

Wolf Creek Fuel Assembly Inspection Program

Phase 2

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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.

<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	J. Halligan	D. Davis
3.0 Guide Thimble Plug Gage Exams	J. Halligan	D. Davis
4.0 Fuel Assembly Growth Data	H. Kunishi	A. Konzel
5.0 Fuel Rod Growth Data	H. Kunishi	A. Konzel
6.0 Fuel Assembly Bow Data	D. Davis	D. Colburn
7.0 Visual Inspections	D. Davis	D. Colburn
8.0 Overall Summary	J. Halligan	D. Davis

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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 concluded that the direct cause of the incomplete RCCA insertions at Wolf Creek was a, b, c

The objective of the Phase 2 Wolf Creek inspection program was to build on the results of the original inspection program (PPE-96-088). The following tests were scheduled to be conducted during the inspection program:

- (1) RCCA Drag Tests;
- (2) Guide Thimble Plug Gage Exams (Single Tube Probe Tests);
- (3) Fuel Assembly Length Measurements;
- (4) Fuel Assembly Bow Measurements;
- (5) Fuel Rod-to-Nozzle Gap Measurements;
- (6) Detailed Visual Inspections;
- (7) Fuel Rod Oxide Measurements;
- (8) Fuel Rod Profilometry Measurements;
- (9) Top Nozzle Spring Load/Deflection Measurements;
- (10) Lateral Grid Width Measurements;
- (11) Grid Cell Size and Force Measurements; and
- (12) Disassembly of H50 and H38 fuel assembly elements for hot cell examinations.

Fuel assembly length measurements and fuel rod-to-nozzle gap measurements were needed to determine if the growth of these fuel assemblies and fuel rods is within the anticipated range. The fuel rod oxide and profilometry results (items 7 and 8) were presented in PPE-96-204. The results of the top nozzle spring load/deflection measurements, lateral grid width measurements, grid cell size and force measurements and hot cell investigations will be presented in later reports.

2.0 Full Length RCCA Drag Tests in the Spent Fuel Pool

a, b, c

The results of the additional fuel assembly testing and skeleton assembly drag testing are provided below. Additional 'G' region and 'H' region assemblies were examined to gather additional information and to record differences between the regions.

Fuel Assemblies

Six additional fuel assemblies were selected for drag testing. Two 'G' region and four 'H' region assemblies were tested. The 'G' region assembly burnup values were 35 and 54 GWD/MTU. The 'H' region assembly burnup values were 37.2, 40, 44 and 49 GWD/MTU.

a, b, c

H50 Skeleton Assembly

After the fuel rods were removed from fuel assembly H50, a drag check measurement was performed with the dummy RCCA. The purpose was to determine what difference, if any, could be measured with the fuel rods removed. The measurements were taken in the new fuel elevator with the skeleton clamped down.

a, b, c

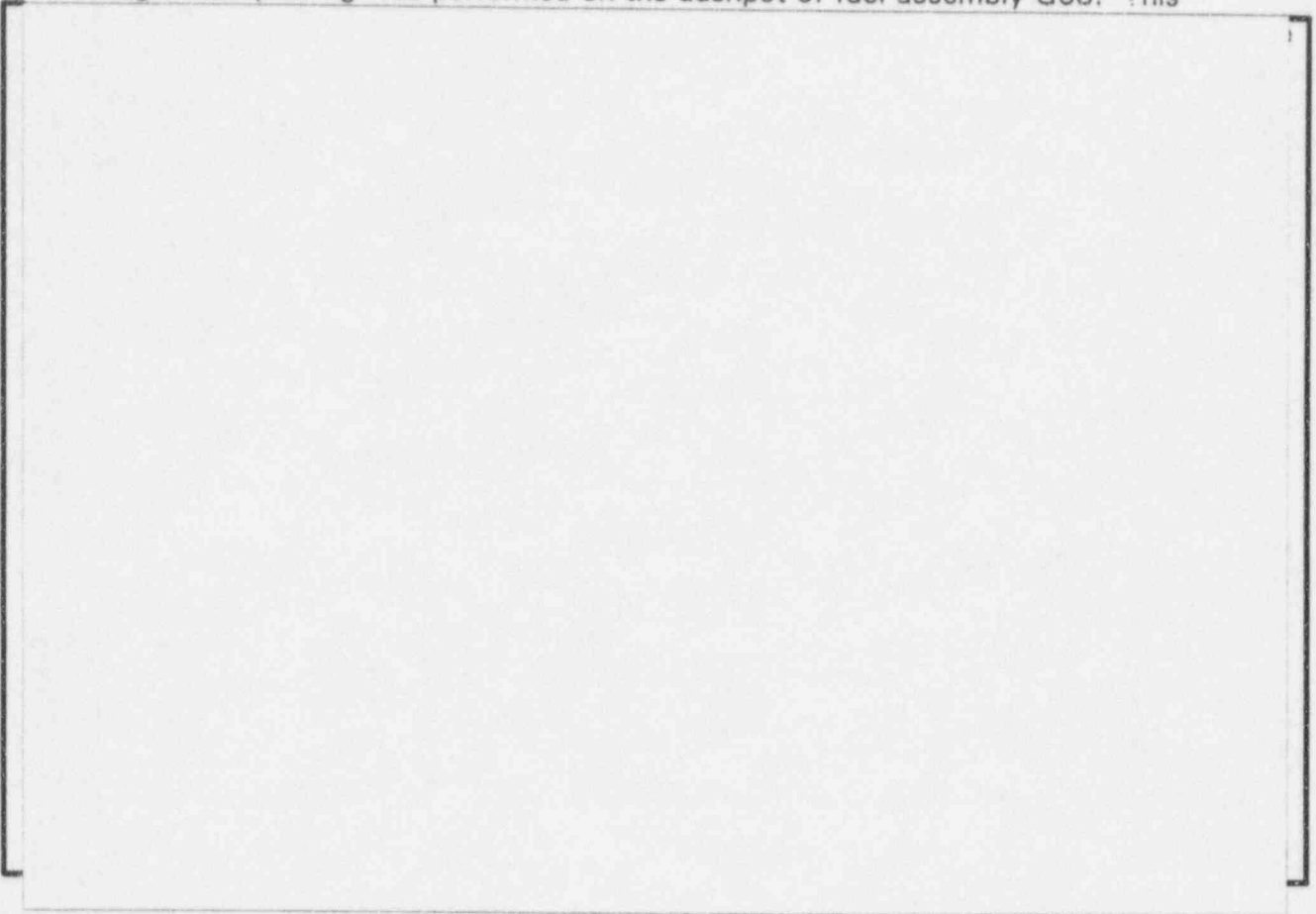
Figure 2.1: Dashpot and Upper Guide Thimble Drag Data



3.0 Guide Thimble Plug Gage Exams

The single tube probing was performed on the dashpot of fuel assembly G68. This

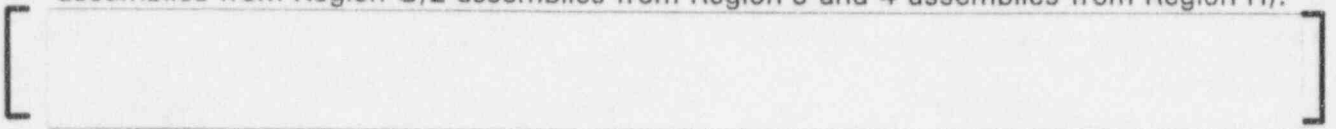
a, b, c



4.0 Fuel Assembly Growth Data

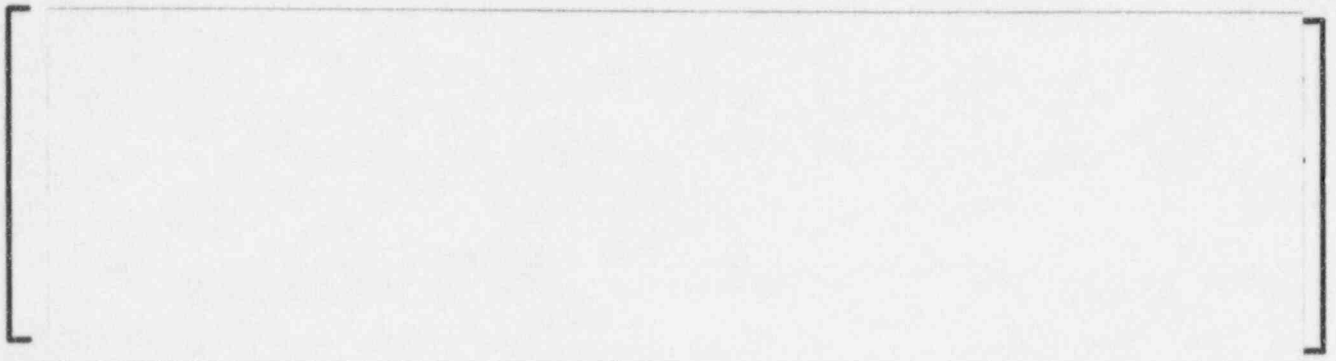
The fuel assembly length measurements were performed on an additional 8 assemblies (2 assemblies from Region G, 2 assemblies from Region J and 4 assemblies from Region H).

a, b, c



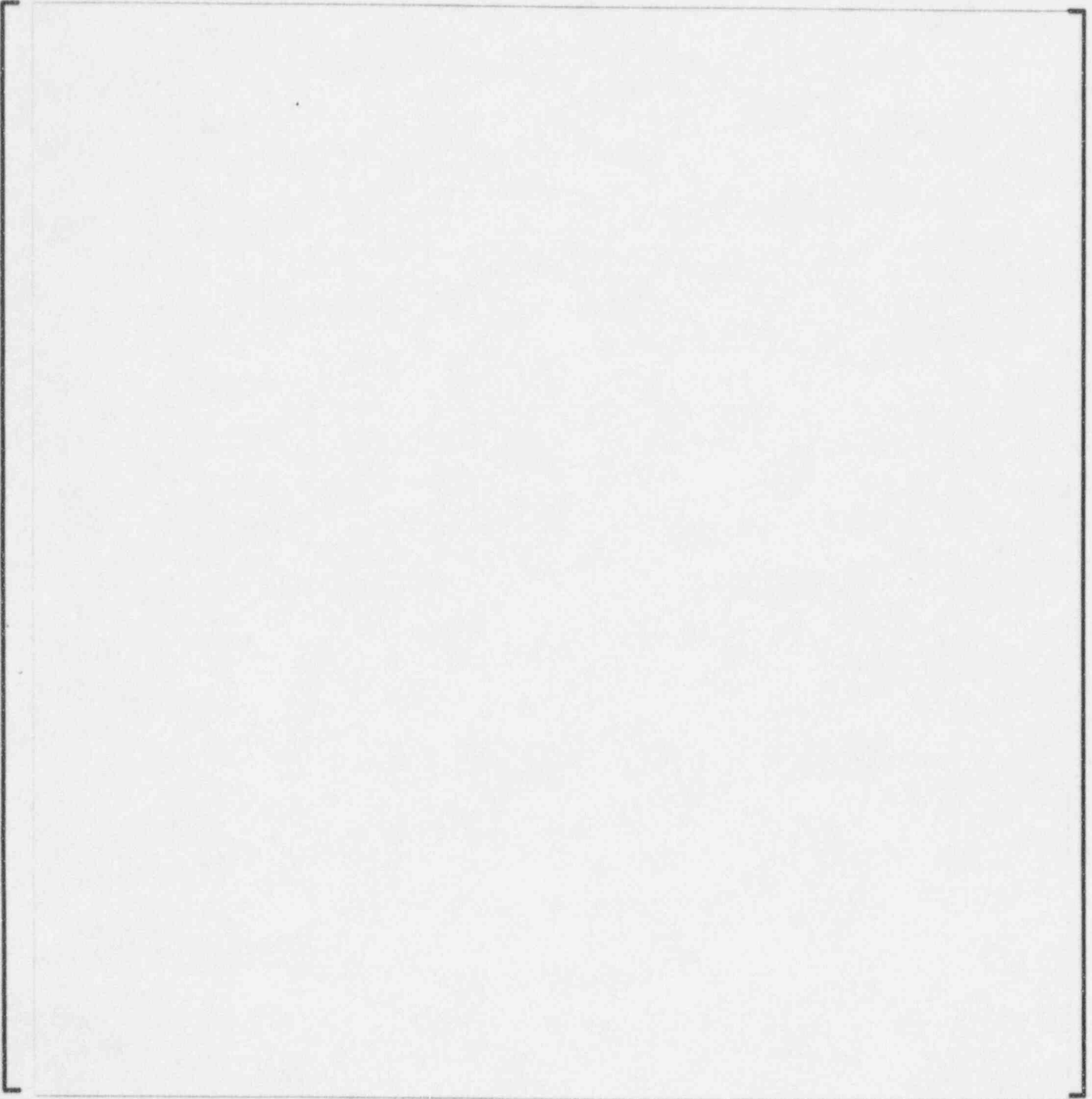
The 'G' assemblies have the 17x17 Standard design while the 'J' and 'H' assemblies have the 17x17 V-5H design. The 'G' assemblies use standard Zircaloy-4 as the thimble tube material, but improved Zircaloy-4 is used for the 'J' and 'H' assemblies.

a, b, c



**Figure 3.1: DASHPOT PROBES "GO/NO GO"
17x17 FUEL ASSEMBLIES**

a, b, c



h:\pnp\go.vsd

**Figure 3.2: WOLF CREEK DASHPOT PROBES
F/A G68**

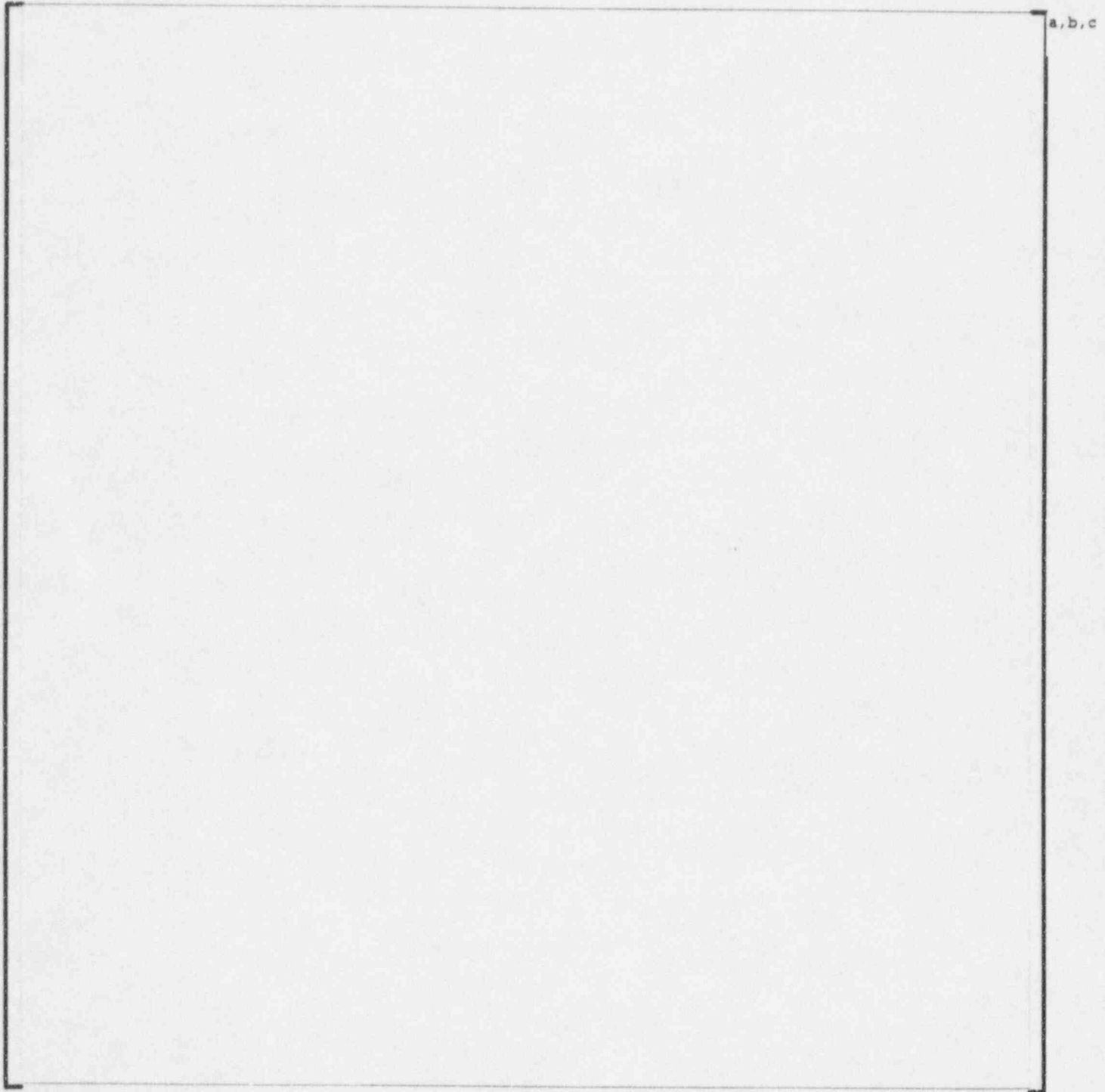


Figure 3.2

a, b, c

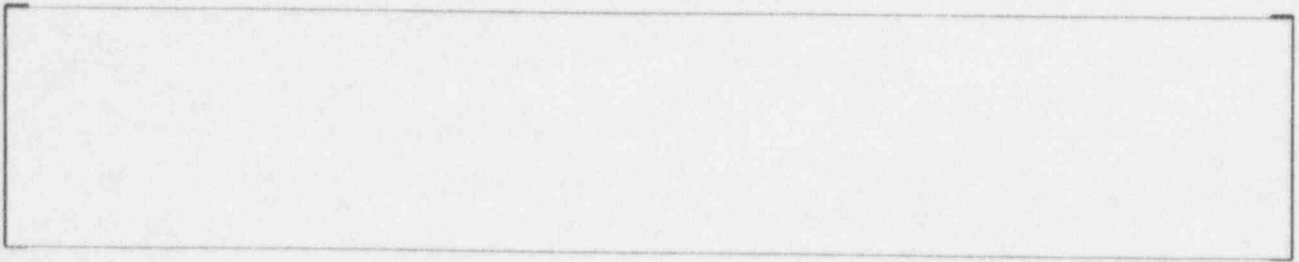


Figure 4.1: Recent Assembly Growth Data



5.0 Fuel Rod Growth Data

The axial gaps between each peripheral rod and the assembly nozzles were measured from the low magnification TV tapes of 10 Wolf Creek assemblies to determine fuel rod growth. The assemblies were G33, G68, H35, H53, H54, H61, H67, H83, J32, AND J37.

a, b, c

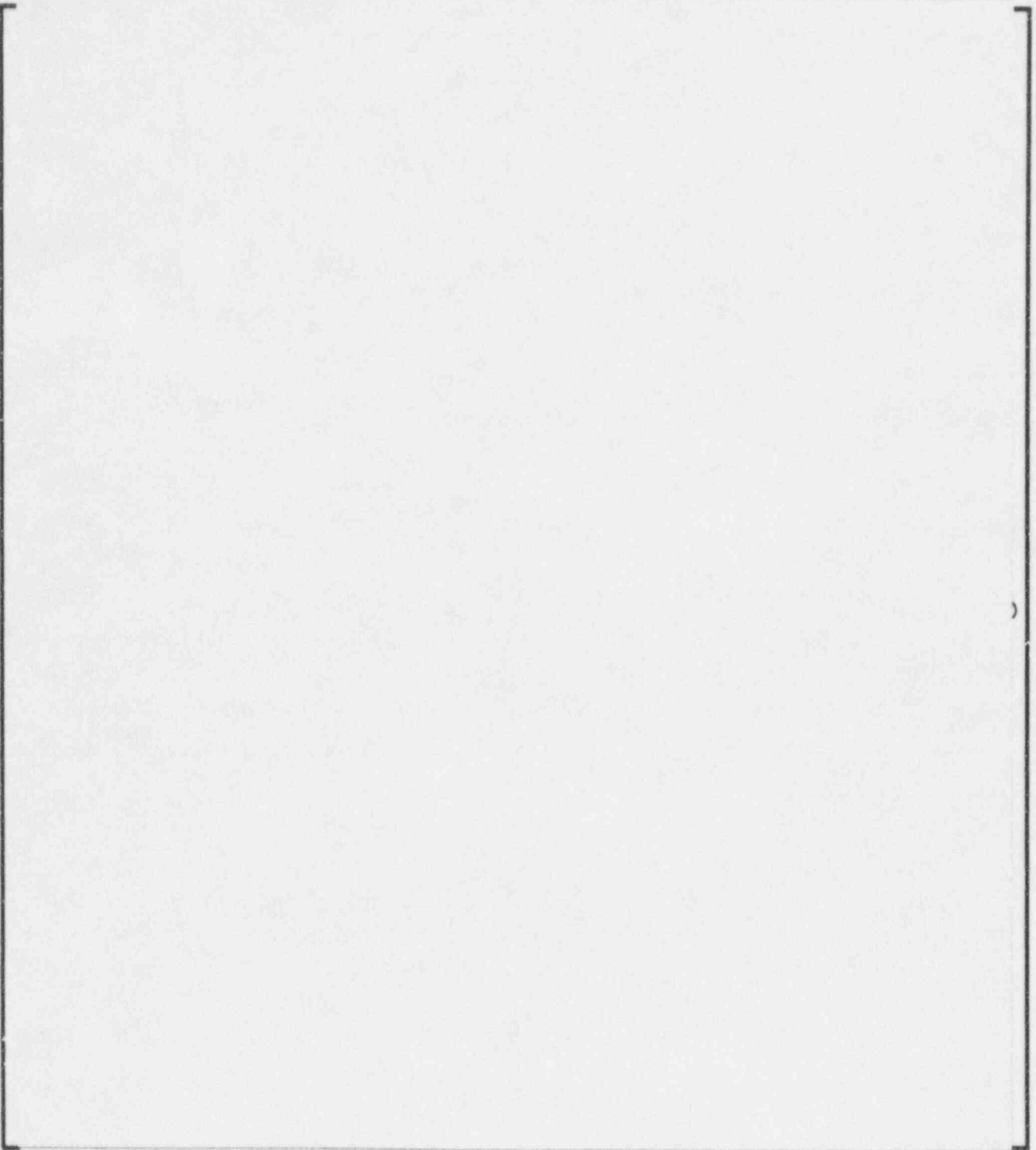
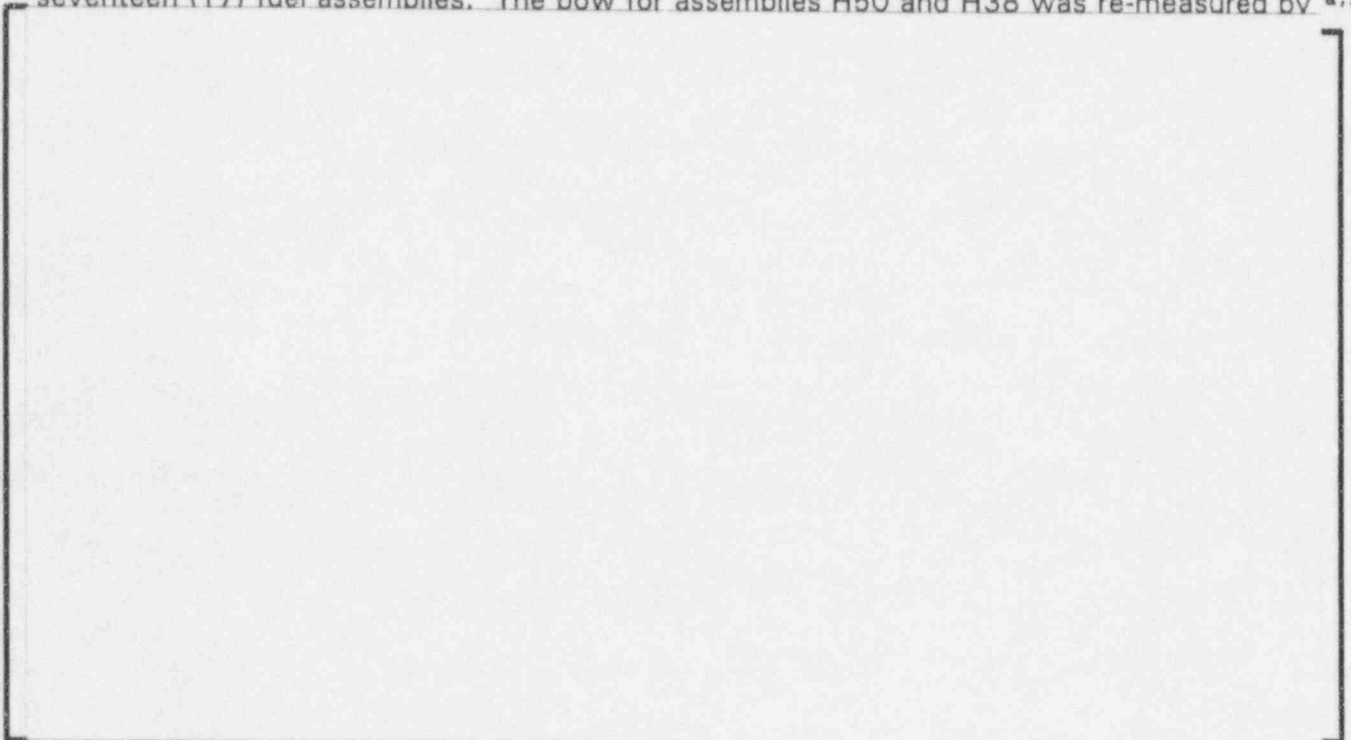


Figure 5.1: Recent Rod Growth Data



6.0 Fuel Assembly Bow Data

In the first phase, the corrected assembly bow shape and bow magnitude was provided for seventeen (17) fuel assemblies. The bow for assemblies H50 and H38 was re-measured by a, b, c



a, b, c

7.0 Visual Inspections

a, b, c

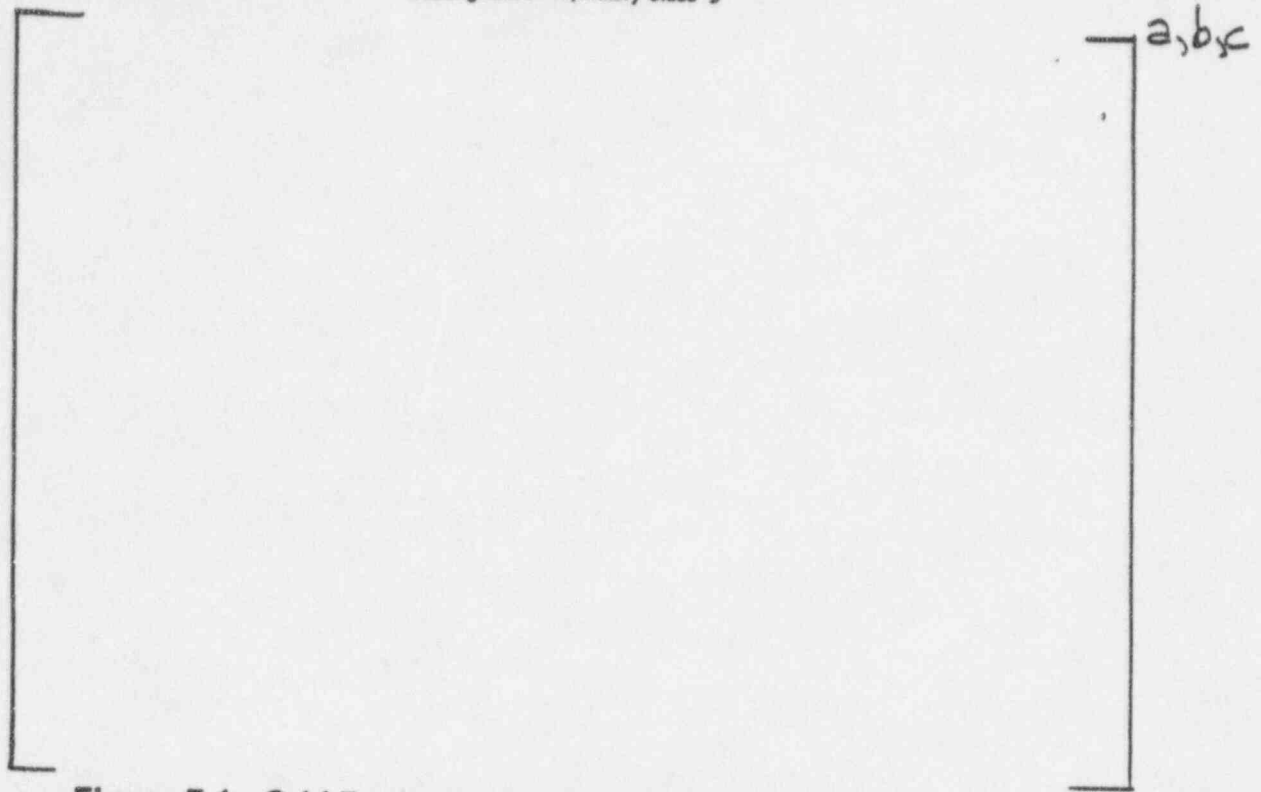


Figure 7.1: Grid 7 relocated to Grid 8 during Phase 1 Testing

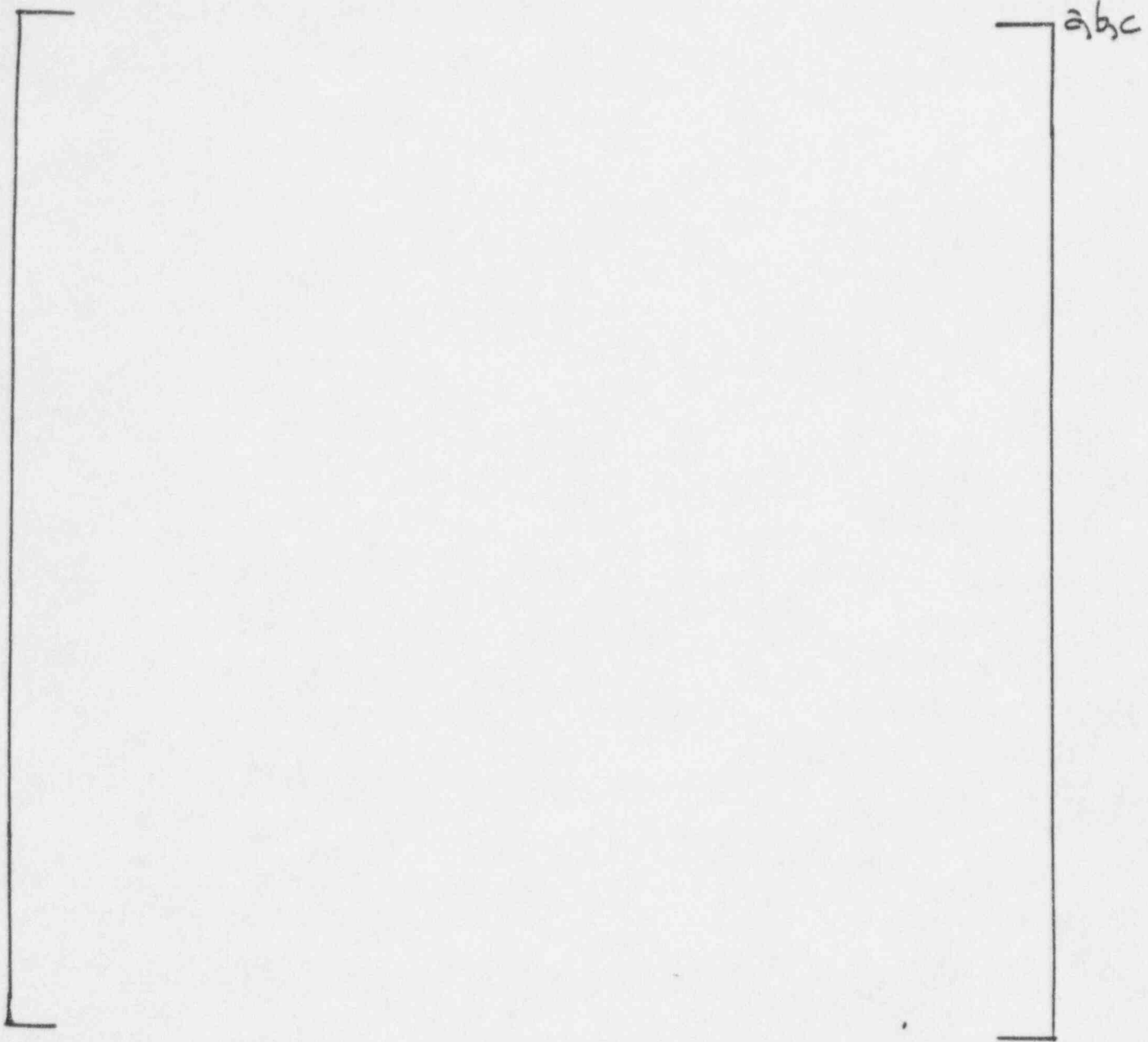
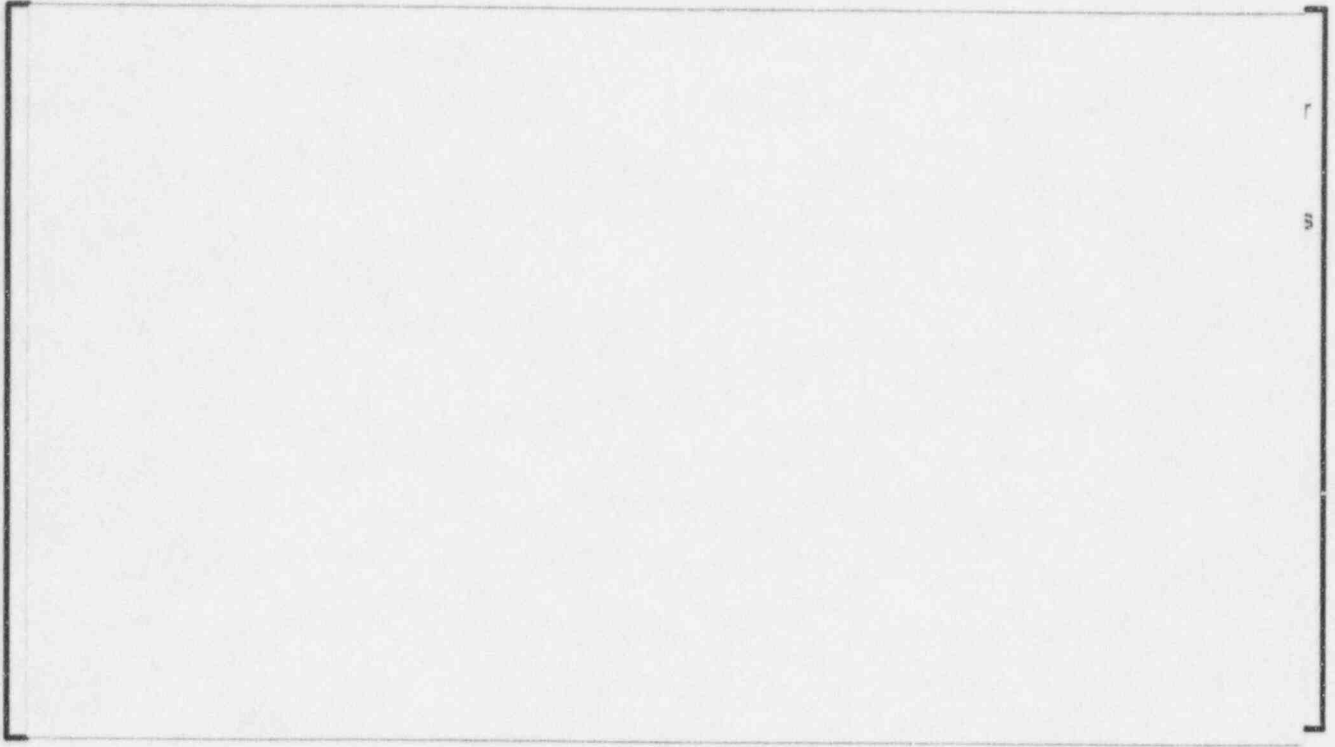


Figure 7.2: Examples of Thimble Tube Distortion for Assembly H50

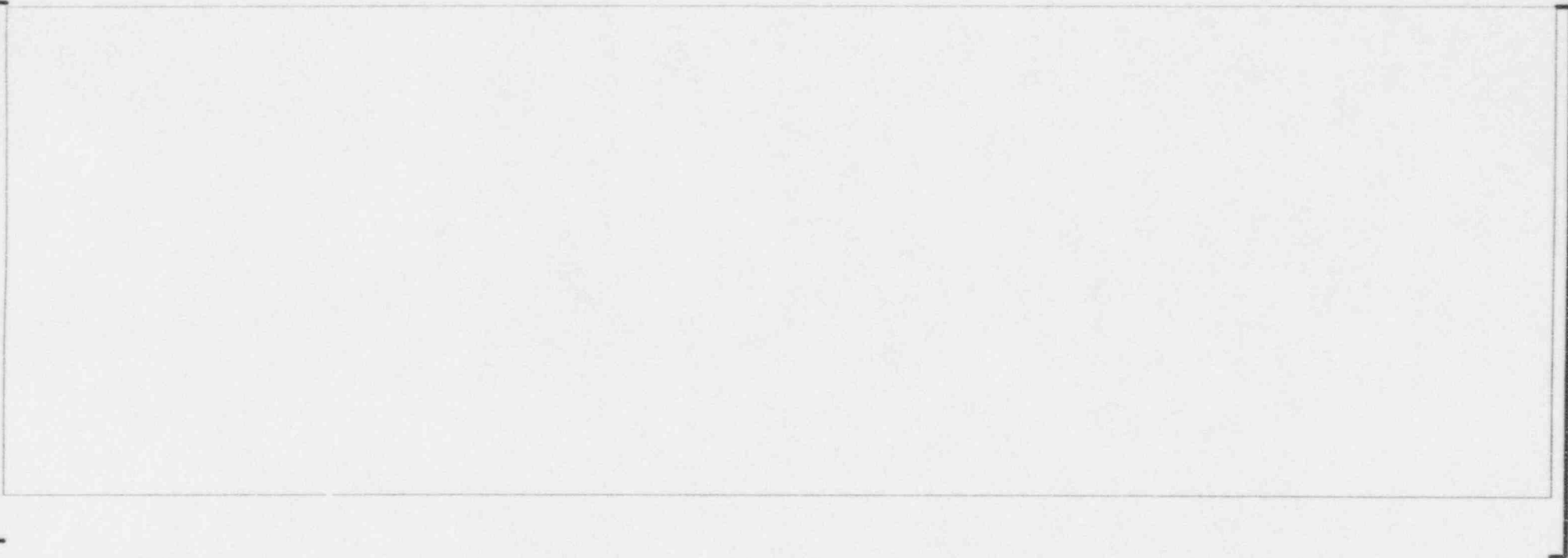
8.0 Summary

a, b, c



Appendix A Fuel Assembly Growth Data For Wolf Creek - EOC-8

a, b, c



Appendix B
Fuel Rod Growth Data
For
Wolf Creek - EOC-8

WOLF CREEK

2.0.2

WOLF CREEK

a.b.c

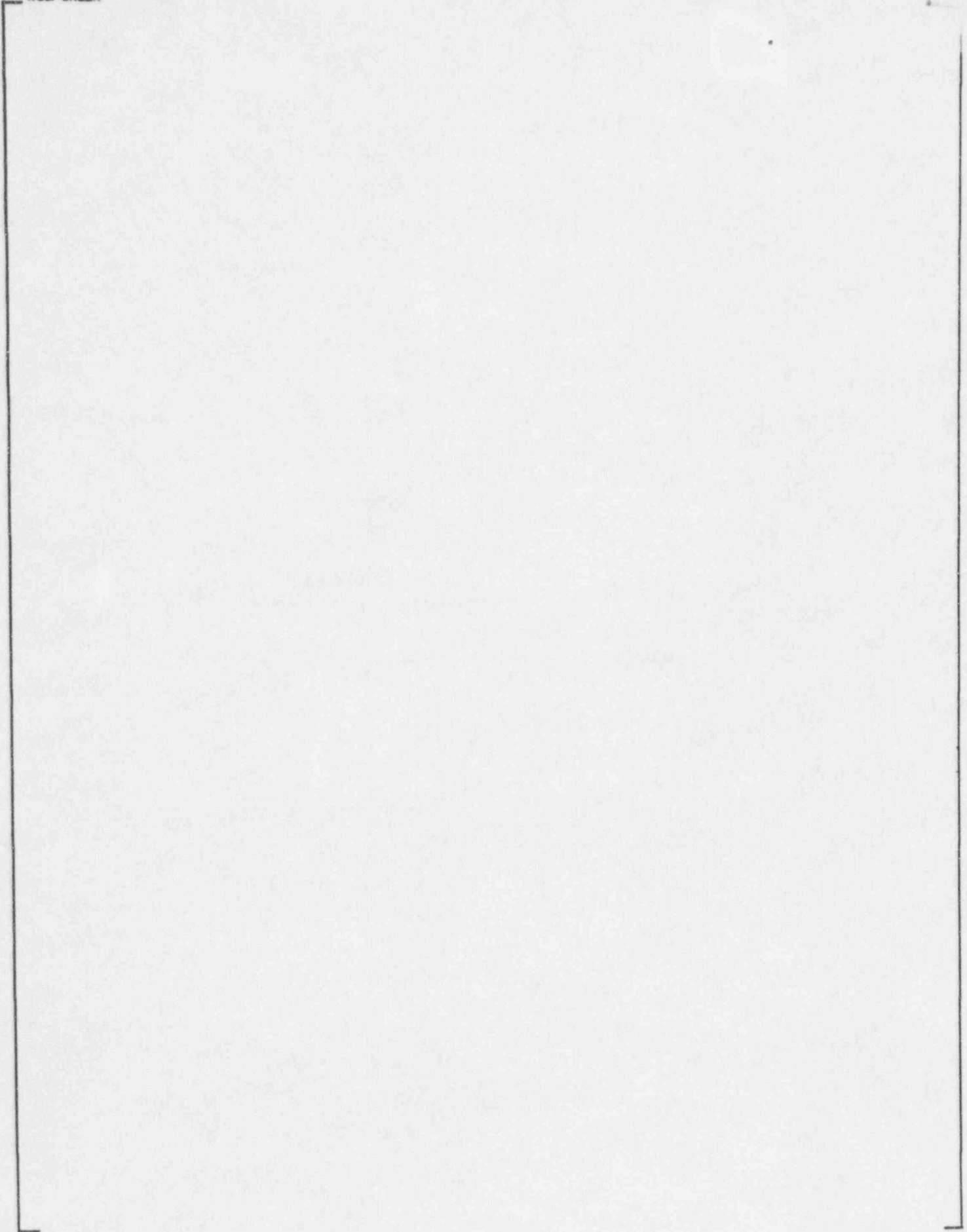
WOLF CREEK

2.5.5

WOLF CREEK

a.b.c

WOLF CREEK



WOLF CREEK

a.b.c.

WOLF CREEK

a. b. c.

WOLF CREEK

a.e.c.

WOLF CREEK

a.b.c

WOLF CREEK

a.b.c

Appendix C
Fuel Assembly Bow Data
For
Wolf Creek - EOC-8

Figure C.1: Fuel Assembly H50, Face 4 Bow Data - Profile View

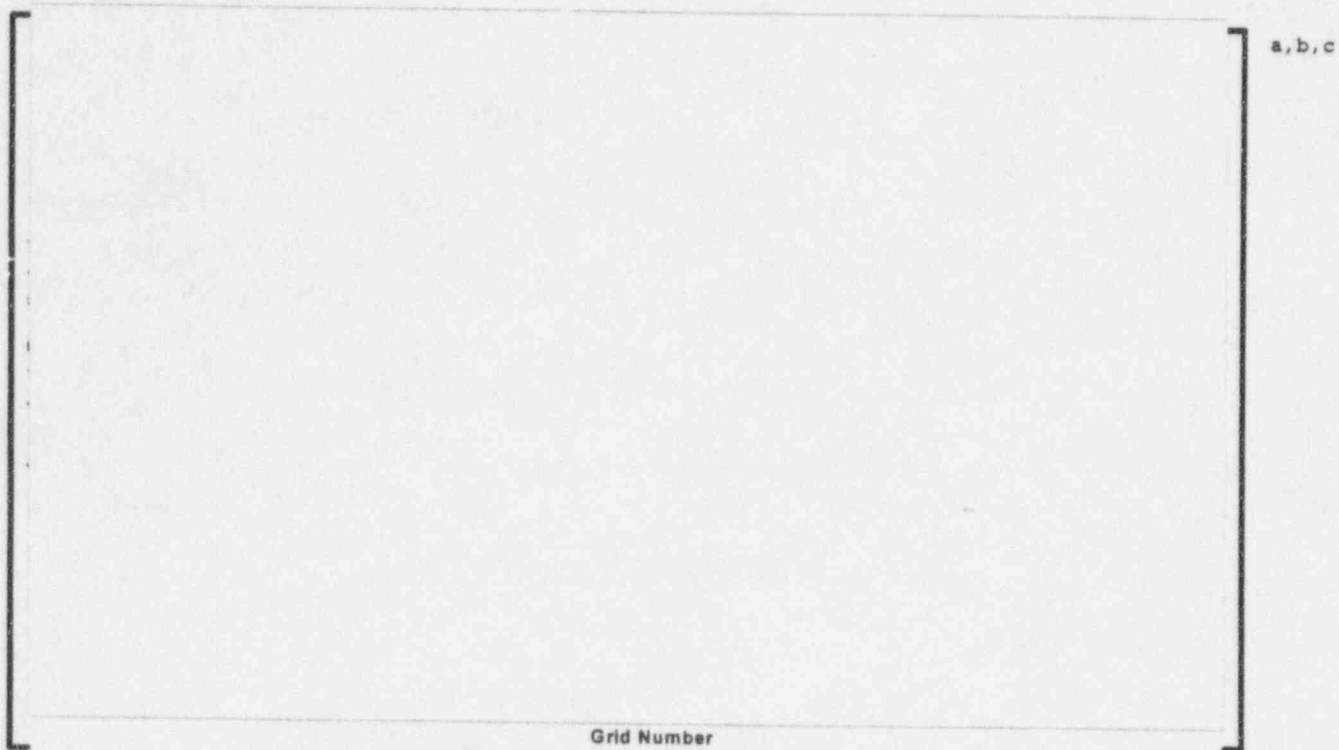


Figure C.2: Fuel Assembly H38, Face 2 Bow Data - Profile



Figure C.3: Fuel Assembly H50, Face 4 Bow Data - Direct View



Figure C.4: Fuel Assembly H50, Face 3 Bow Data - Direct View

