

Millstone 3 Fuel Assembly Inspection Program

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Inspection work was conducted at Millstone Unit 3 by an NSD crew under the direction of PPE contract engineer Jim Kisak. Responsibility for the reduction and verification of individual portions of the inspection program was assigned to various PPE engineers. Their signatures on this document attest that (1) they have independently verified the sections assigned to them; and (2) they concur with the results documented herein. A listing of the individual data reduction and verification assignments is given below:

<u>Inspection Program Section</u>	<u>Originating Engineer</u>	<u>Verifying Engineer</u>
1.0 Background & Objectives	D. Colburn	J. Halligan
2.0 Full Length RCCA Drag Tests	D. Davis	D. Colburn
3.0 Guide Thimble Plug Gage Exams	J. Halligan	D. Colburn
4.0 F/A Length Measurements	H. Kunishi	T. Freeman
5.0 Fuel Rod Growth Data	H. Kunishi	T. Freeman
6.0 Overall Summary	D. Colburn	D. Davis

Signatures On File

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1.0 Background and Objectives

An RCCA insertion anomaly was experienced at Wolf Creek and South Texas Unit 1. During SCRAMs, several RCCAs did not fully insert. Wolf Creek conducted cold drop tests after the event and additional RCCAs did not fully insert. A subsequent inspection program^{a, b, c}

The following tests were conducted during the inspection program:

- (1) RCCA Drag Tests;
- (2) Guide Thimble Plug Gage Exams (Single Tube Probe Tests);
- (3) Fuel Assembly Length Measurements; and
- (4) Fuel Rod-to-Nozzle Gap Measurements.

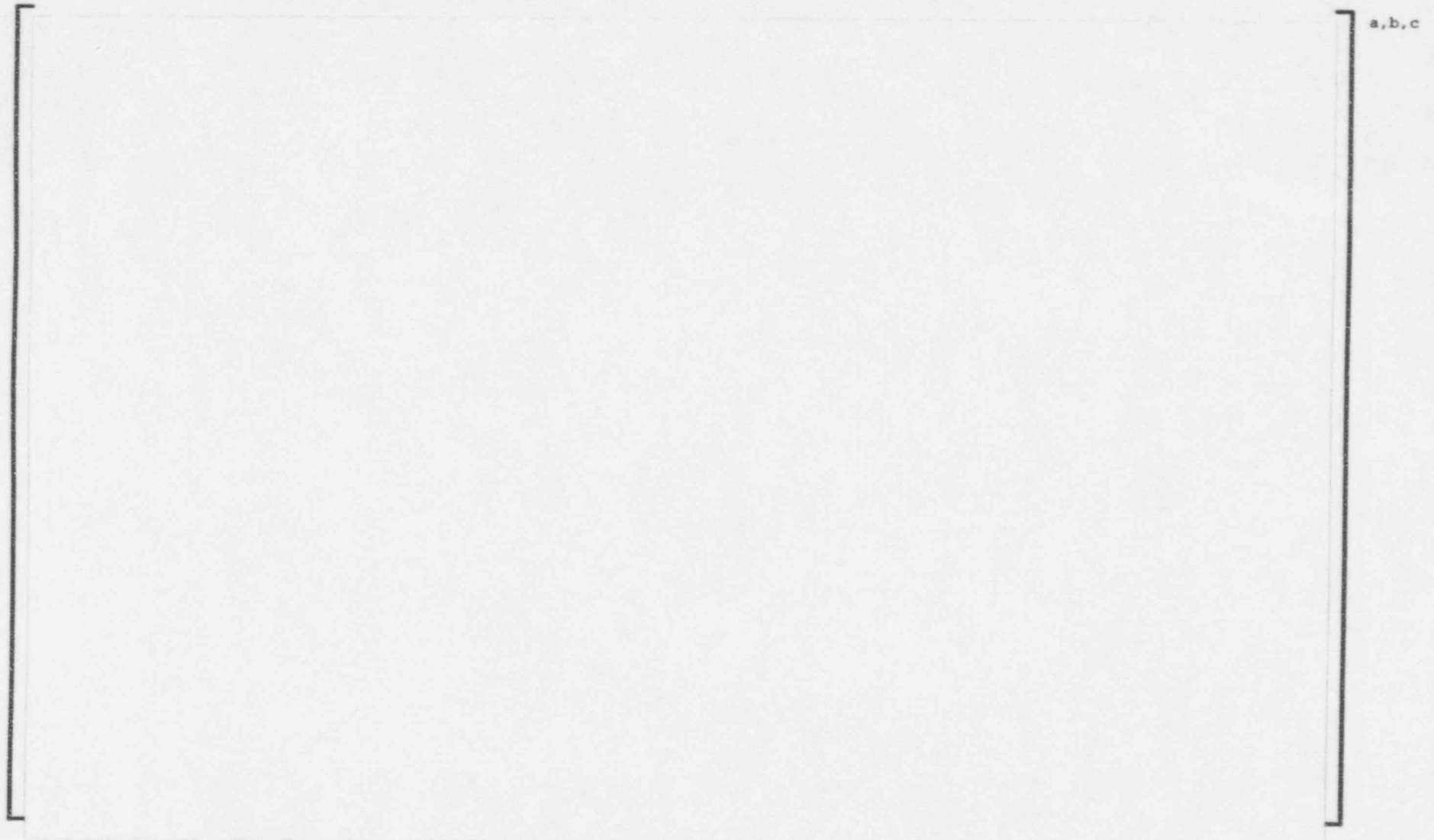
Fuel assembly length measurements and fuel rod-to-nozzle gap measurements were needed to determine if the growth of the fuel assemblies and fuel rods is within the predicted range.

2.0 Full Length RCCA Drag Tests (Spent Fuel Pool)

Fuel assemblies fabricated for two different contracts were drag tested in the spent fuel pool. The specific fuel features for each contract are shown below. Nine of the ten fuel assemblies that were tested were fabricated with Vantage 5H fuel features.

The drag test results are tabulated in Table 2.1. The Millstone Unit 3 dashpot and upper guide thimble data is shown in Figure 2.1 along with data from other plants. As shown in^{a, b, c}

Figure 2.1: Dashpot and Upper Guide Thimble Drag Data



In Figures A.1 and A.2, the dashpot and guide thimble drag data are graphed versus their corresponding F/A fast fluence. At Wolf Creek, incomplete RCCA insertions occurred in fuel with F/A fluences greater than 9×10^{21} nvt, when the dashpot and guide thimble drag F.5.1 criteria were exceeded. In contrast to the Wolf Creek fuel, none of the Millstone Unit 3 fuel assemblies exceeded the F-5.1 upper guide thimble drag criteria of 40 lbs. nor the dashpot drag criteria of 100 lbs.] a,b,c

Table 2.1: Millstone Unit 3 Drag Test Data

a,b,c

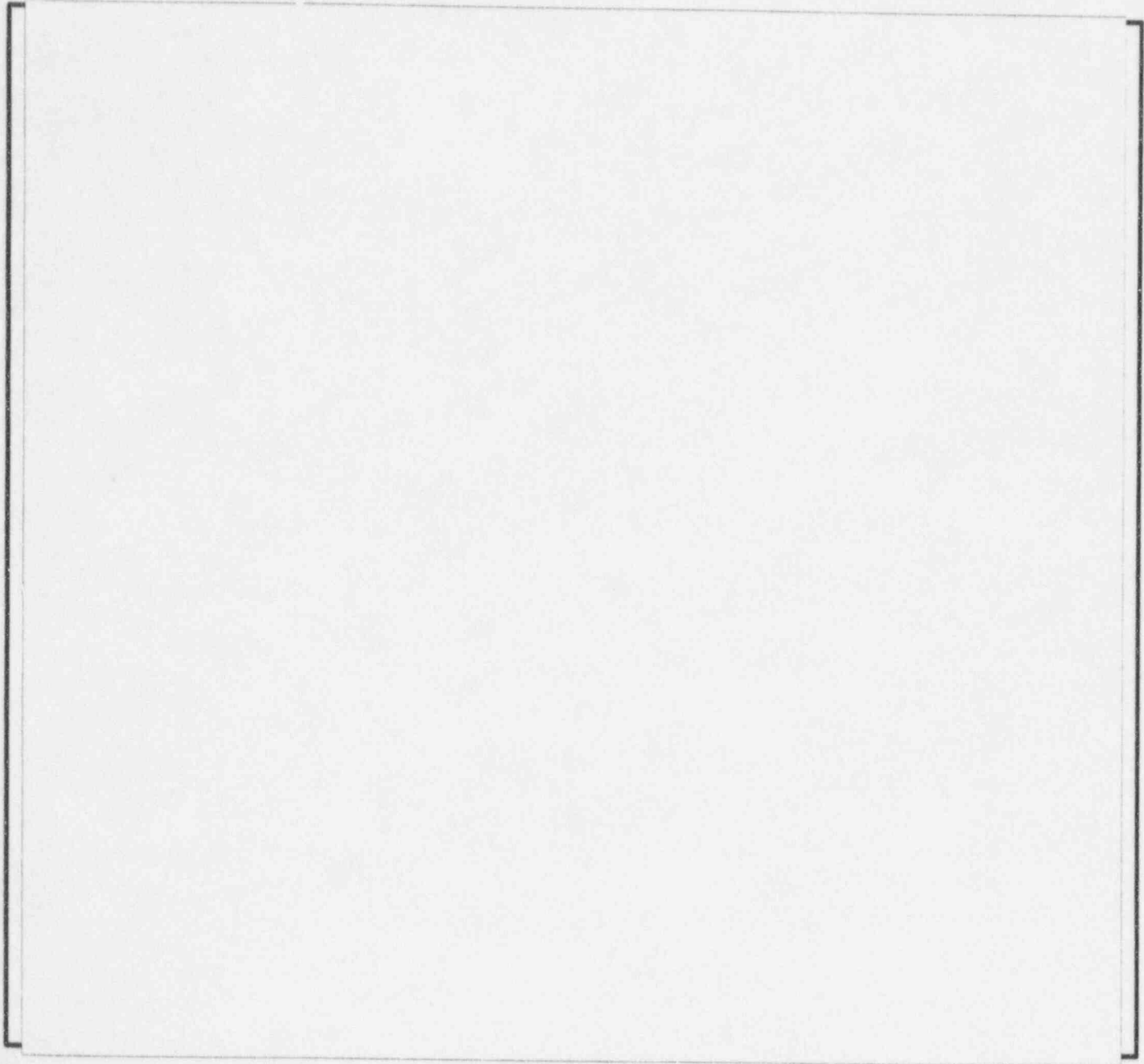
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3.0 Single Tube Probe

a,b,c

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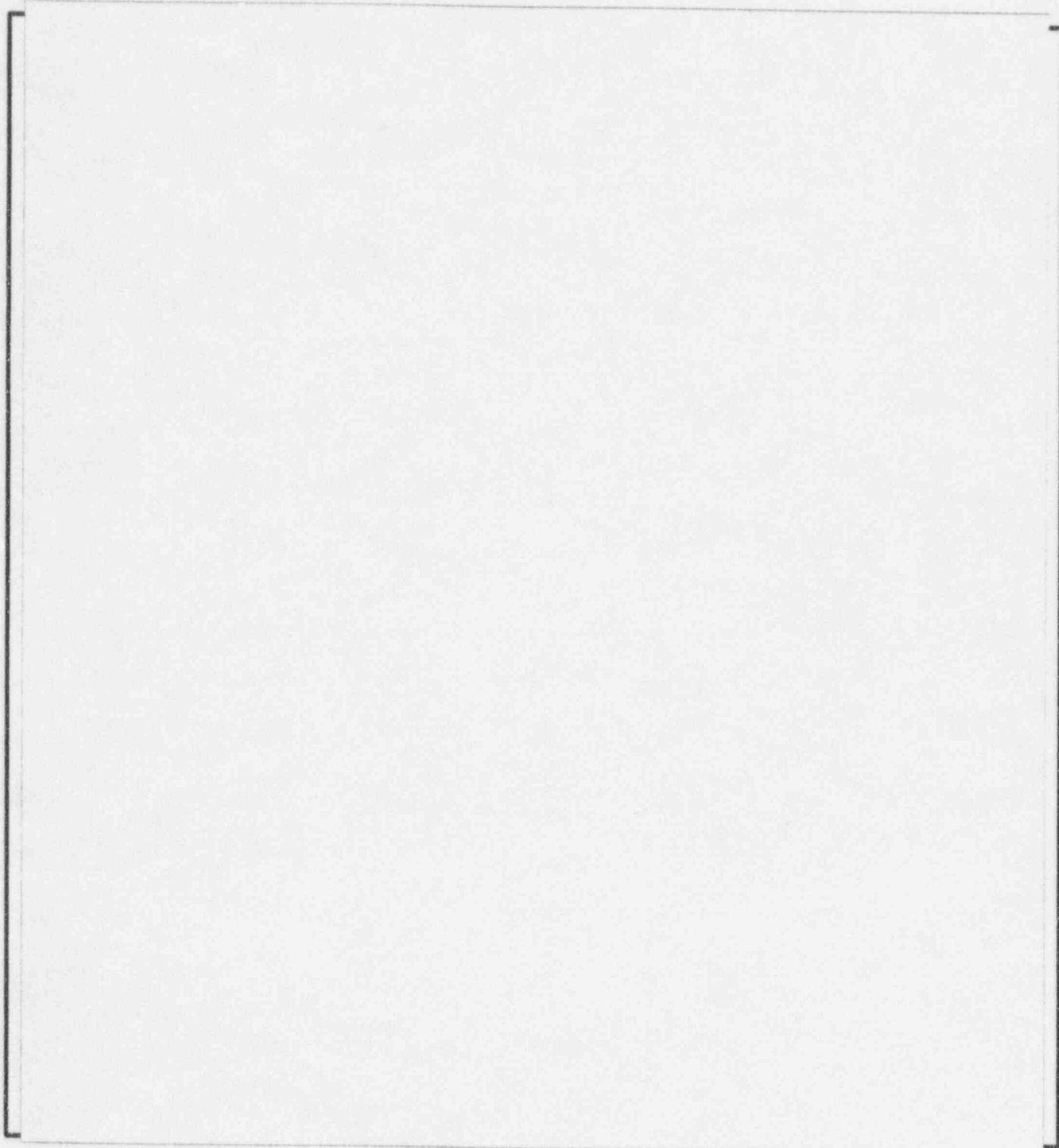
**Figure 3.1: Dashpot "GO/NO GO" Probes
17x17 Fuel Assemblies**



a, b, c

h3200461.1c
11

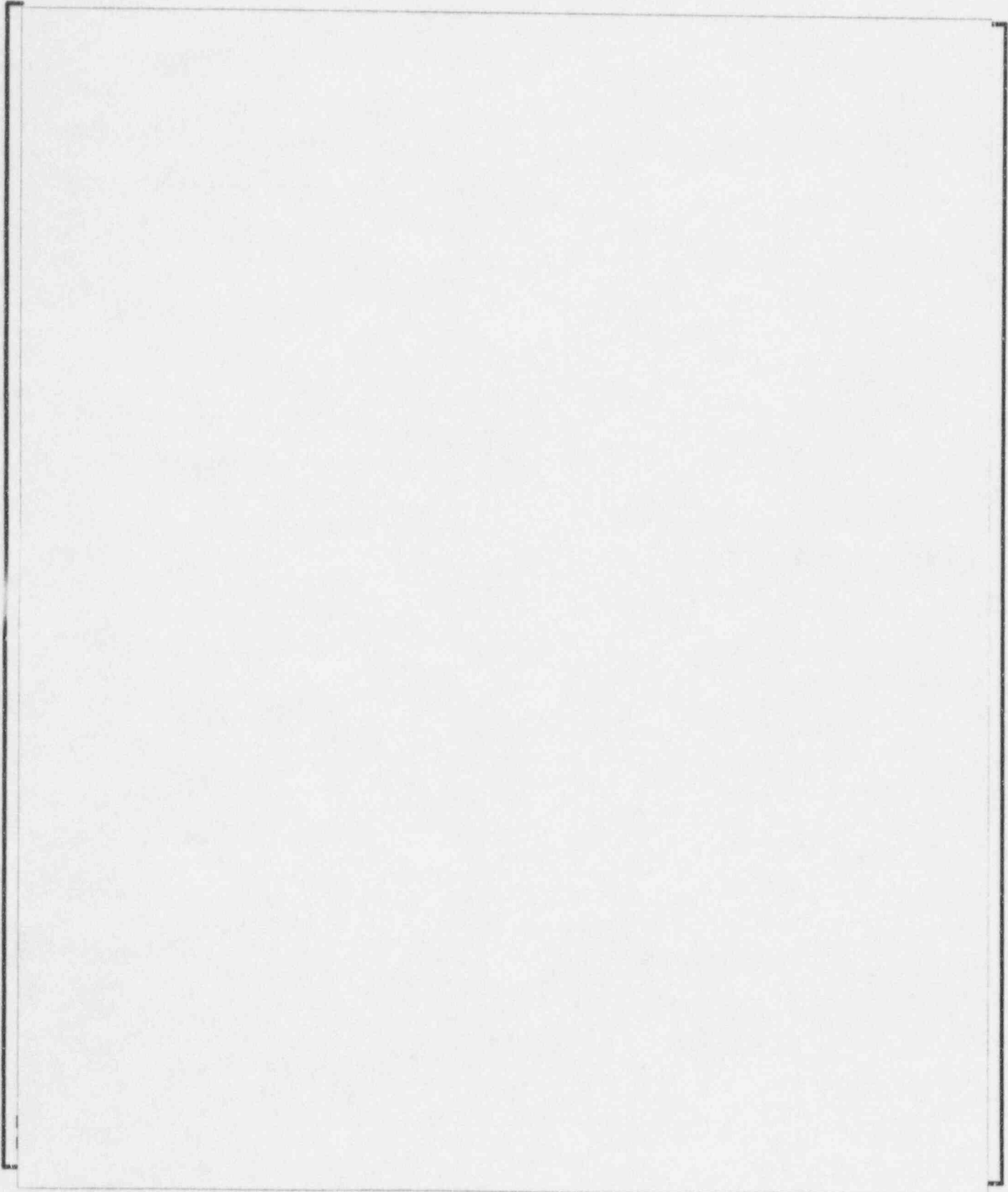
Figure 3.2: Upper Guide Thimble "GO/NO GO" Probes
17x17 Fuel Assemblies
W/ Zircaloy Mid-Grids



a, b, c

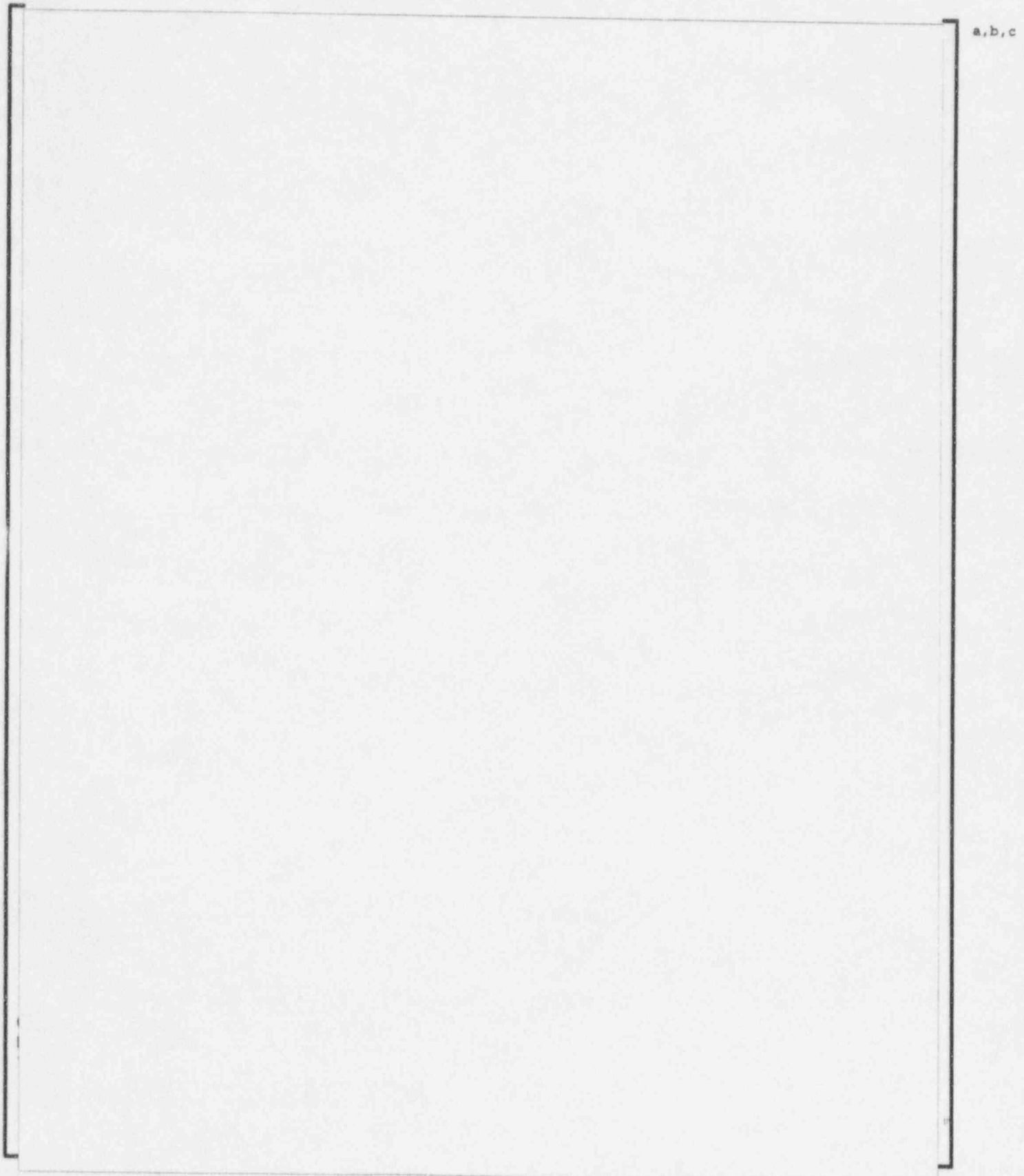
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11

**Figure 3.3: Millstone 3 Fuel Assembly F02
Dashpot Probes**

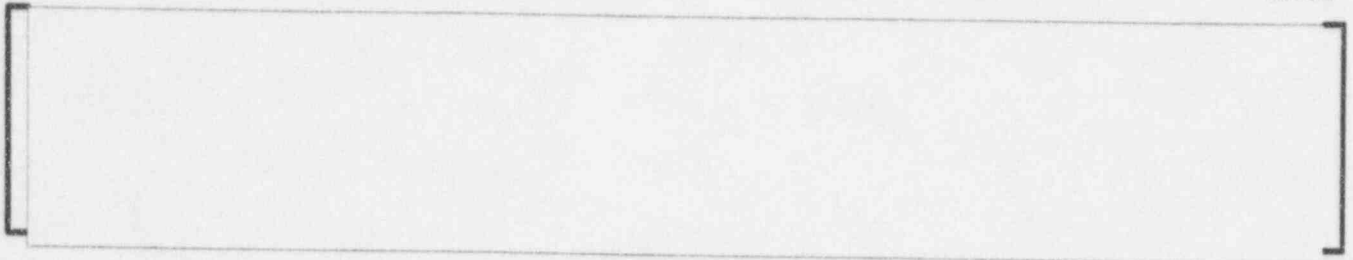


a, b, c

**Figure 3.4: Millstone 3 Fuel Assembly F02
Upper Guide Thimble Probes**



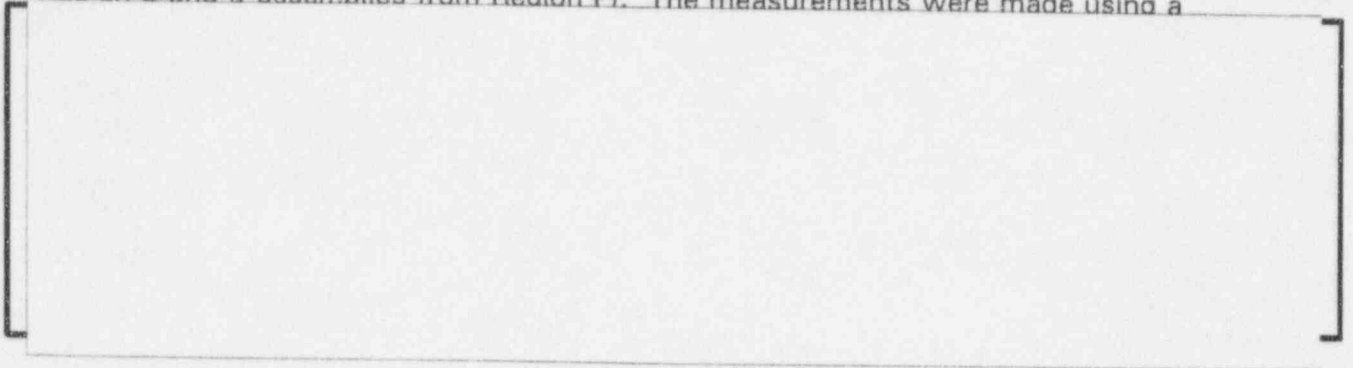
a, b, c



4.0 Fuel Assembly Growth Data

Fuel assembly length measurements were performed on 10 assemblies (1 assembly from Region E and 9 assemblies from Region F). The measurements were made using a

a, b, c



5.0 Fuel Rod Growth Data

The axial gaps between the peripheral rods and the assembly nozzles were measured from the low magnification TV tapes of 10 Millstone Unit 3 assemblies to determine fuel rod growth. The assemblies were E40, F85, F18, F02, F87, F86, F01, F11, F81 and F25.

a, b, c



Figure 4.1: Recent Assembly Growth Data



a, b, c

In Appendix C, the calculated rod growth data is summarized. The maximum, average, and minimum rod growth values for each assembly are listed in the table below. The data

a, b, c

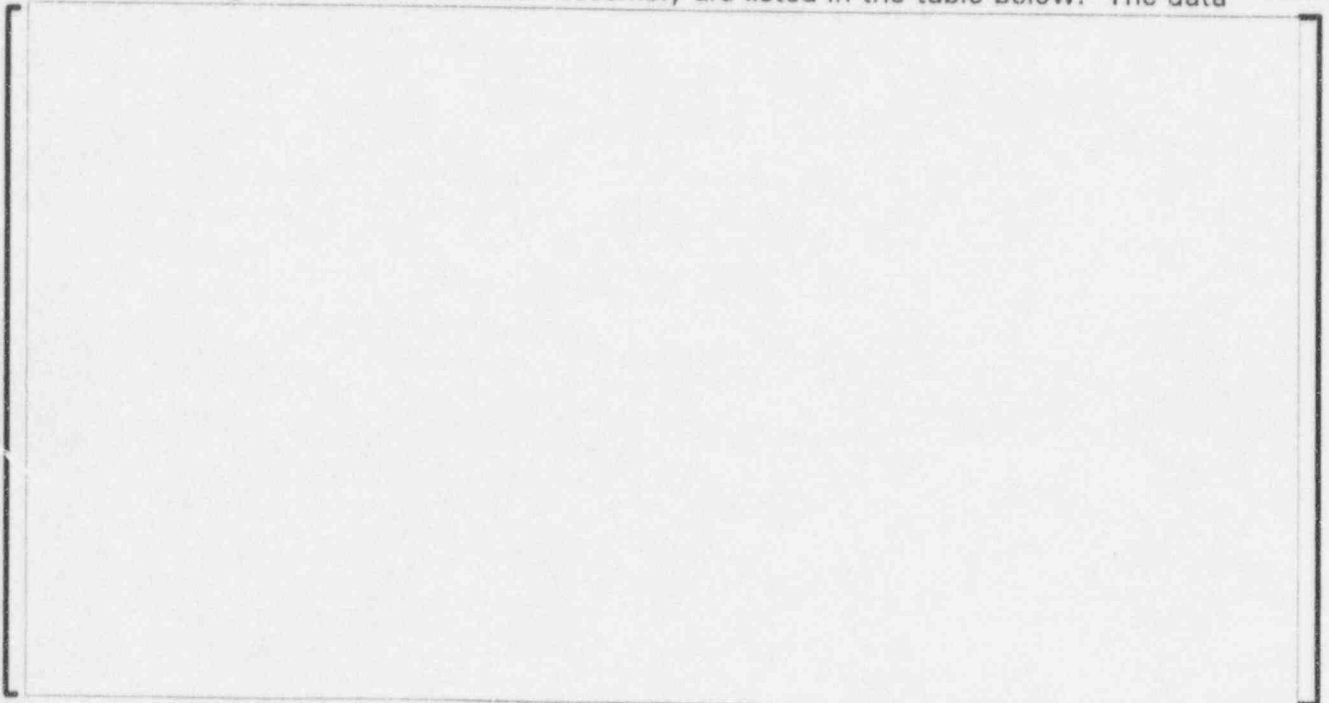


Figure 5.1: Recent Rod Growth Data

a, b, c

6.0 Summary

a, b, c

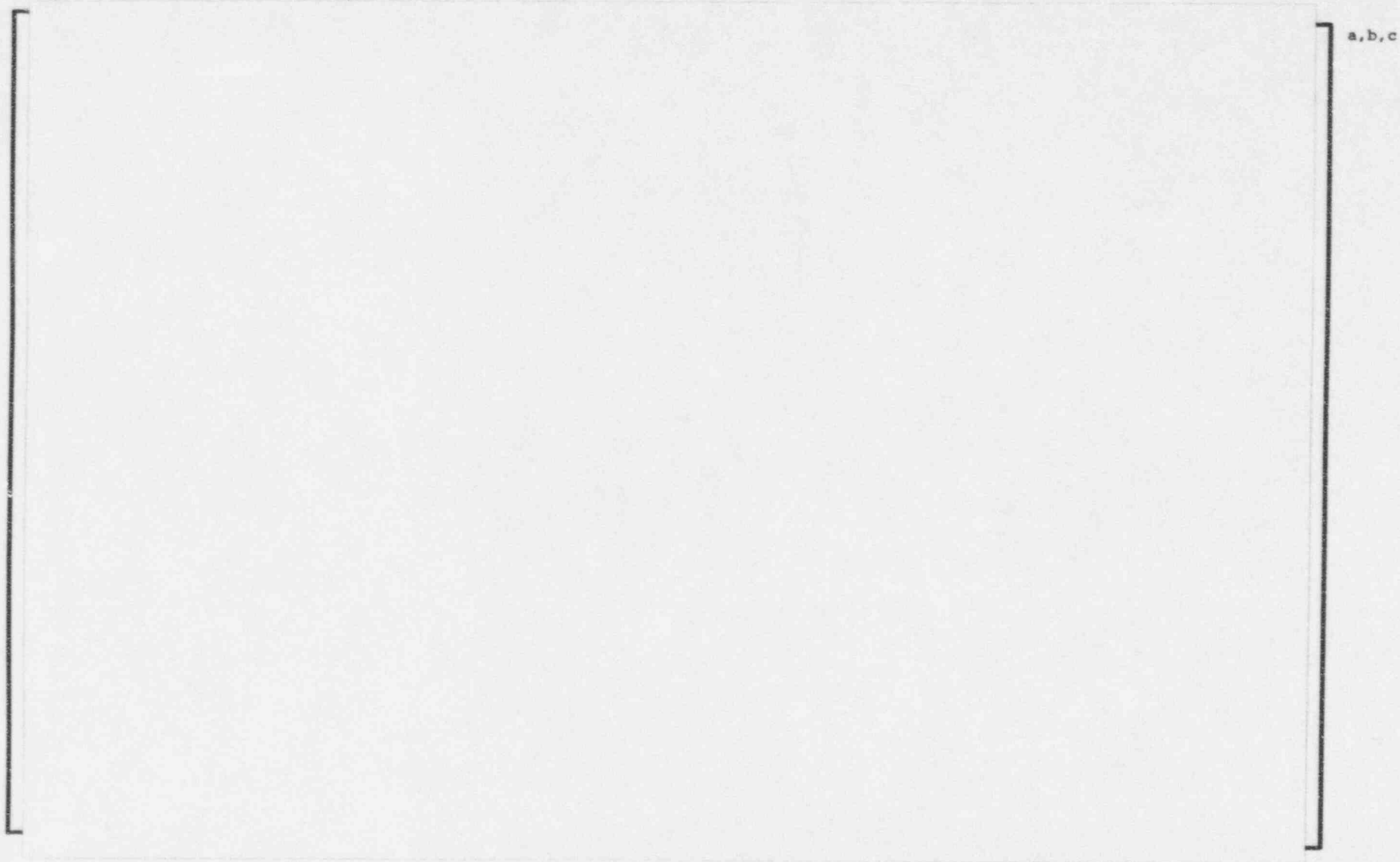
Appendix A

Millstone 3 Fuel Assembly Drag Data

Figure A.1: Dashpot Drag and Fast Fluence Data



Figure A.2: Upper Guide Trimble Drag and Fast Fluence Data



Appendix B

Millstone 3 Assembly Growth Data



a, b, c

Appendix C
Fuel Rod Growth Data
for
Millstone 3

MILLSTONE 3

a.b.c

MILLSTONE 3

8.0.2

MILLSTONE 3

a.c.

MILLSTONE 3

8.0.0

MILLSTONE 3

4.0.2

MILLSTONE 3

a.d.c.

MILLSTONE 3

a.c.c.

MILLSTONE 3

A.D.C.

MILLSTONE 3

a.b.c

MILLSTONE 3

A.B.C.