THE SHAPE ANNEALING FACTOR COMPONENT

OF THE

AXIAL SHAPE INDEX UNCERTAINTY

AT MILLSTONE PCINT UNIT 2

CEN-247(N)-NP

March 1983

Combustion Engineering, Inc.
Nuclear Power Systems
Windsor, Connecticut

LEGAL NOTICE

Abstract

This report provides the Northeast Nuclear Energy Company with the results of C-E's analysis of the Millstone Point Unit 2 (MP2) trip or monitoring system axial shape index uncertainty due to the uncertainty in the excore detector shape annealing factor.

A comparison is made between the uncertainty derived from MP2 Cycle 1 measurements and those derived from similar measurements at Calvert Cliffs Units 1 and 2 and St. Lucie Unit 1. The comparison demonstrates that the Millstone Point Unit 2 shape annealing factor component of the axial shape index uncertainty is bounded by the functional relationship

$$K \sigma_{I(\alpha)} = \left|\frac{\delta \alpha}{\alpha}\right| I_p \leq .068\ I_p$$

In practice, with a full power shape index band of $\pm .2$ asiu, $|K \sigma_{I(\alpha)}| \leq .0136$.

TABLE OF CONTENTS

1. Introduction

In order to support the uncertainties used in the setpoints for licensing current and future cycles of Millstone Point Unit 2 (MP2), Northeast Nuclear Energy Company (NNEC) has requested Combustion Engineering, Inc. (C-E) to provide them with a re-evaluation of the uncertainty in the axial shape index (I) due to the uncertainty in the shape annealing factor (SAF or α). This document reports the development of the requested uncertainty.

2. Correlation of Shape Annealing Factors Uncertainty with Shape Index Uncertainty

As used in the C-E designed setpoint system, the SAF (α) is used as a multiplier of the ex-core instrument shape index (I_e) to determine the trip or monitoring shape index (Y_I). That is,

$$\alpha I_e = Y_I.$$

The multiplicative combination of these two variables, which are uncertain, to calculate the trip variable results in a bounded trip variable uncertainty of the form

$$\delta Y_I \leq \left| \frac{\delta\alpha}{\alpha} \right| Y_I + \left| \frac{\delta I_e}{I_e} \right| Y_I$$

Thus, for our purpose, the error in the protective or monitoring system shape index (Y_I) due to the error in the shape annealing factor can be assumed to be bounded by

$$\delta Y_I(\alpha) \leq \left| \frac{\delta\alpha}{\alpha} \right| Y_I$$

3. Development of Shape Annealing Factor Uncertainty from Shape Annealing Factor, Shape Index Correlations

The C-E setpoint methodology is based, in part, on the assumption that the attenuation of neutron flux from the core periphery to the ex-core detectors is essentially independent of [

] Thus, the correlation between the detected neutron flux at the ex-core detectors and the power distribution at the edge of the core is given by

$$\alpha I_e = I_p$$

where

α is the shape annealing factor (SAF) (under investigation herein),

I_e is the axial shape index defined by the upper (S_u) and lower (S_l) segment excore detector signals as $I_e = \frac{S_l - S_u}{S_l + S_u}$, and

I_p is the axial shape index at the periphery of the core, defined as

$$I_p = \frac{\sum_i (W_i \; P_i \; I_u)}{\sum_i (W_i \; P_i)}$$

where

- W_i is the assembly weighting factor of the i^{th} assembly whose flux contributes to the ex-core detector signal,
- P_i is the power in assembly i, and
- I_i is the shape index of the average axial power distribution in assembly i.

Evaluation of I_p from calculations and experiments has shown that for C-E reactors of the same class as Millstone Point 2 (MP2, Calvert Cliffs Units 1 and 2, St. Lucie Units 1 and 2, Ft. Calhoun Unit 1, Maine Yankee),

I_p is linearly related to the core average shape index by an equation of the form

$$I_p = \overline{I} + \Delta$$

where

$\overline{I}$ is the core average axial shape index, and
Δ is a bias term [

]

The shape annealing factor measurement procedure consistent with C-E's setpoint logic requires the correlation of measured values of the ex-core instrument shape index to the measured values of the core average shape index. This procedure yields an experimental evaluation of α from determining the slope of the straight line fit of the plot of $\overline{I}(t)$ against $I_e(t)$ for an axial oscillation. That is,

$$\overline{I}(t) = \alpha I_e(t) - \Delta$$

NNEC's experimental evaluation procedure (Reference 1) is consistent with this logic.

4. Experimental Data Analyses

NNEC provided C-E with [ ], the core average shape index and the ex-core detector signals for the four safety channels, at selected times during two beginning of first cycle uncontrolled, but damped, axial oscillations (References 2 and 3). Each of these data sets were examined to determine if any points were spurious. Each channel's remaining valid data set was analyzed to determine the shape annealing factor by evaluating a fit to the straight line by least squares procedures. The resultant shape annealing factors, the bias and their fitting errors are given in Table 1. Figures 1 through 12 exhibit the respective plotting of $\overline{I}, I_e$ data pairs and the least squares fitted straight line for each data set.

These results are similar to those reported in a previous analysis of the same experiments (Reference 4). (See Table 2)

Comparison of these sets of shape annealing factors result in the individual safety channel calculated fractional standard deviations given in Table 3. The fractional standard deviations of the measurements are defined from the relationships

$$\Delta\alpha_i = \bar{\alpha} - \alpha_i$$

and

$$\sigma\left|\frac{\delta\alpha}{\bar{\alpha}}\right| = \left\{ \frac{1}{N-1} \sum_{i=1}^{N} \left(\frac{\Delta\alpha_i}{\bar{\alpha}}\right)^2 \right\}^{1/2}$$

5. Analysis of a Limiting Uncertainty

In previous uncertainty evaluations (References 5, 6 and 7), C-E has interpreted the shape annealing factor uncertainty to be determined from evaluation of the cycle to cycle reproducability of the measured shape annealing factor. Discussions with NRC's technical reviewers and the NRC's subsequent acceptance of our SCU methodology (Reference 8), confirmed that this is an acceptable basis evaluating this uncertainty.

Thus, shape annealing factor uncertainties derived from experiments in only the first cycle of operation of Millstone Point 2 are insufficient for defining the uncertainty for all future cycles. Comparison of MP2 data with data for its C-E designed sister plants, Calvert Cliffs Unit 1 and St. Lucie Unit 1, is required to determine an applicable uncertainty for Millstone Point 2.

Shape annealing factor uncertainty data for Calvert Cliffs Units 1 and 2, St. Lucie Unit 1 and Millstone Point Unit 2 were submitted to the NRC as part of the support for a total statistical combination of uncertainty (SCU) margin recovery programs for the Calvert Cliffs and St. Lucie units. (References 5,6 and 7) (That MP2 data was based on earlier reported evaluations of the safety channel SAF's.) All of those data had been analyzed by statistical analyses and bounding limit comparison methods to justify a shape annealing factor component of the shape index uncertainty for inclusion in the total SCU program. This comparison is illustrated in

Figure 13. This comparison's bounding line shows that $\frac{\delta\alpha}{\alpha} \leq$[ ] for $\bar{\alpha} \leq$[ ].

In this analysis, the MP2 test data has been reanalyzed with more explicit consideration of the correlation of the data with operating conditions. The new uncertainties for MP2 SAF's are compared to the St. Lucie and Calvert Cliffs data in Figure 14. A bounding line has been drawn above all the data points. This line indicates that the measured uncertainty in SAF is bounded by $\frac{\delta\alpha}{\alpha}$ = [ ] for all values of $\alpha <$[ ]. However, bounding limit analyses by themselves do not necessarily provide adequate assurance that 95% confidence/95% probability limits have been determined. The previous statistical analyses had supported a 95/95 SAF [ ]. The NRC had accepted the previous bounding value analysis $\frac{\delta\alpha}{\alpha} \leq$[ ] for $\bar{\alpha} <$ [ ], as being consistent with the applicability of [ ] as the 95/95 level uncertainty in the SAF for St. Lucie 1 and BG&E. The present bounding value analysis is therefore construed to support a normal distribution 95/95 probability/confidence level fractional SAF uncertainty for MP2 as .068. Thus, the shape annealing factor uncertainty component of the axial shape index uncertainty for MP2 is bounded by the equation

$$K^{-}_{I(\alpha)} \leq \frac{\delta\alpha}{\bar{\alpha}} I_p = .068\ I_p$$

for $\bar{\alpha} \leq 4.0$.

References

1. "Excore Nuclear Instrument (NI's) Calibration to INCORES," SP2401, Rev. 05, December 28, 1981, Transmitted by Letter, J. R. Guerci (NU) to A. Kasper (C-E), NU File NE-82-R-848, December 3, 1982.

2. Letter, J. R. Guerci (NU) to A. Kasper (C-E), NU File NE-82-R-911, December 23, 1982.

3. Letter, J. R. Guerci (NU) to A. Kasper (C-E), NU File NE-82-R-919, December 30, 1982.

4. "Millstone Unit 2 Startup Test Report," Docket No. 50-336, August 26, 1976.

5. "Statistical Combination of Uncertainties," CEN-124(B)-P, Part 1, December 1979; Part 2, January 1980; Part 3, March 1980.

6. "Statistical Combination of Uncertainties," CEN-123(F)-P," Part 1, December 1979; Part 2, January 1980; Part 3, February 1980.

7. "Responses to Second Round Questions for Statistical Combination of Uncertainties Program (CEN-123(F)-P, Parts 1 and 3), Part 2," September 1981.

8. Letter, D. H. Jaffe (NRC) to A. E. Lundvall, Jr. (BG&E), June 24, 1982, Docket No. 50-317, Conveying Amendment 71 to Operating Licenses for Calvert Cliffs Unit 1 Cycle 6 and SER.

TABLE 1

RESULTS OF LINEAR FITTING OF
MILLSTONE POINT 2 CYCLE
SHAPE ANNEALING FACTOR DATA

Percent Power	[ ]	Channel	Shape Annealing Factor (Slope)	Intercept	σ Points	σ Slope	σIntercept	Number of Points Analyze

TABLE II

Comparison of Shape Annealing Factors

Channel	Shape Annealing Factor: Per Reference 4 50% Oscillation	Per Reference 4 80% Oscillation	C-E Re-evaluation of Reference 4 50% Data*
A	2.193	2.157	2.188
B	1.742	1.717	1.736
C	2.142	2.135	2.132
D	1.851	1.829	1.847

*Approximately 5.5 hr of the initial ARO data was removed from the analysis to account for the damping of "spatial mode contamination".

TABLE III - A

MP2 CYCLE 1
SHAPE ANNEALING FACTOR UNCERTAINTY
[ ]

	Channel			
	A	B	C	D
1. Shape Annealing Factor(α) for:				
[				]
2. Average Value of $\alpha = \bar{\alpha}$	[			]
3. $(\alpha - \bar{\alpha})/\bar{\alpha}$ for:				
[				]
4. Standard Deviation of $\frac{\Delta\alpha}{\bar{\alpha}}$ ($\frac{\sigma\Delta\alpha}{\bar{\alpha}}$) where $\Delta\alpha = (\alpha - \bar{\alpha})$ and number of degrees of freedom =[ ]	[			]

TABLE III - B

MP2 CYCLE 1

SHAPE ANNEALING FACTOR UNCERTAINTY

[ ]

	Channel			
	A	B	C	D
1. Shape Annealing Factor(α) for:				
[ ]				
2. Average Value of α ($\bar{\alpha}$)	[ ]			
3. $(\alpha-\bar{\alpha})/\bar{\alpha}$ for				
[ ]				
4. Standard Deviation of $\frac{\Delta\alpha}{\bar{\alpha}}\left(\sigma\frac{\Delta\alpha}{\bar{\alpha}}\right)$	[ ]			

where $\Delta\alpha = (\alpha-\bar{\alpha})$ and number of degress of freedom = [ ]

Figure -1

MILLSTONE POINT SHAPE ANNEALING FACTOR

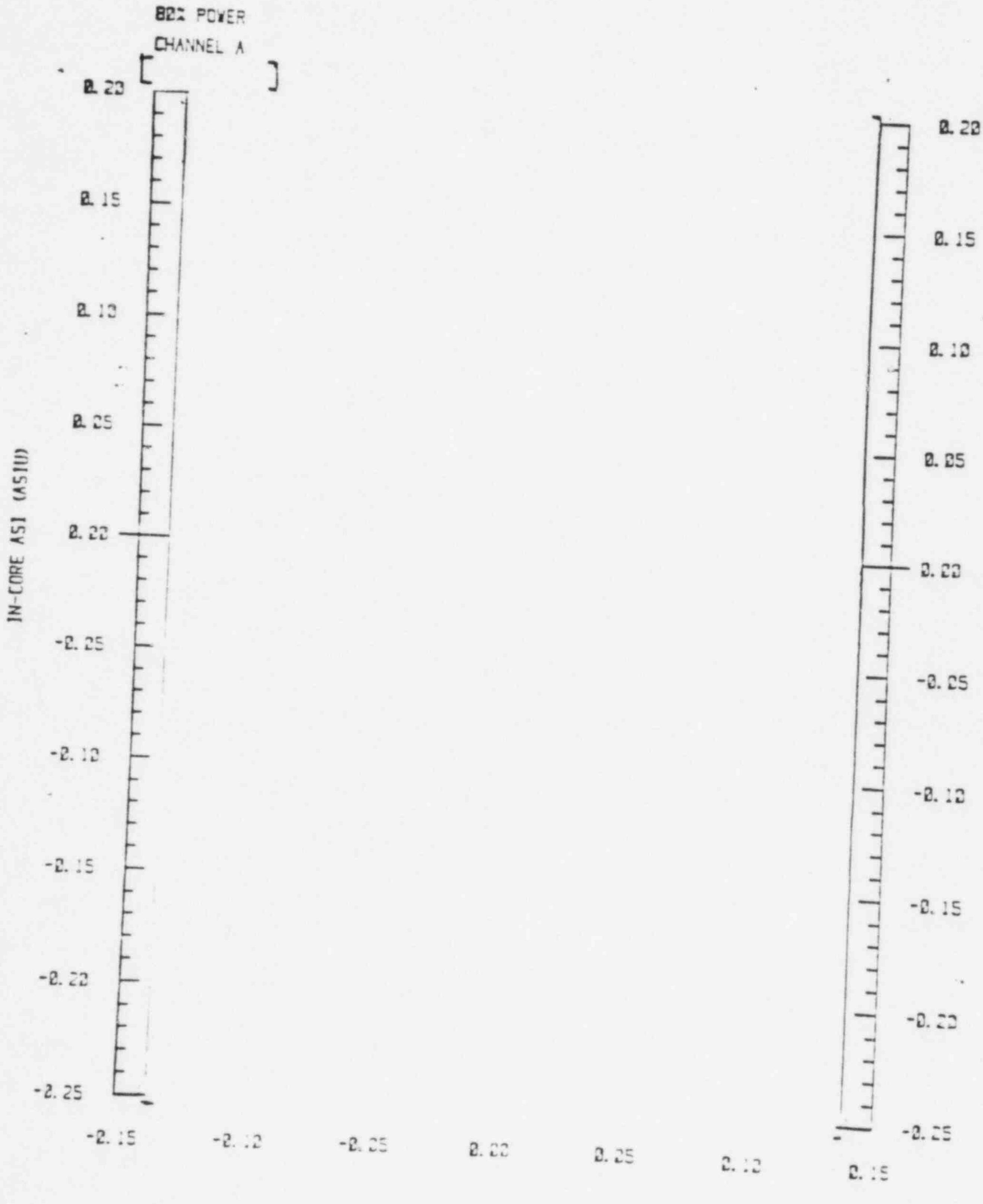


Figure -2

MILLSTONE POINT SHAPE ANNEALING FACTOR

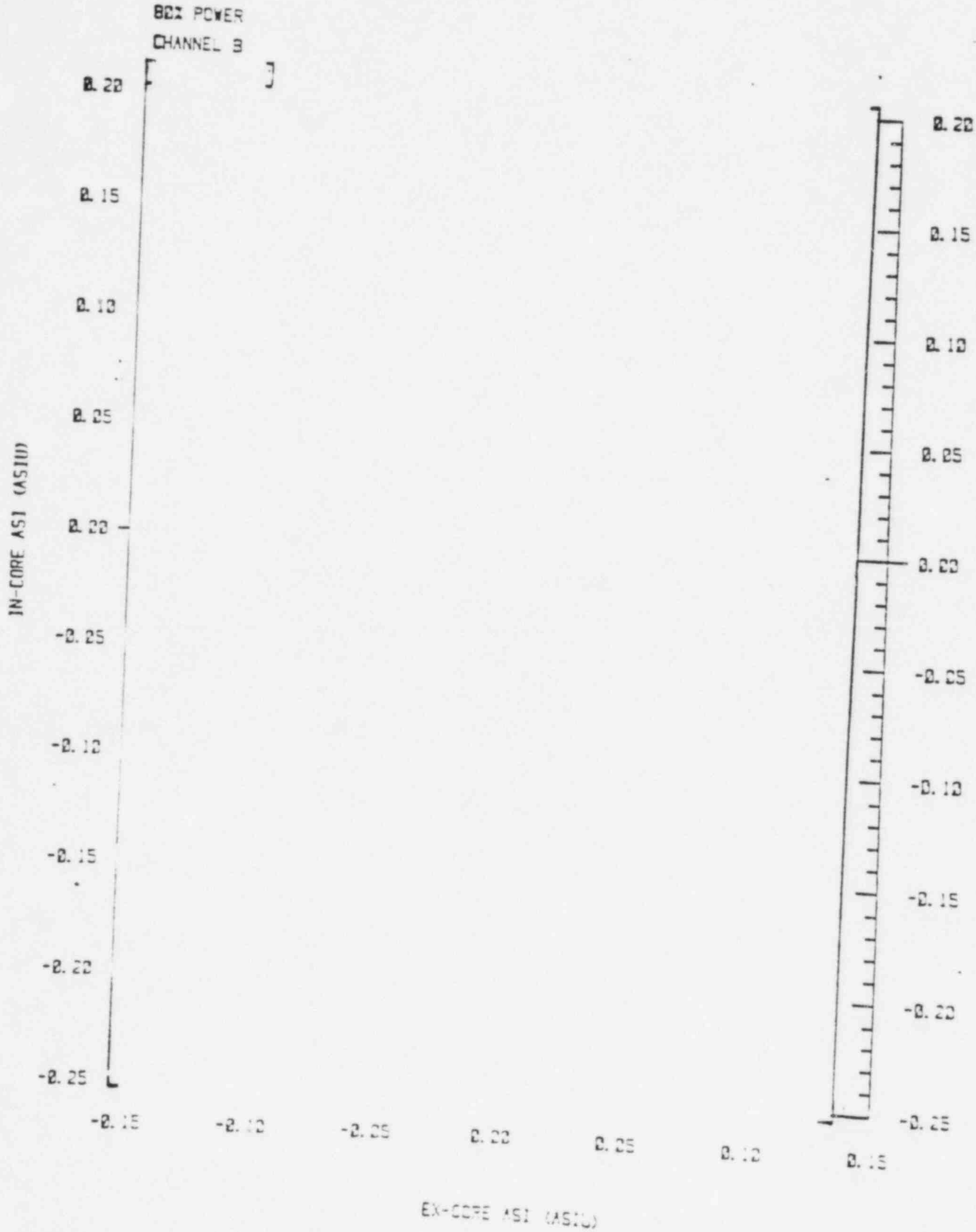


Figure -3

MILLSTONE POINT SHAPE ANNEALING FACTOR

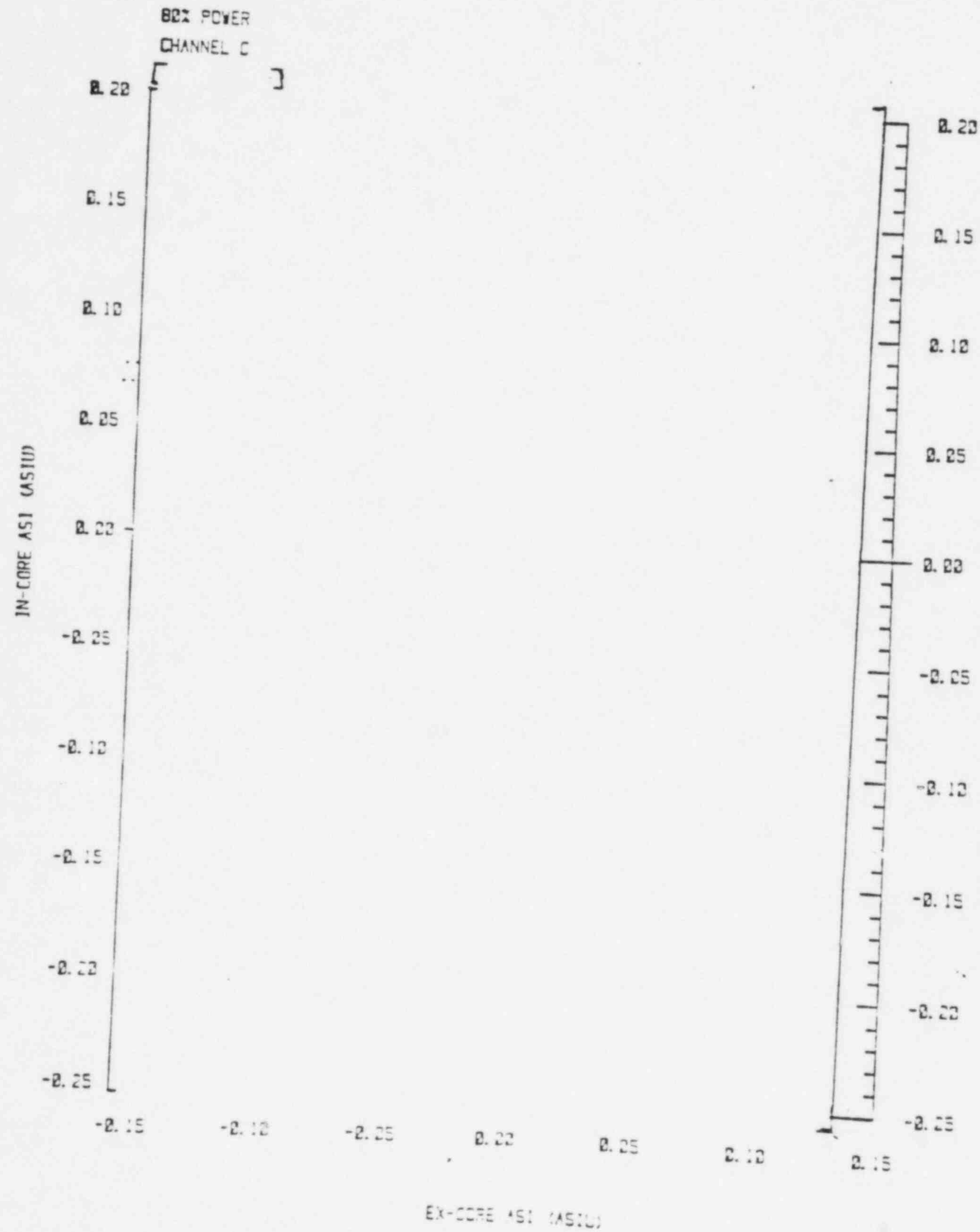


Figure -4

MILLSTONE POINT SHAPE ANNEALING FACTOR

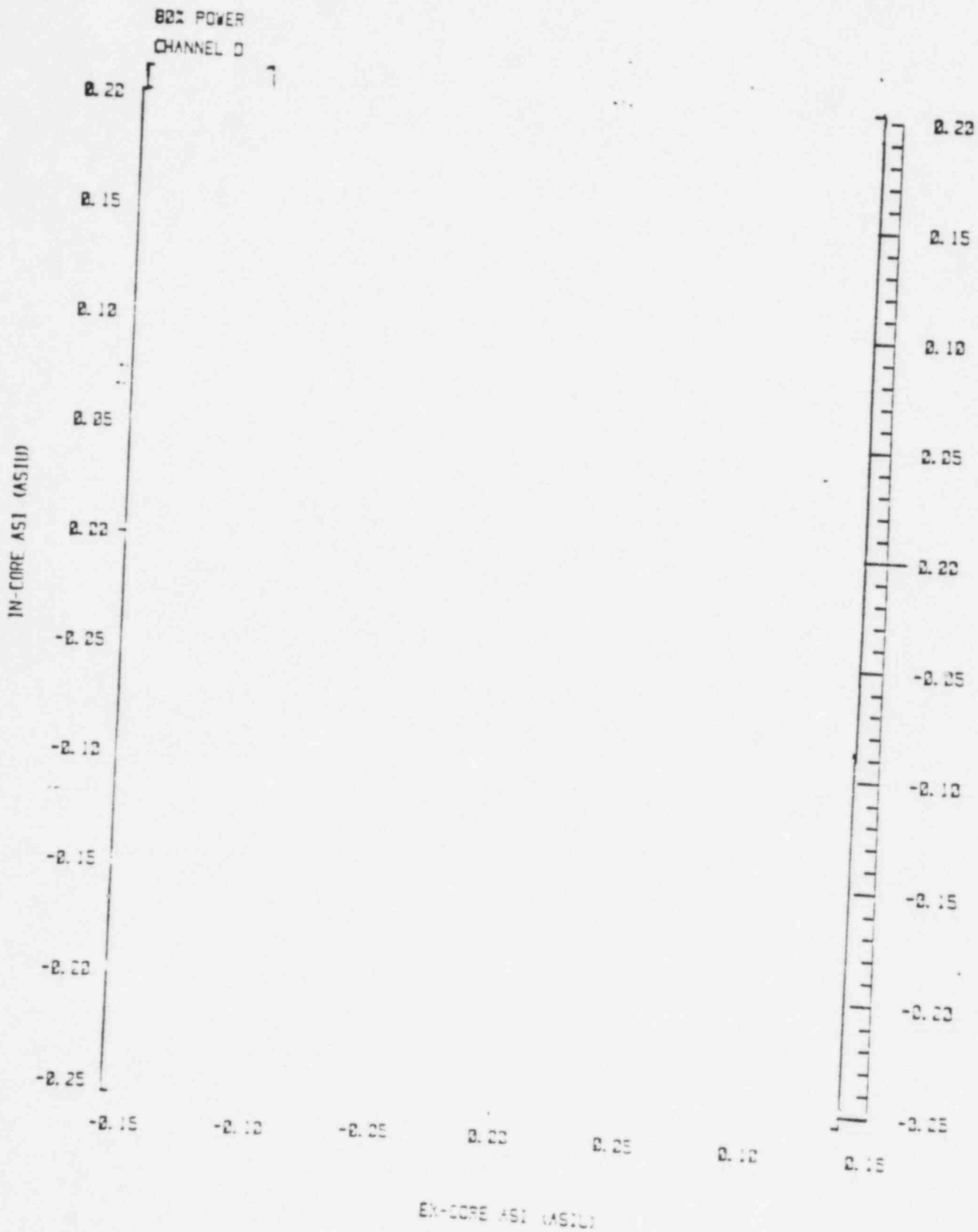


Figure -5

MILLSTONE POINT SHAPE ANNEALING FACTOR

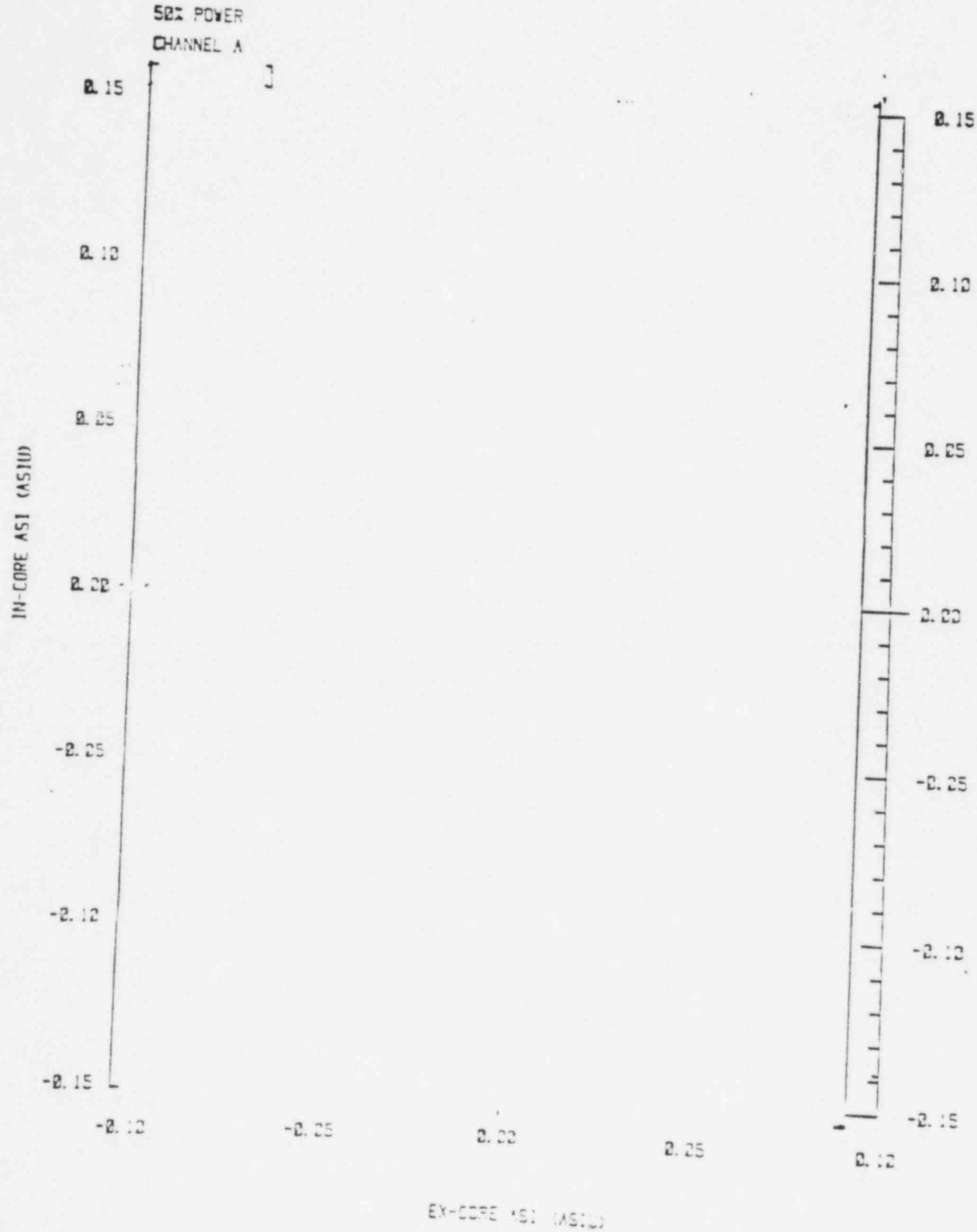


Figure -6

MILLSTONE POINT SHAPE ANNEALING FACTOR

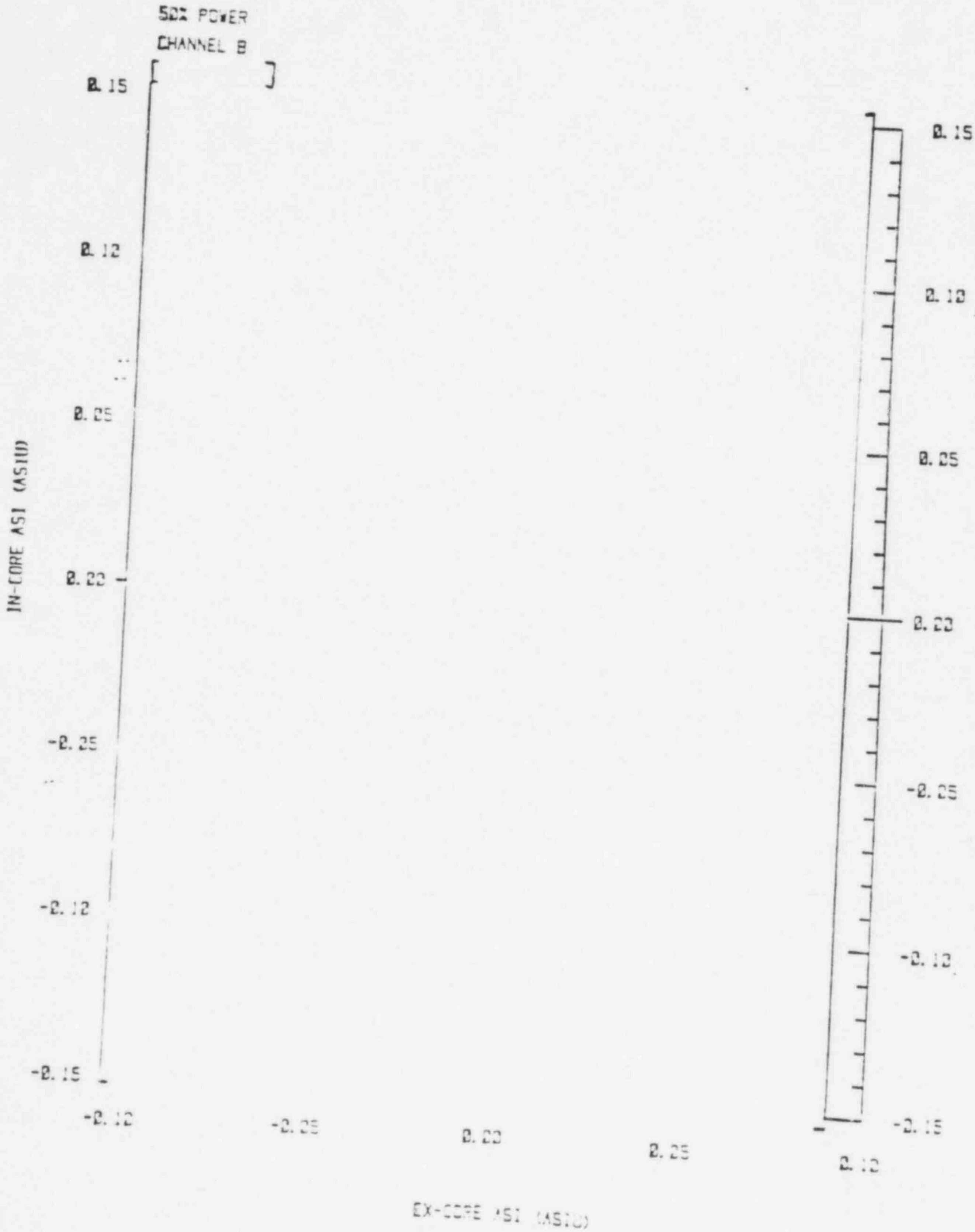


Figure -7

MILLSTONE POINT SHAPE ANNEALING FACTOR

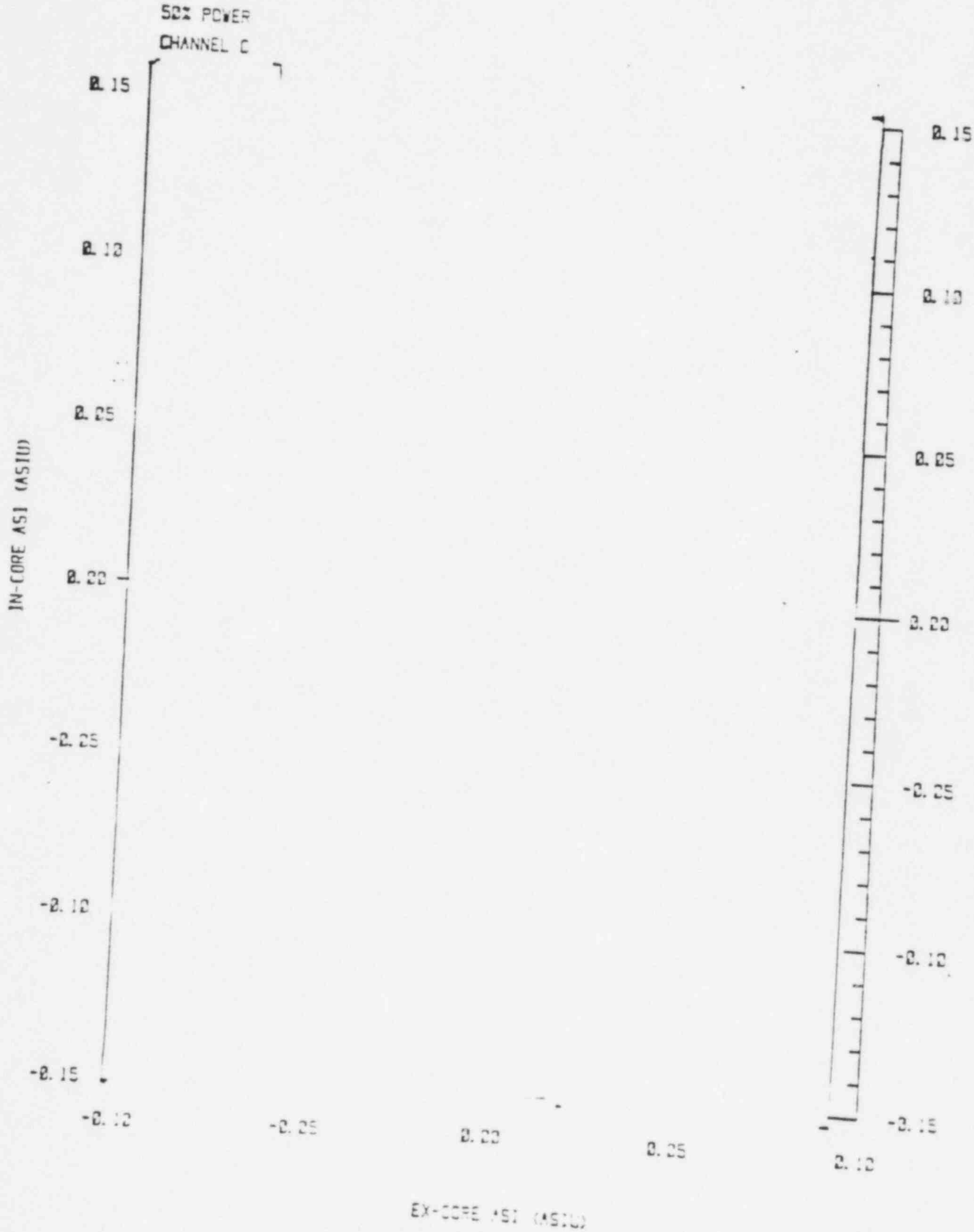


Figure - 8

MILLSTONE POINT SHAPE ANNEALING FACTOR

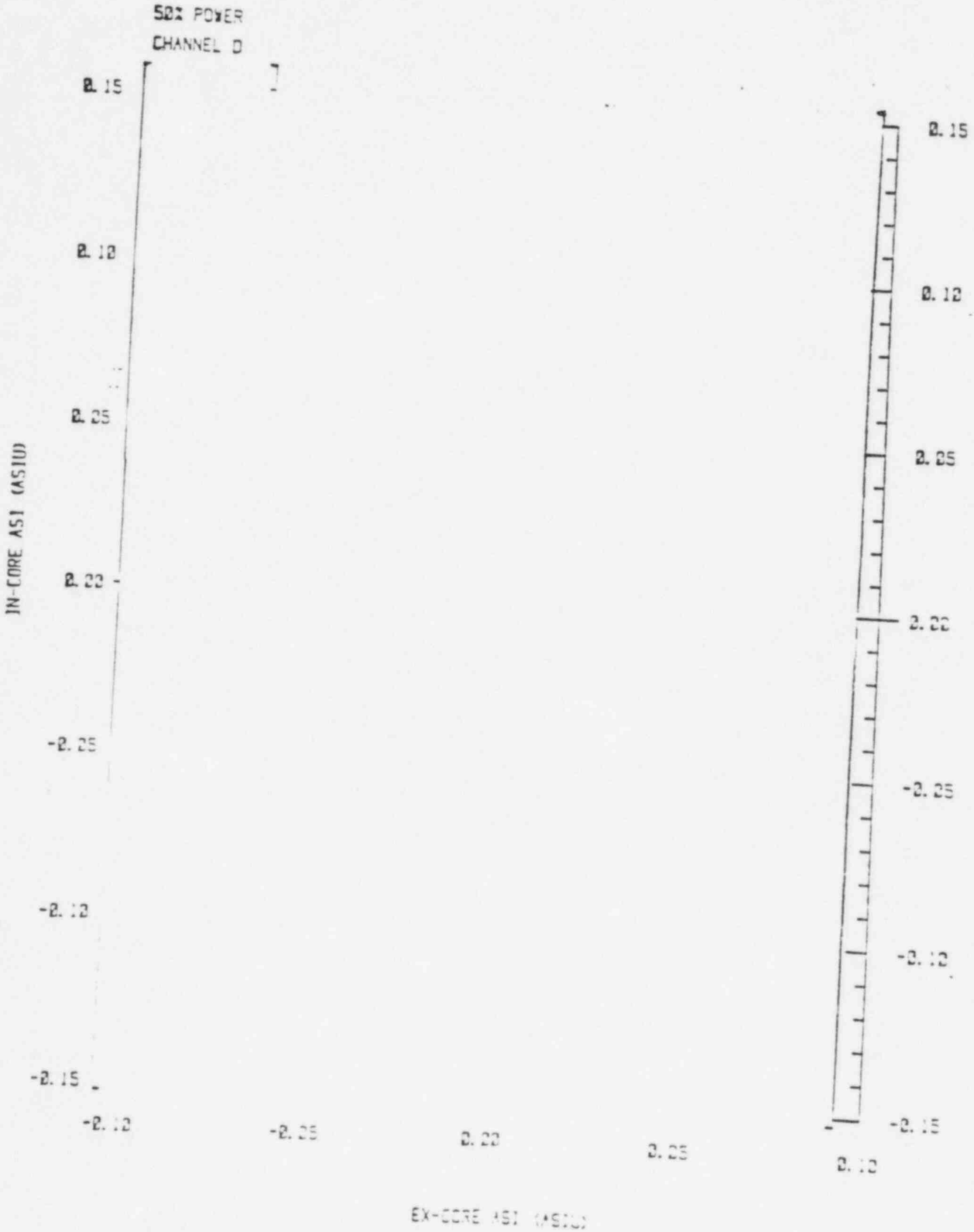


Figure 1-9

MILLSTONE POINT SHAPE ANNEALING FACTOR

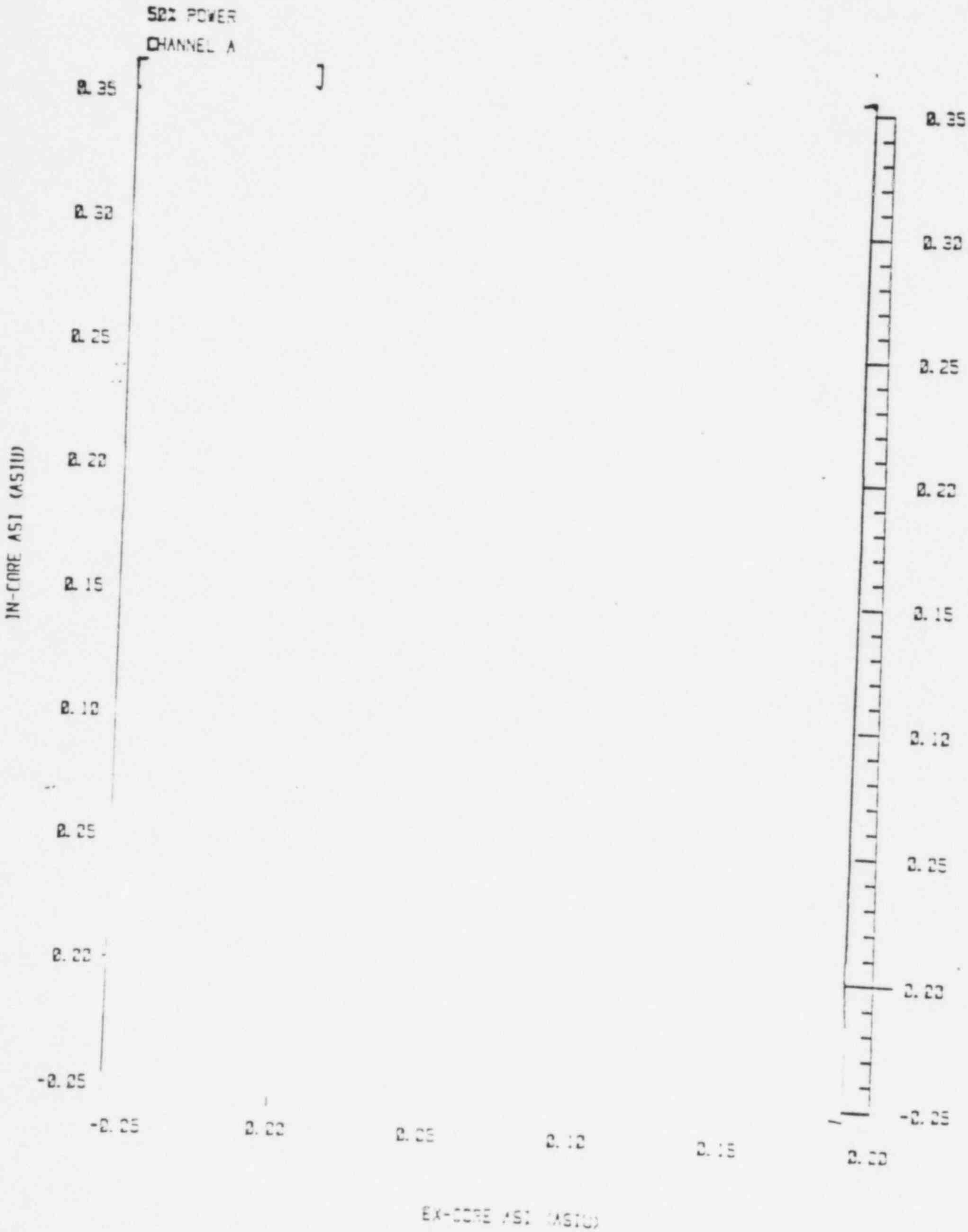


Figure F-10

MILLSTONE POINT SHAPE ANNEALING FACTOR

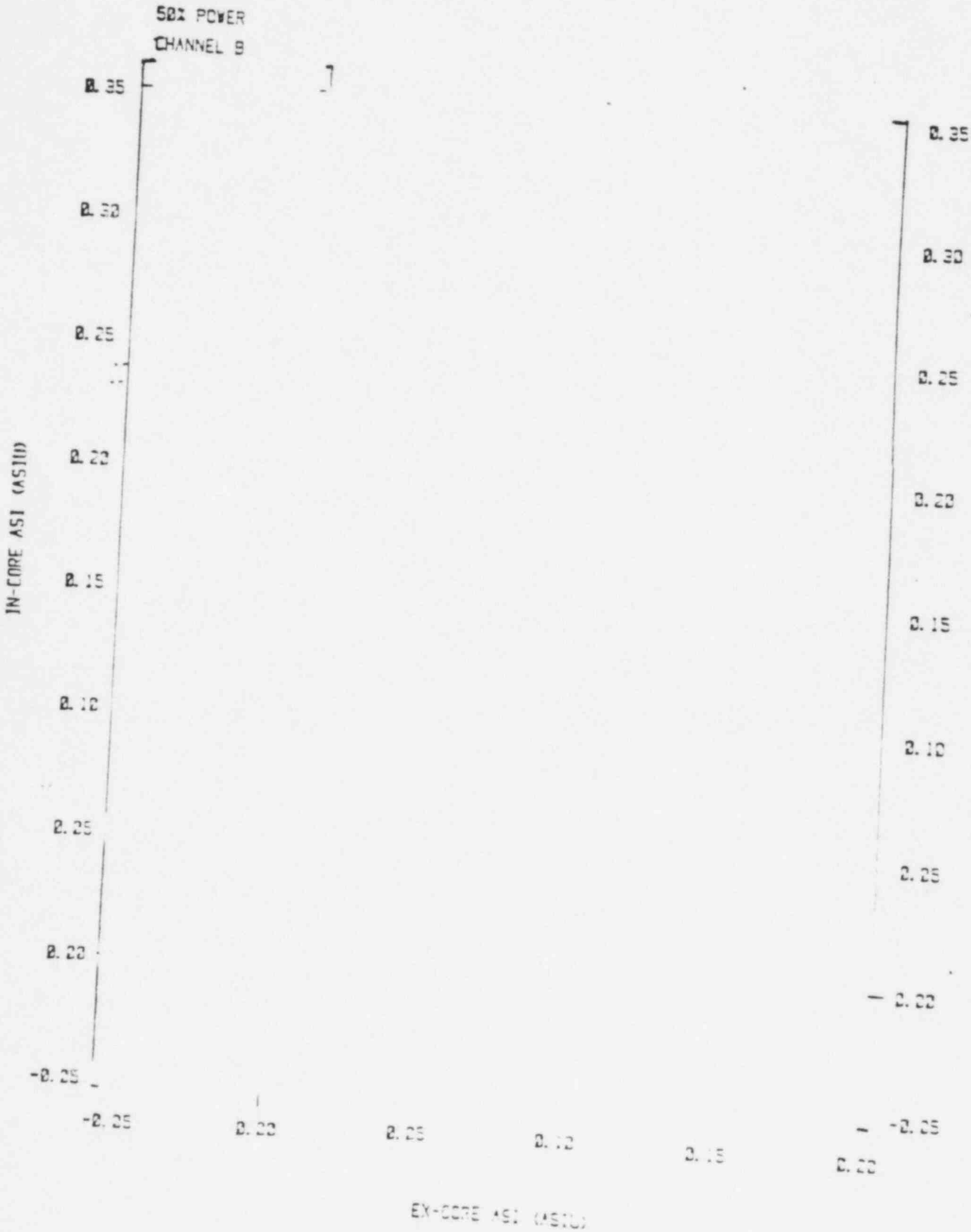


Figure L11

MILLSTONE POINT SHAPE ANNEALING FACTOR

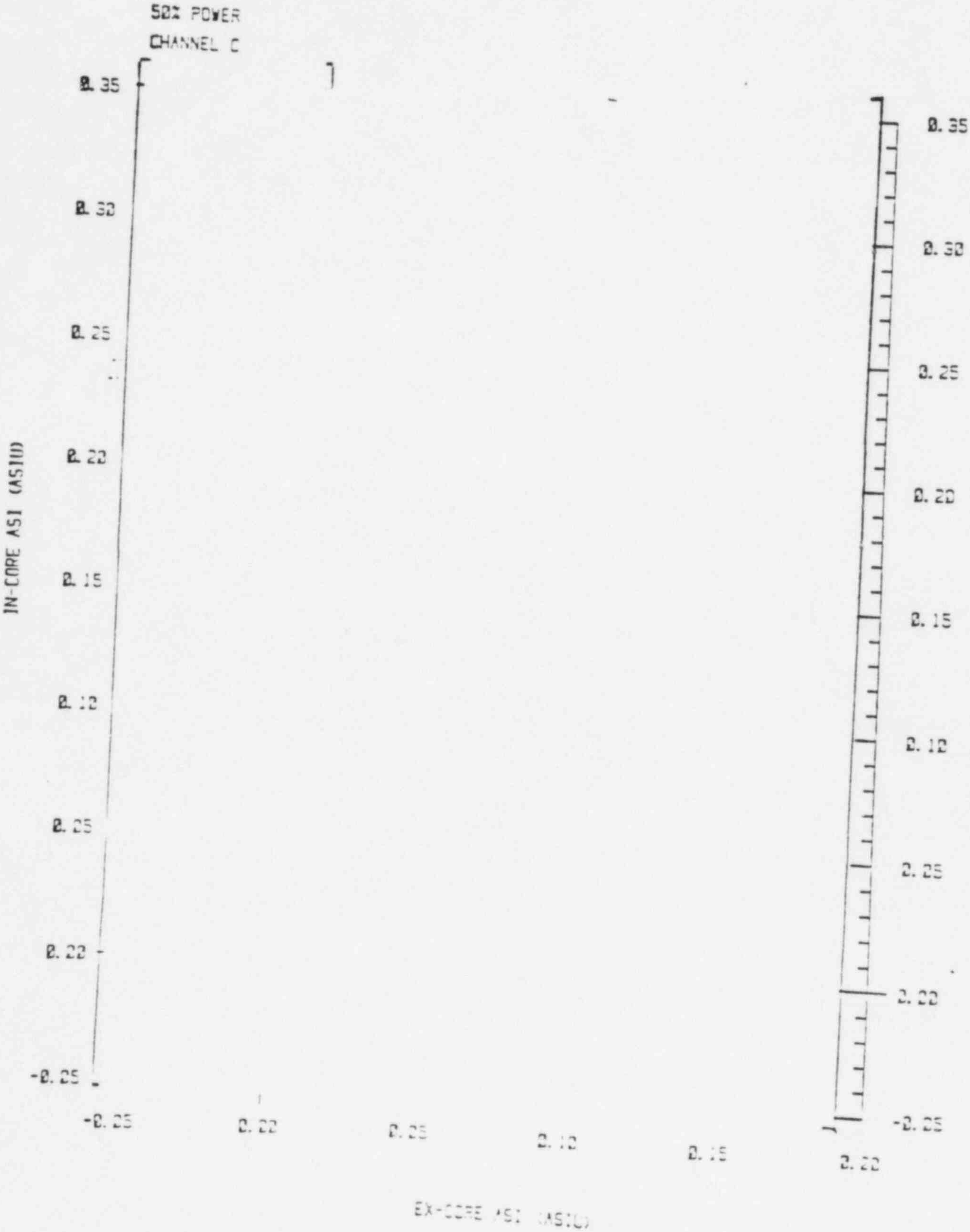
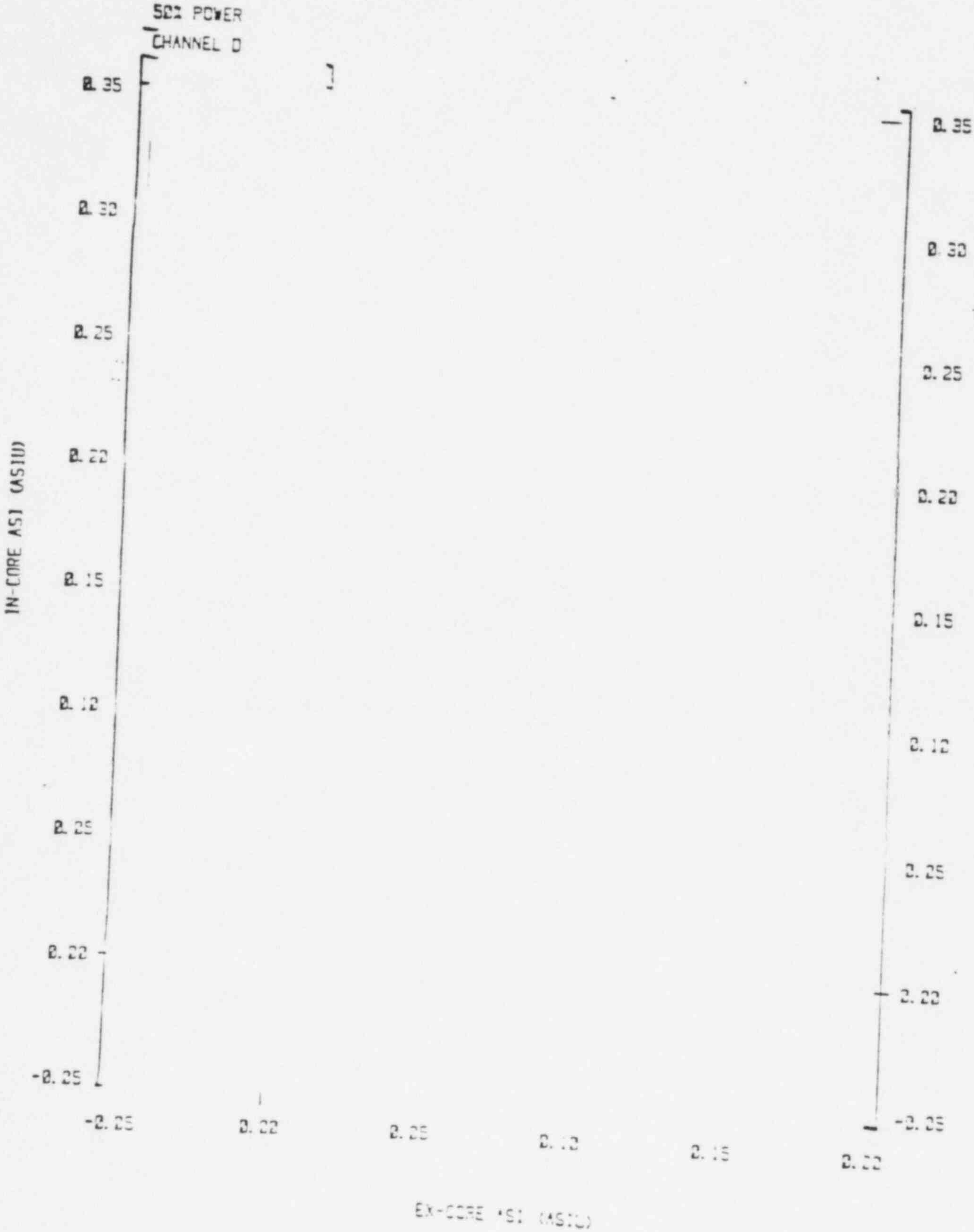


Figure -12

MILLSTONE POINT SHAPE ANNEALING FACTOR



Variation of Grouped Data Shape Annealing Factor Uncertainty With Group Average Shape Annealing Factor

Figure 13

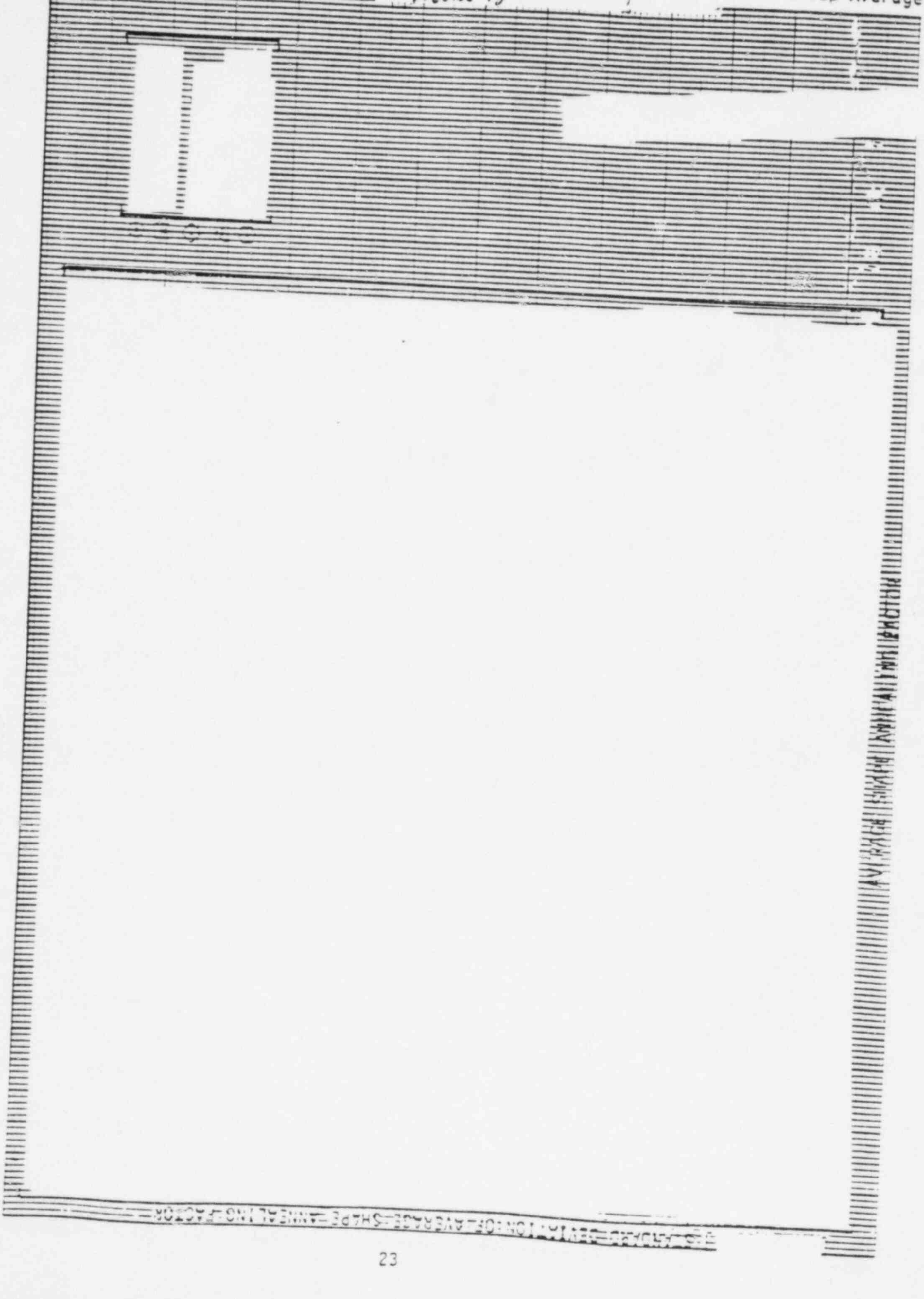
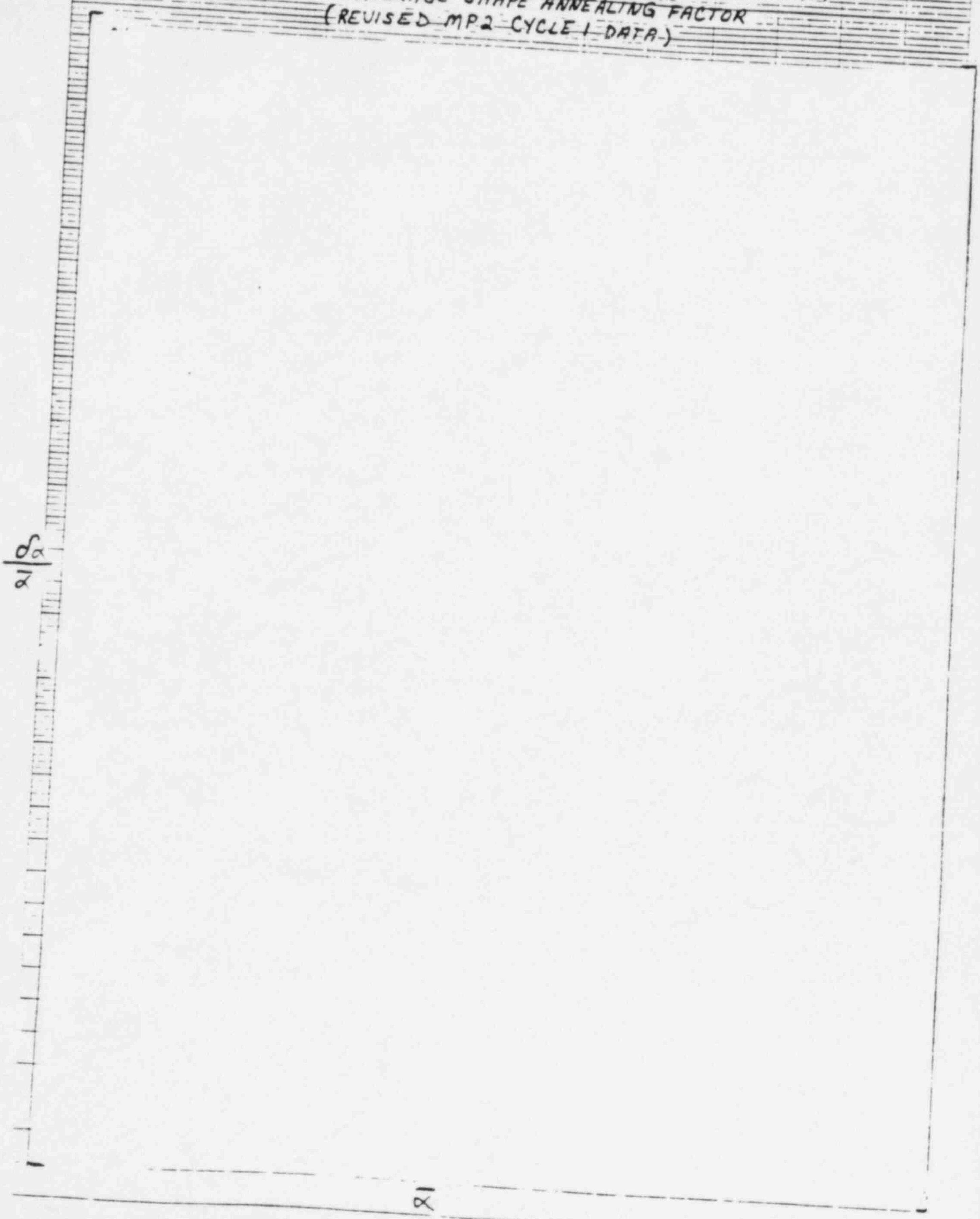


FIGURE 14

VARIATION OF SHAPE ANNEALING FACTOR UNCERTAINTY WITH AVERAGE SHAPE ANNEALING FACTOR (REVISED MP2 CYCLE 1 DATA)



Docket No. 50-336

Attachment 2

Results of the Evaluation of the
Feedwater Measurement System

May, 1983

This attachment provides additional information to justify the measurement uncertainties assumed in the Millstone Unit 2 Reload Analyses. Reference (4) of the cover letter provided the results of a re-analysis of the primary pressure, temperature, core power (LCO and LSSS), primary flow, and axial shape index. The evaluation of the feedwater temperature measurement system has been completed. This evaluation was undertaken in order to identify possible areas of improvement in the feedwater temperature measurement which could lead to a smaller core power uncertainty. NNECO has recently changed the Millstone Unit 2 main feedwater temperature measurement channel (T-5262) span from 0-600 F to 100-500 F. This was accomplished by recalibration of the temperature transmitter.

Figure 1 provides the block diagram of the Main Feedwater Temperature Channel (T-5262) with the associated errors. Table 1 summarizes the overall feedwater temperature channel error which is $\pm$ 6.6 F for the new range of 100 F - 500 F (400 F span). The errors in steam generator power and core calorimetric power have been recalculated as a result of the new feedwater temperature channel error. The new uncertainty in core power is $\pm$ 1.36% of the nominal measured core thermal power of 2700 MWth. This uncertainty is summarized in Table 2.

Table 3 summarizes the revised uncertainty in the RCS flow determination due to the change in the core thermal power uncertainty. The resultant RCS flow uncertainty is $\pm$ 2.38% of the design flow of 324, 800 gpm.

Table 4 summarizes the revised overall error in the neutron and delta-T power calibration to core calorimetric power. The new core power uncertainty of $\pm$ 1.36% results in an overall neutron and delta-T power calibration uncertainty of $\pm$ 1.46%.

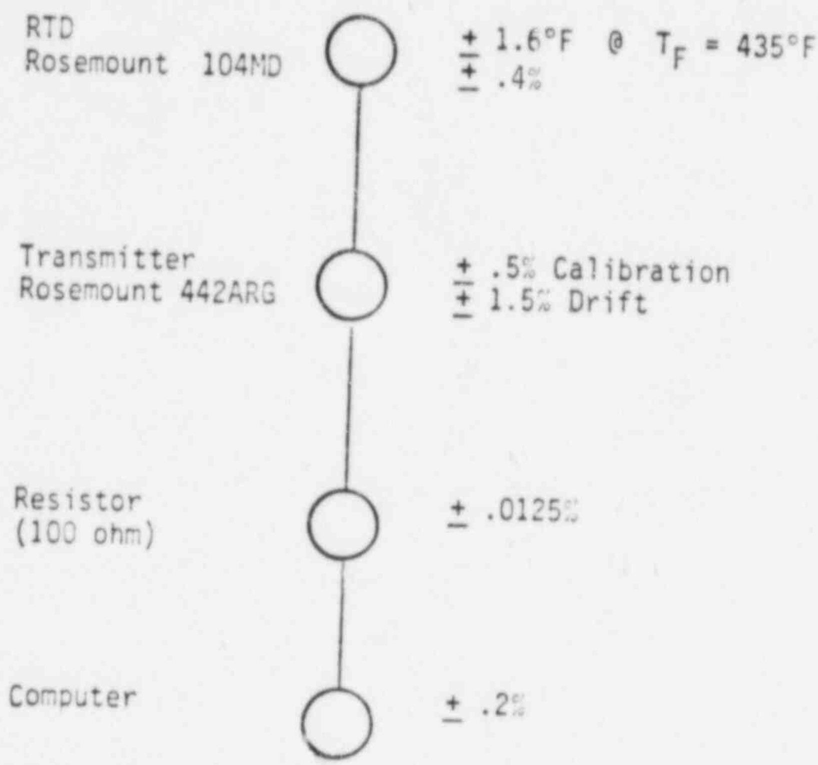
In summary, a reduction in the span of the feedwater temperature measurement channel was made to increase the accuracy of the feedwater temperature measurement which is directly used in the computer calculated core calorimetric power. This change also resulted in a revised RCS flow uncertainty and neutron and delta-T power calibration. Table 5 provides the comparison of the uncertainties calculated in this analysis and the uncertainties utilized in the Millstone Unit 2 Reload Analysis. The results of these comparisons, therefore, continue to justify the applicability and conservatism of the measurement uncertainties utilized.

QA-verification has been completed for information provided in reference (4) of the cover letter. The QA-verified results indicate that two of the instrument span drifts are smaller than those values originally reported. The two parameters which were revised are the pressure transmitter and the Foxboro SPEC 200 Rack Module drifts. These changes are summarized in Table 6. All other results remain the same.

FIGURE 1

Feedwater Temperature T-5262

Span 400°F
Range 100-500°F



Errors in percent span

TABLE 1

Errors in Feedwater Temperature

	T-5262
	Span 400°F Range 100-500°F
1. RTD (Rosemount 104MD) Calibration	± 1.6°F @ T_F = 435°
	± .4%
2. Transmitter (Rosemount 442 ARG)	
Calibration Accuracy	± .5%
Drift	± 1.5%
3. Precision Resistor (100 ohm)	± .0125%
4. Computer Accuracy	± .2%

Total Error $= [\ .4^2 + .5^2 + 1.5^2 + .0125^2 + .2^2\ ]^{\frac{1}{2}}$

$= \pm\ 1.65\%$ of span

$= \pm\ 6.6°F$

Errors in percent span

TABLE 2

Errors in Steam Generator Thermal Output and Core Thermal Power

Errors in Steam Generator Thermal Output

Error Component	Error (% SG Thermal Output)
1. Independent Errors	
- Due to venturi calibration coefficient (K)	± .37%
- Due to venturi area expansion factor (F_a) (linear thermal expansion coefficient uncertainty)	± .034%
- Due to ΔP measurement	± .81%
Subtotal of Independent Errors (RMS)	± .9%
2. Errors due to steam Pressure (P_s)	
- Error in steam enthalpy (h_s)	- .091%
- Error in feedwater enthalpy (h_f)	- .002%
- Error in feedwater density (ρ_f)	+ .008%
Total of P_s Errors	± .085%
3. Errors Due to Feedwater Temperature (T_f)	
- Error in feedwater enthalpy (h_f)	- .93
- Error in feedwater density (ρ_f)	- .28
- Error in F_a	+ .014
Total of T_f Errors	± 1.196

$$\% \text{ Core Thermal Power Uncertainty} = \left[2\left(\frac{.9}{2}\right)^2 + 2\left(\frac{.085}{2}\right)^2 + \left(\frac{1.196}{2} + \frac{1.196}{2}\right)^2\right]^{\frac{1}{2}}$$

$$= \pm 1.36\%$$

The ±1.36% uncertainty is the error in core thermal power expressed as a percent of the nominal measured core thermal power of 2700 MW.

TABLE 3

Errors in Reactor Coolant Flow Determination

Error Component		Error (% Nominal Flow)
1.	Core Thermal Power Uncertainty (± 1.36%)	± 1.36%
2.	Error Due to Average THOT Error in hot leg enthalpy (h_h)	± .73%
3.	Error Due to Temperature Gradient Effect Error in hot leg enthalpy (h_h)	± 1.1%
4.	Error Due to Average TCOLD Error in cold leg enthalpy (h_c)	± .65%
5.	Error Due to Pressurizer Pressure (P_p) Error in hot leg enthalpy (h_h) Error in cold leg enthalpy (h_c) Total of P_p errors	 + .13% - .042% ± .088%
TOTAL ERROR (RMS)		± 2.01%

Typical measured flow is 118.5% of the design flow of 324800 GPM, therefore:

% Reactor Coolant Flow Uncertainty = 1.185 x 2.01%

= ± 2.38% of design flow

TABLE 4

Error in Nuclear Power and ΔT Power Calibration to Calorimetric Power

Error Contribution	Error (% Power)
1. Calorimetric Power Uncertainty	± 1.36
2. RPS Digital Panel Meter (Newport Series 2000-3)	± .06
3. Calibration Setting Tolerance	± .1
4. Drift Allowance	± .5
5. Total Error (RSS)	± 1.46

TABLE 5

Comparison of Uncertainties

Parameter	Calculated Uncertainties	Uncertainties Utilized in Reload Analyses
Pressure	± 20.2 psi	± 22 psi
Temperature	± .86°F	± 2°F
Power (LCO)	± 1.36%	± 2%
Primary Flow	± 2.38%	± 4%
Axial Shape Index	< ± .06 asiu *	± .06 asiu
Power (LSSS)	< ± 5%	± 5%

* See Attachment 3

TABLE 6

JUSTIFICATION OF DRIFT ASSUMPTIONS

EQUIPMENT	# DRIFT DATA POINTS	STANDARD DEVIATION (S)	95% PROBABILITY LIMITS (1.96S)	ANALYSIS ASSUMPTION
Pressure Transmitters	39	.82%	± 1.61%	± 1.75%
Feedwater Δ P Transmitters	8	.36%	± .71%	± 1.0%
Feedwater Temperature Transmitter	10	.61%	± 1.196%	± 1.5%
Foxboro SPEC 200 Rack Modules	84	.17%	± .33%	± .5%
ASI Calibration	140	.0042 asiu	± .0083 asiu	± .00891 asiu
Neutron Power Calibration	57	.132%	± .26%	± .5%

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared Robert A. Wiesemann, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Corporation ("Westinghouse") and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

Robert A. Wiesemann

Robert A. Wiesemann, Manager
Licensing Programs

Sworn to and subscribed before me this 1 day of December 1976.

[signature]

Notary Public

(1) I am Manager, Licensing Programs, in the Pressurized Water Reactor Systems Division, of Westinghouse Electric Corporation and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing or rule-making proceedings, and am authorized to apply for its withholding on behalf of the Westinghouse Water Reactor Divisions.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.790 of the Commission's regulations and in conjunction with the Westinghouse application for withholding accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse Nuclear Energy Systems in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

(g) It is not the property of Westinghouse, but must be treated as proprietary by Westinghouse according to agreements with the owner.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information which is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition in those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.790, it is to be received in confidence by the Commission.

(iv) The information is not available in public sources to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in the attachment to Westinghouse letter number NS-CE-1298, Eicheldinger to Stolz, dated December 1, 1976, concerning information relating to NRC review of WCAP-8567-P and WCAP-8568 entitled. "Improved Thermal Design Procedure," defining the sensitivity of DNB ratio to various core parameters. The letter and attachment are being submitted in response to the NRC request at the October 29, 1976 NRC/Westinghouse meeting.

This information enables Westinghouse to:

(a) Justify the Westinghouse design.

(b) Assist its customers to obtain licenses.

(c) Meet warranties.

(d) Provide greater operational flexibility to customers assuring them of safe and reliable operation.

(e) Justify increased power capability or operating margin for plants while assuring safe and reliable operation.

(f) Optimize reactor design and performance while maintaining a high level of fuel integrity.

Further, the information gained from the improved thermal design procedure is of significant commercial value as follows:

(a) Westinghouse uses the information to perform and justify analyses which are sold to customers.

(b) Westinghouse sells analysis services based upon the experience gained and the methods developed.

Public disclosure of this information concerning design procedures is likely to cause substantial harm to the competitive position of Westinghouse because competitors could utilize this information to assess and justify their own designs without commensurate expense.

The parametric analyses performed and their evaluation represent a considerable amount of highly qualified development effort. This work was contingent upon a design method development program which has been underway during the past two years. Altogether, a substantial amount of money and effort has been expended by Westinghouse which could only be duplicated by a competitor if he were to invest similar sums of money and provided he had the appropriate talent available.

Further the deponent sayeth not.

AFFIDAVIT PURSUANT

TO 10 CFR 2.790

Combustion Engineering, Inc.)
State of Connecticut)
County of Hartford) SS.:

I, A. E. Scherer, depose and say that I am the Director, Nuclear Licensing, of Combustion Engineering, Inc., duly authorized to make this affidavit, and have reviewed or caused to have reviewed the information which is identified as proprietary and referenced in the paragraph immediately below. I am submitting this affidavit in conformance with the provisions of 10 CFR 2.790 of the Commission's regulations and in conjunction with the submittal of Northeast Nuclear Energy Company for withholding this information.

The information for which proprietary treatment is sought is contained in the following document:

CEN-247(N)-P, The Shape Annealing Factor Component of the Axial Shape Index Uncertainty at Millstone Point Unit 2, March 1983.

This document has been appropriately designated as proprietary.

I have personal knowledge of the criteria and procedures utilized by Combustion Engineering in designating information as a trade secret, privileged or as confidential commercial or financial information.

Pursuant to the provisions of paragraph (b) (4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure, included in the above referenced document, should be withheld.

1. The information sought to be withheld from public disclosure are the methods for evaluating safety system setpoints and their associated uncertainties, which is owned and has been held in confidence by Combustion Engineering.

2. The information consists of test data or other similar data concerning a process, method or component, the application of which results in a substantial competitive advantage to Combustion Engineering.

3. The information is of a type customarily held in confidence by Combustion Engineering and not customarily disclosed to the public. Combustion Engineering has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The details of the aforementioned system were provided to the Nuclear Regulatory Commission via letter DP-537 from F.M. Stern to Frank Schroeder dated December 2, 1974. This system was applied in determining that the subject document herein are proprietary.

4. The information is being transmitted to the Commission in confidence under the provisions of 10 CFR 2.790 with the understanding that it is to be received in confidence by the Commission.

5. The information, to the best of my knowledge and belief, is not available in public sources, and any disclosure to third parties has been made pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.

6. Public disclosure of the information is likely to cause substantial harm to the competitive position of Combustion Engineering because:

a. A similar product is manufactured and sold by major pressurized water reactor competitors of Combustion Engineering.

b. Development of this information by C-E required hundreds of manhours and tens of thousands of dollars. To the best of my knowledge and belief a competitor would have to undergo similar expense in generating equivalent information.

c. In order to acquire such information, a competitor would also require considerable time and inconvenience related to the development of the methods for evaluating safety system setpoints and their associated uncertainties.

d. The information required significant effort and expense to obtain the licensing approvals necessary for application of the information. Avoidance of this expense would decrease a competitor's cost in applying the information and marketing the product to which the information is applicable.

e. The information consists of methods for evaluating safety system setpoints and their associated uncertainties, the application of which provides a competitive economic advantage. The availability of such information to competitors would enable them to modify their product to better compete with Combustion Engineering, take marketing or other actions to improve their product's position or impair the position of Combustion Engineering's product, and avoid developing similar data and analyses in support of their processes, methods or apparatus.

f. In pricing Combustion Engineering's products and services, significant research, development, engineering, analytical, manufacturing, licensing, quality assurance and other costs and expenses must be included. The ability of Combustion Engineering's competitors to utilize such information without similar expenditure of resources may enable them to sell at prices reflecting significantly lower costs.

g. Use of the information by competitors in the international marketplace would increase their ability to market nuclear steam supply systems by reducing the costs associated with their technology development. In addition, disclosure would have an adverse economic impact on Combustion Engineering's potential for obtaining or maintaining foreign licensees.

Further the deponent sayeth not.

A. E. Scherer
Director
Nuclear Licensing Department

Sworn to before me

this 22 day of March 1983

Notary Public