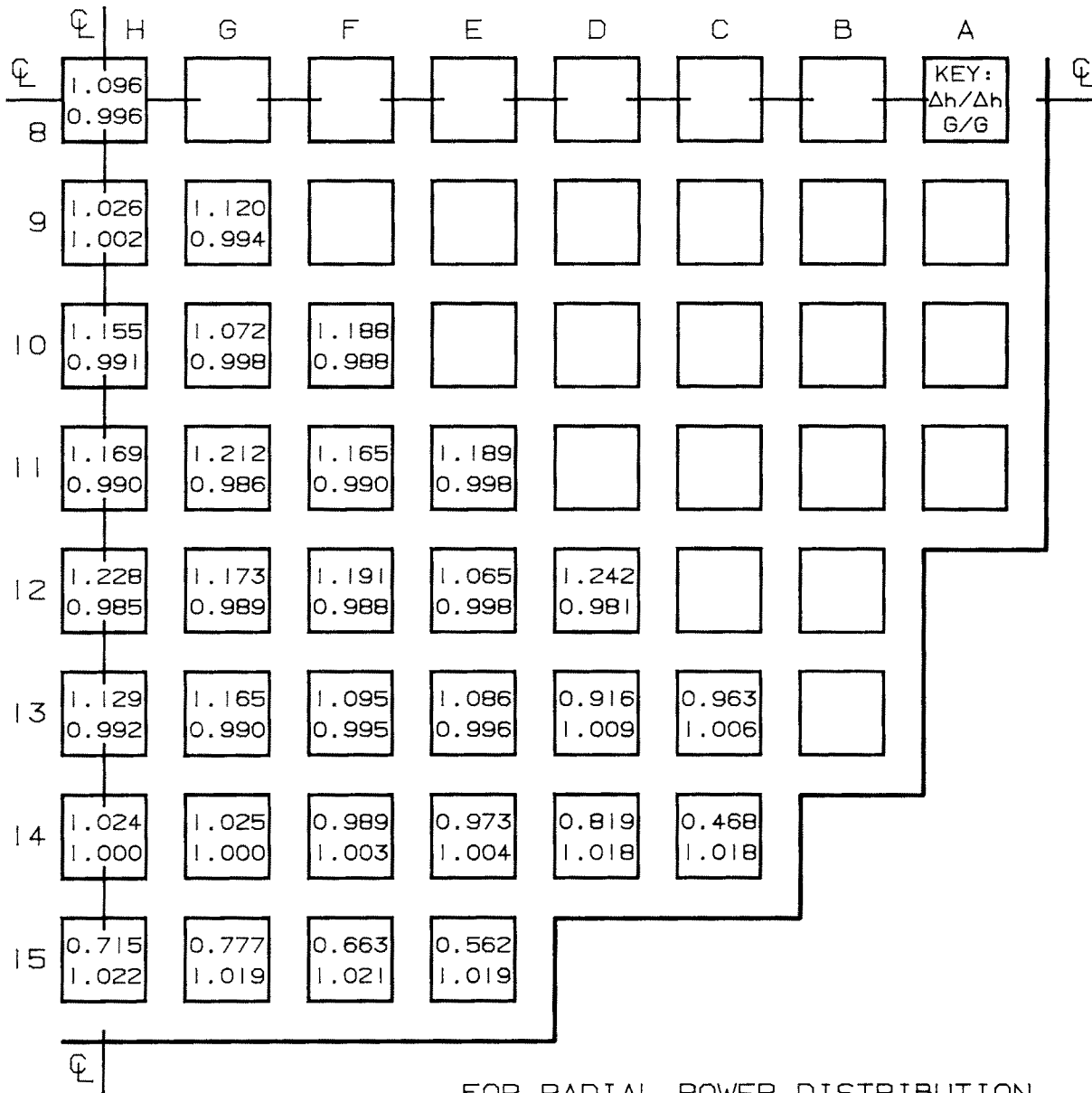
CALCULATED $F_{\Delta H}^N = 1.34$

(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

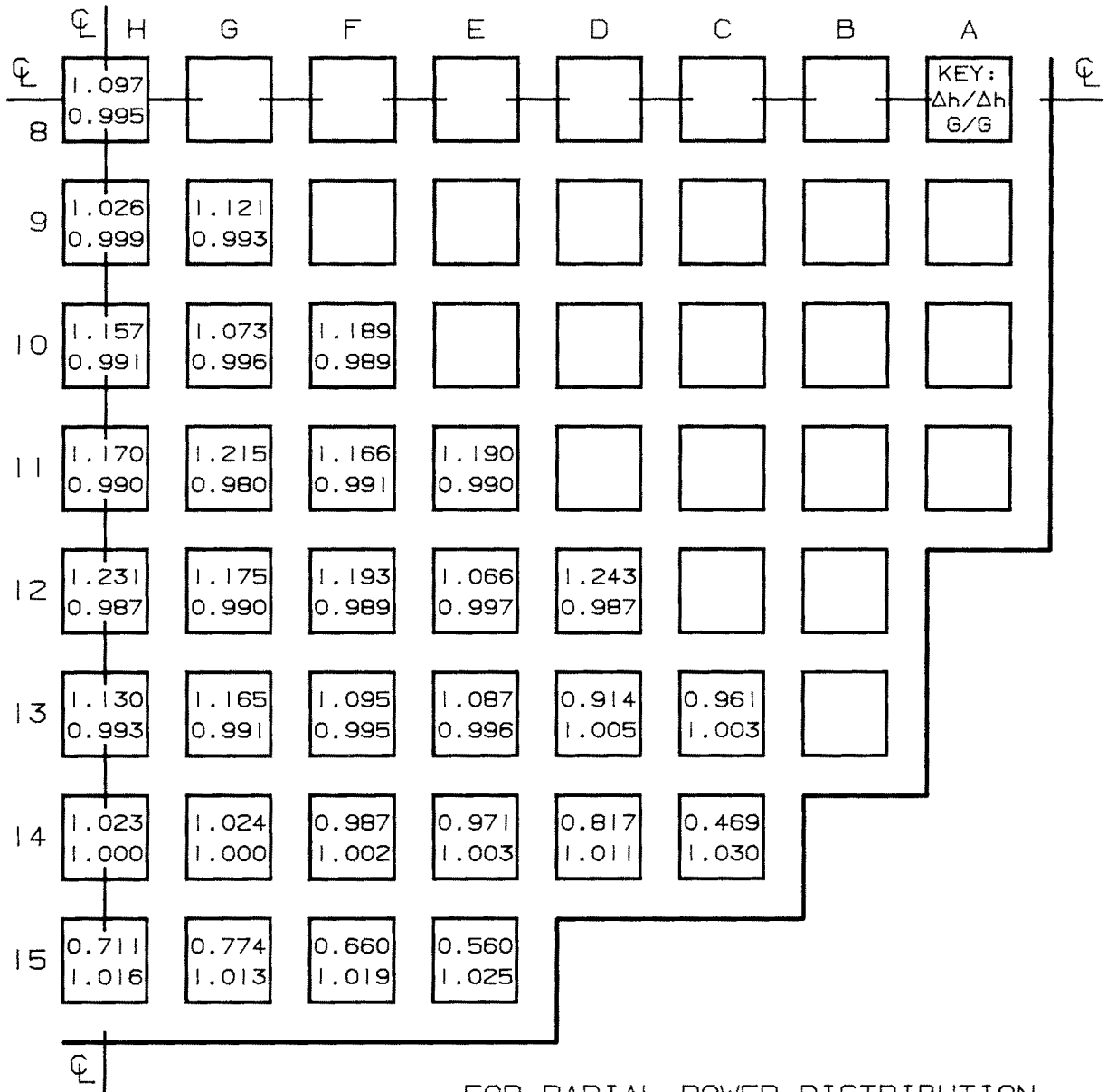
CALCULATED $F_{\Delta H}^N = 1.34$

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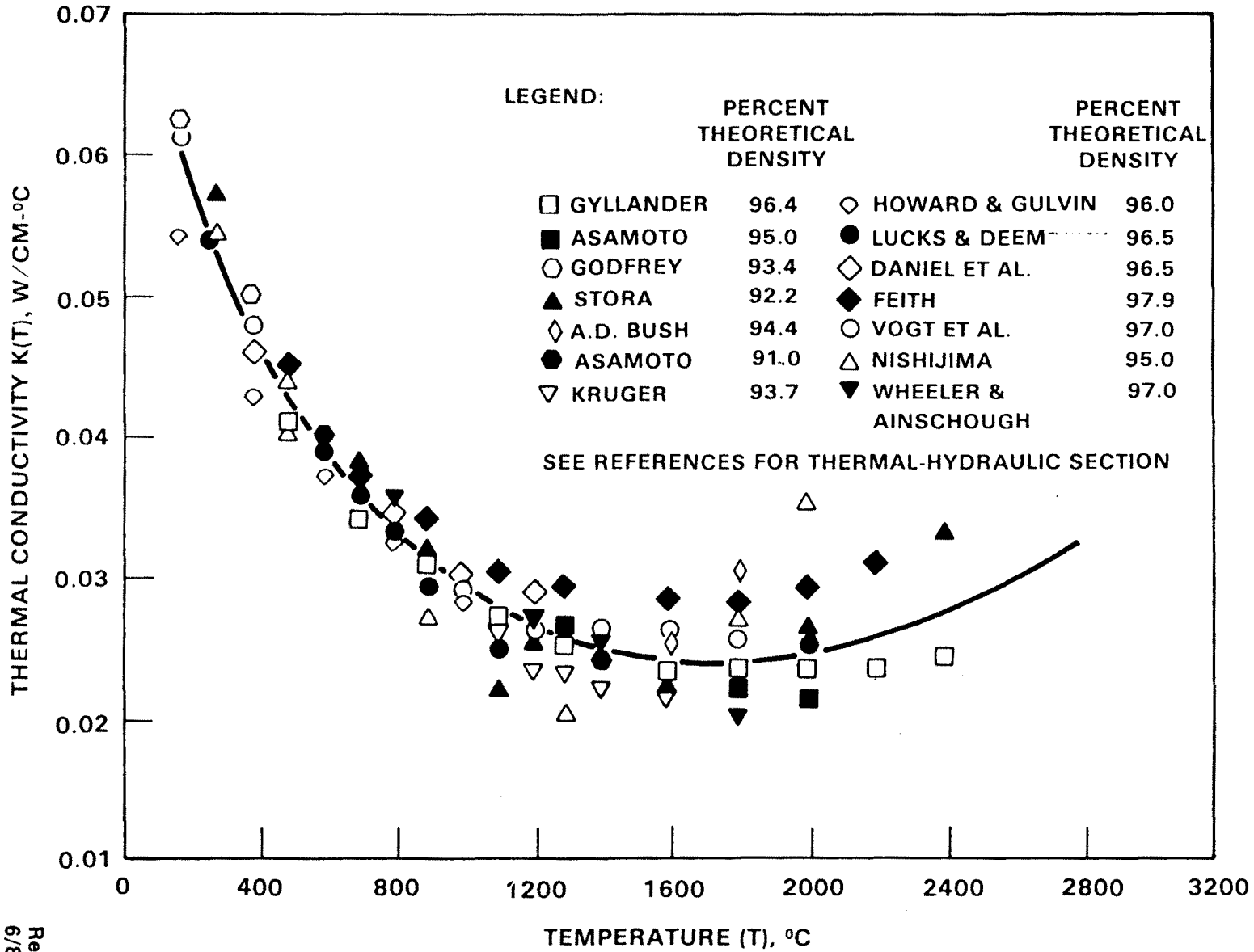
FIGURE 4.4-7
NORMALIZED RADIAL FLOW AND
ENTHALPY DISTRIBUTION AT 12 FOOT
ELEVATION - CORE EXIT

Figure 4.4-8 Deleted

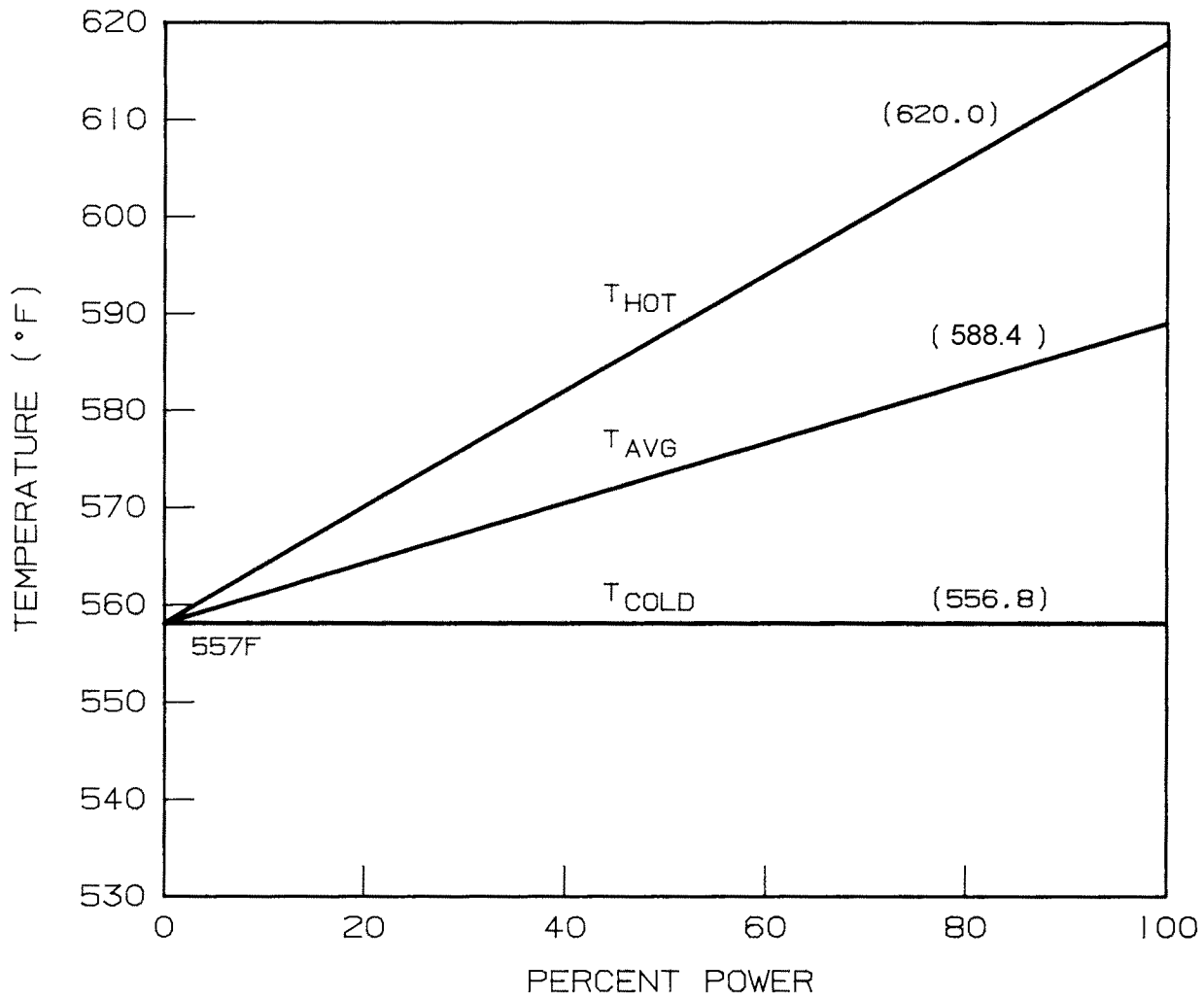
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FIGURE 4.4-9

Thermal Conductivity of UO₂
(Data Corrected to 95%
Theoretical Density)



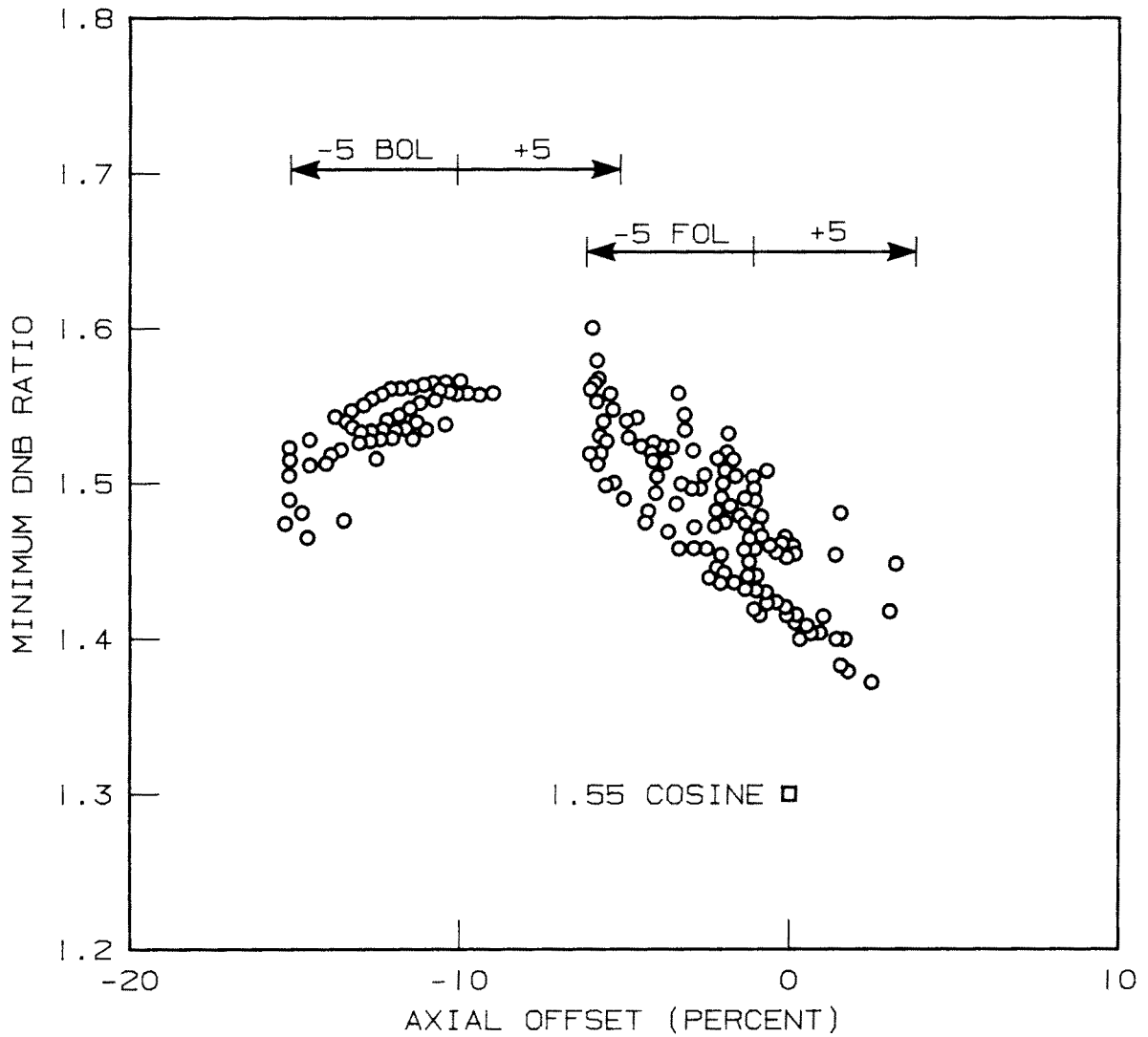
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**FIGURE 4.4-10
REACTOR COOLANT SYSTEM
TEMPERATURE-PERCENT POWER MAP**



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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.

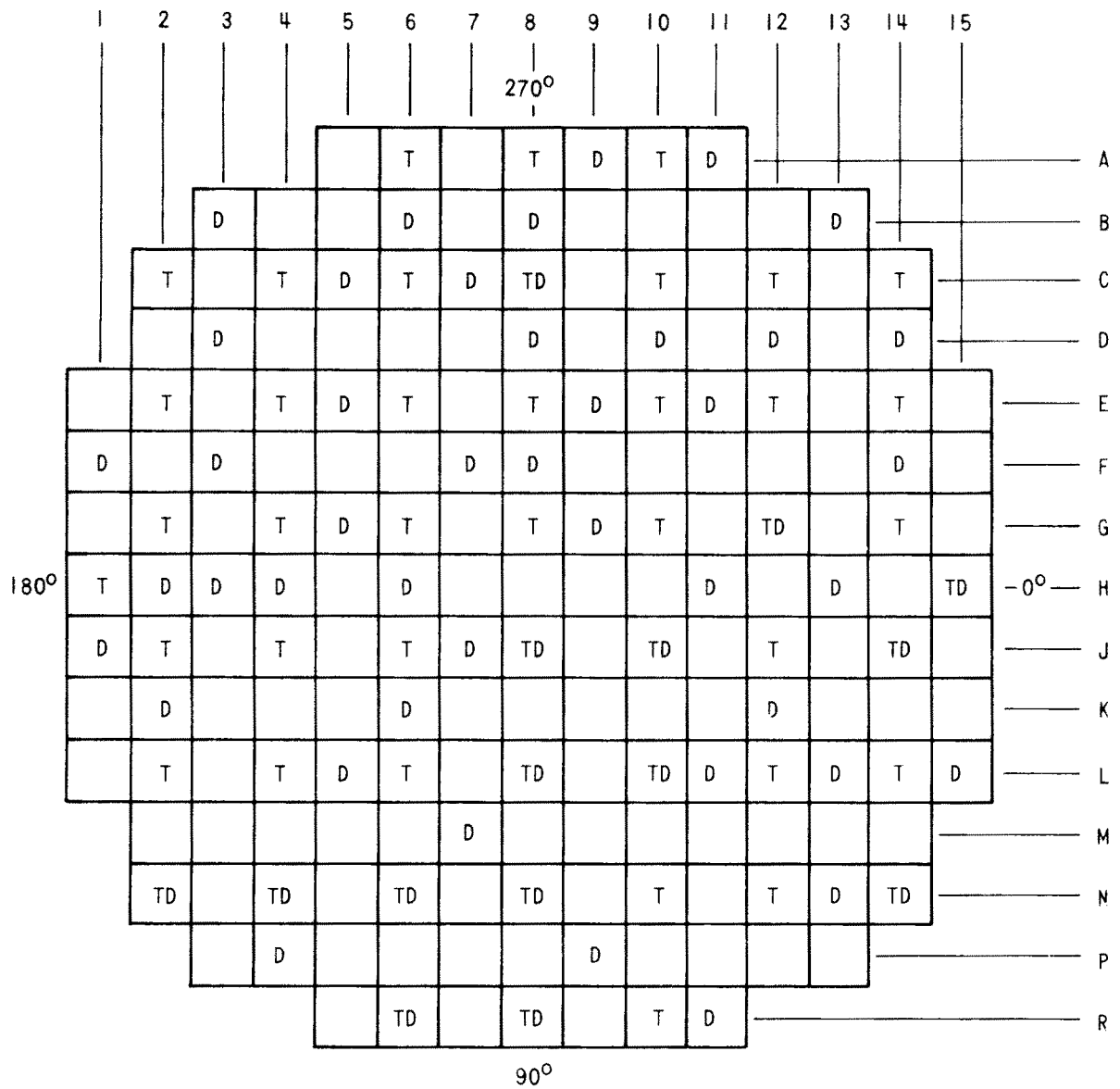
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Figure 4.4-17 Deleted.

Figure 4.4-18 Deleted.

Figure 4.4-19 Deleted.

Figure 4.4-20 Deleted.



T = THERMOCOUPLE (50 LOCATIONS)
 D = MOVABLE INCORE DETECTOR (58 LOCATIONS)

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 FIGURE 4.4-21
 DISTRIBUTION OF INCORE
 INSTRUMENTATION