Florida
Power
CORPORATION
Crystal River Unit 3
Docket No. 50-302

August 20, 1997
3F0897-09

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: Request for Additional Information Regarding Technical Specification Change Request Notice No. 211, Revision 0

References: A. FPC to NRC letter, 3F0397-16, dated March 27, 1997
B. FPC to NRC letter, 3F0597-23, dated May 1, 1997
C. NRC to FPC letter, 3N0496-25, dated April 30, 1996

Dear Sir:

Florida Power Corporation (FPC) is providing this letter to respond to NRC questions regarding Technical Specification Change Request Notice (TSCRN) No. 211, Revision 0, which were discussed during a telephone conference call that was held on June 16, 1997.

Attachment A provides a list of regulatory commitments made in this submittal. Attachment B provides the NRC questions and FPC responses. As part of the response to Question 1, a revised Table 1 is provided containing all known tubes with first span Intergranular Attack (IGA) indications in the "B" Once-Through Steam Generator (OTSG).

The response to Question 6 includes a detailed discussion of the information that will be included as part of the reporting requirements to be provided in TSCRN No. 211, Revision 1 which will propose to adopt, on a permanent basis, the current reporting requirements as approved for Crystal River Unit 3 in License Amendment No. 154 (Reference C). FPC will submit TSCRN 211, Revision 1 under separate cover.

Additionally, FPC will submit a license amendment request by October 6, 1997 to address how FPC will monitor first span IGA indications and disposition growth during future "B" OTSG eddy current exams.



A001

Should you have any questions or require additional information, please contact David Kunsemiller a (352) 563-4566.

Sincerely,

J. J. Holden
Director
Site Nuclear Operations

JJH/LVC

Attachment A: List of Regulatory Commitments

Attachment B: Responses to Technical Specification Change Request Notice 211, Revision 0, Request For Additional Information

xc: Regional Administrator, Region II
Senior Resident Inspector
NRR Project Manager

## ATTACHMENT A

## LIST OF REGULATORY COMMITMENTS

The following are the actions committed to by Florida Power Corporation in this document. Any other actions discussed in the submittal represents intended or planned actions by Florida Power Corporation. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Manager, Nuclear Licensing of any questions regarding this document or any associated regulatory commitments.

| ID Number | Commitment | Commitment Date |
|---|---|---|
| 3F0897-09-1 | In TSCRN 211, Revision 1, FPC will propose to adopt, on a permanent basis, the current reporting requirements which were approved for Crystal River Unit 3 in License Amendment No. 154. | August 20, 1997 |
| 3F0897-09-2 | FPC will submit a license amendment request by October 6, 1997 to address how FPC will monitor first span IGA indications and disposition growth during future inspections. | October 6, 1997 |
| 3F0897-09-3 | Attachment B, responses to NRC questions, include the following commitments which will be incorporated into FPC procedures upon approval of TSCRN 211:<br><br>Following future inspections, tubes may be added to table 1 as described in the response to Question 2a.<br><br>The criteria for confirmation of a tube as a first span IGA is described in the response to Questions 2b, 4, and 5<br><br>Following future inspections, tubes may be removed from Table 1 as described in the response to Question 2c.<br><br>CR-3 will not leave tubes in service with first span IGA indications within one inch of the edge of the lower tubesheet secondary face (LTS+1) or within one inch of the first support plate lower edge (01-1.75).<br><br>The protocol to disposition pit like IGA is described in the response to Question 4 (A through K). | Programmatic Commitment effective upon approval of TSCRN 211 |

## ATTACHMENT B

Responses to Technical Specification Change Request Notice 211, Rev. 0, Request For Additional Information

Each question presented by the NRC staff is shown below in italics and is followed by the FPC response.

**Question 1**

*Tubes included for consideration of the pit-like IGA eddy current depth sizing technique are included in Table 1 of the submittal dated March 27, 1997. Explain the methodology used and criteria established to define this list of tubes containing IGA indications in the first span of the "B" Once-Through Steam Generator (OTSG).*

**Response to Question 1**

The tube identities originally submitted in Table 1 with TSCRN 211, Revision 0, all had historical bobbin calls in the first span of the B OTSG. To ensure FPC programmed the examination with a conservative approach, the CR-3 TUBAN II database was queried for all tubes with previous bobbin calls in the B OTSG first span from 1987 through 1996 inspections. The query results did not depend on whether a tube had previous rotating coil exams. These calls consisted of:

| INDICATION CODE | NUMBER OF INDICATIONS | NUMBER OF TUBES AFFECTED |
|---|---|---|
| NQI | 34 | 19 |
| % TW | 23 | 23 |
| S/N | 1298 | 318 |
| BVT | 282 | 109 |

*NOTE: Multiple tubes had more than one indication type, thus the number of affected tubes is not determined by simply adding the last column.*

Of the 366 tubes listed on Table 1, a limited number had been inspected with an MRPC probe in the past. The results of these inspections were:

| INDICATION CODE | NUMBER OF INDICATIONS | NUMBER OF TUBES AFFECTED |
|---|---|---|
| VOL | 246 | 130 |
| PIT | 42 | 21 |

*NOTE: Multiple tubes had more than one indication type, thus the number of affected tubes is not determined by simply adding the last column.*

Codes used in the above tables:

| | |
|---|---|
| NQI | Non-Quantifiable Indication |
| PIT* | The indication exhibits pit-like qualities |
| VOL | The Indication exhibits volumetric (pit like) qualities |
| BVT* | The Indication was Below an established Voltage Threshold |
| S/N* | The Indication was below an established Signal to Noise ratio |
| %TW | Percent Through Wall of the Indication |

**These codes are no longer used at CR-3.*

An updated Table 1 has been included as part of this response. This updated Table 1 includes all known tubes with B OTSG first span IGA indications. This list was developed by inspecting *all* of the tubes identified in the previously submitted Table 1 as well as *all* first span B OTSG bobbin indications identified in the 1997 inspection with the protocol described in the reply to Question 4.

Note that three tubes listed in the originally submitted Table 1 have been removed from the updated Table 1. Two tubes were dispositioned in the 1997 rotating coil inspections as Manufacturing Burnish Marks (MBMs). One tube was dispositioned in the 1997 rotating coil inspections as No Degradation Found (NDF). These tubes were dispositioned in accordance with the protocol established in the CR-3 Eddy Current Inspection Guidelines.

**Question 2**

*(a) As currently proposed, a tube not listed in Table 1 with a confirmed pit-like IGA indication will be counted toward the C-1, C-2, and C-3 inspection classification. Would such a tube be added to the list in the OTSG Inservice Inspection Surveillance Procedure to require that it be included in the sample inspection referenced in TS 5.6.2.10.2.e. for future inspections?*

*(b) Describe any additional criteria other than the confirmation of a pit-like IGA indication that would be considered prior to adding a tube to the list tubes in the inspection procedure.*

*(c) Define the conditions, if any, where tubes would be removed from the list.*

**Response to Question 2**

(a) Yes. In future inspections, tubes not already identified in Table 1 which confirm to be first span IGA tubes will be taken into consideration when determining inspection results categories in the inspection year in which the tube is identified. After that inspection, these newly identified first span IGA tubes will be added to Table 1 to ensure subsequent outage inspections per reply to Question 4 are performed. Once a tube has been added to the Table, the tube will be excluded when determining inspection results categories in future inspections.

(b) The criteria for confirmation of a tube as a first span (pit-like) IGA tube are:

- The protocol described in the response to Question 4 below must be followed to ensure that the morphology is consistent with that expected for the first span IGA.
- The historical data review protocol described in the responses to Question 4 and to Question 5 below must be followed to validate the existence of a previous signal and ascertain whether the signal is changing.

Only tubes that can meet these criteria will be added to Table 1. Tubes that cannot meet these criteria will be plugged.

(c) Tubes may be removed from Table 1 for the following reasons:

1. The tube is plugged.
2. A sleeve is installed that spans the degraded or defective region (for future use - CR-3 is not installing any sleeves in 1997).

Since a rotating coil examination will be required for all first span indications in future outages, no tubes will be removed from the list unless one of the above two reasons is applicable.

**Question 3**

*The "first span" region is defined as the section of tubing between the lower tubesheet secondary face and the bottom of the first tube support plate. The staff notes that based on industry experience in applying an eddy current depth sizing technique to indications at support structures that applying the technique near the first span boundary could lead to significant, non-conservative errors in estimated depth inconsistent with the results of the qualification program. The proposed TS changes would allow degradation at or near the tubesheet or first support plate to remain in service based on the eddy current sizing technique. Provide the basis for not including an allowance in the definition of the first span region that could preclude introducing errors into the depth estimate of degradation located at or near the periphery of the first span.*

**Response to Question 3**

CR-3 will not leave tubes in service with first span IGA indications within one inch of the edge of the lower tubesheet secondary face (LTS+1) or within one inch of the first support plate lower edge (01S-1.75" since the support plate is 1.5" thick and measurements are referenced from the centerline of the support plate). B OTSG first span IGA tubes with indications in these regions will be plugged regardless of %TW. As a result of the 1997 inspections, there are no tubes with known IGA indications within 2 inches of the LTS secondary face or tubes with known IGA indications within four inches of the lower face of the first support plate. Figure 1 shows the distribution of first span IGA indications left in service after the 1997 inspection.

**Question 4**

*Reference C (FPC to NRC Letter, 3F0396-19, dated March 21, 1996) of the March 27, 1997, submittal provides background information on the work the licensee has completed to demonstrate that pit-like IGA degradation can be distinguished from other modes of tube degradation (i.e., cracks). However, this reference does not appear to include specific criteria for the data analysts that would be used to classify indications as pit-like IGA. Provide a summary defining the criteria data analysts will utilize to classify an indication a pit-like IGA degradation.*

**Response to Question 4**

The protocol that CR-3 uses for dispositioning the first span IGA is:

A) The area of interest is limited to the first span of the B OTSG.

B) If an NQI is called by the mid-range (MR) bobbin exam [all freespan bobbin indications are identified as NQIs using the MR bobbin exam], or the tube is listed in Table 1, the entire length of the first span of that tube is inspected using the rotating coil exam technique. The rotating coil exams in 1997 consist of a mid-range +Point coil, 0.115" pancake coil and 0.080" mid-range pancake coil in a MRPC probe head with three shoes.

C) The +Point coil is the primary coil relied upon for identification (detection) of the indications. The analysts must review the C-scan plot for the entire length of data acquired. Indications that are volumetric in nature are identified as VOL. Locations that have more than one VOL indication in the same circumferential plane are identified as MVI (multiple volumetric indications). If another type of indication is observed, the appropriate three letter code is used for that indication (examples: SCI, SAI, etc.).

D) A high frequency bobbin coil exam is performed on the tubes that have a VOL indication. This exam is used to ensure that the same probe and parameters used during the development of the regression technique are maintained.

E) The analyst uses the VOL indications from the rotating coil exam as a "roadmap" to obtain bobbin signals off the high frequency data. If the analyst is capable of correlating a bobbin signal to the VOL location, the analyst applies the CR-3 specific regression technique (via the ZETEC Regression Tool). If the analyst is not capable of correlating a bobbin signal to the VOL indication, the analyst identifies this situation by the use of the NQI code for that location in the high frequency bobbin results.

F) Tubes with a high frequency bobbin NQI are plugged.

G) Tubes with an MVI call are plugged [due to the inability of the bobbin coil to acceptably distinguish individual volumetric indications when multiple indications are present at the same axial location].

H) Tubes with a regression call ≥40% are plugged.

I) Tubes that have first span IGA indications which are within one inch of the 01S support lower edge or within one inch of the lower tube sheet secondary face are identified and plugged.

J) Tubes that have VOL indications which are all sized less than 40% throughwall have their historical data reviewed. These tubes have at least one previous inspection reviewed to ensure that there is historical evidence of the indication. Only 27 tubes with B OTSG first span IGA indications do not have previous high frequency bobbin data (these tubes were last inspected in 1990, when a mid-range bobbin probe was used). For these 27 tubes, the mid-range bobbin data is reviewed to verify that these indications were present in 1990, but the regression tool is not applied. The remainder of these tubes have, as a minimum, the most recent high frequency bobbin inspection reviewed and the historical indications sized using the regression technique. If the analyst is not capable of clearly sizing a bobbin indication in the historical data for that VOL indication, the code INF (indication not found) is used to denote this fact. The indication is then conservatively assigned an initial depth of 0 when determining growth rate for that indication. Many indications had multiple years of data reviewed to further validate the CR-3 position that this degradation mechanism is dormant. As a result of the 1997 inspections, CR-3 determined that these indications continue to be dormant.

A complete report describing the data gathered and compiled results of these indication growth studies will be submitted to the NRC with the CR-3 OTSG inservice inspection Special Report, as required by CR-3 ITS 5.7.2.

K) Any tube which contains an indication that demonstrates a growth of greater than 10% TW by regression sizing is conservatively plugged regardless of 1997 %TW. This growth criteria is applied to 1992 to 1997, 1994 to 1997, and 1996 to 1997 high frequency bobbin coil data.

[Assuming a 39% throughwall indication was left in service that grew 10% throughwall in an operational cycle, the indication would exhibit a depth of 49% throughwall at the end of cycle. This depth for CR-3 first span volumetric IGA is well within the previously submitted Regulatory Guide 1.121 structural integrity analysis for this degradation mechanism (reference FPC letter to the NRC, 3F0494-09, dated April 19, 1994). Assuming the tube did demonstrate this type of measurable growth in a single operational cycle, during the next inspection the tube would be readily identified by the mandatory B OTSG first span IGA inspection and subsequently plugged.]

A tube is readily identified on the +Point coil as volumetric by the nature of the signal response of the coil. Similarly, the pancake coil has a characteristic signal response to the first span IGA indications. These volumetric signals present themselves in the characteristic "camel-toe" response pattern on the vertical strip chart [i.e., the vertical component of the signal starts by deviating from background to the right, the signal dips back to the left, then tracks back to the right past background, and finally returns to background position]. Figure 2 shows the +Point coil and Pancake coil lissajous, strip chart components, and C-scan plots for a 36% throughwall first span IGA indication. Figure 3 shows the +Point coil and Pancake coil lissajous, strip chart components, and C-scan plots for a 41% throughwall first span IGA indication. For comparison purposes, Figure 4 shows the +Point coil and Pancake coil lissajous, strip chart components, and C-scan plots for a 20% throughwall flat bottom hole on the calibration standard.

**Question 5**

*The pit-like IGA degradation is believed to be attributed to a one-time chemistry excursion several years ago. Consequently, the licensee has concluded that little or no growth is expected in the future for known indications. However, the potential exists for the initiation and growth of IGA degradation in the CR-3 OTSG tubes from mechanisms other than those which resulted in the pit-like IGA indications in the first span of tubing.*

*(a) Discuss how new or active IGA degradation (i.e., not associated with mechanisms of the pit-like IGA indications) would be identified and dispositioned during the course of the eddy current examinations.*

*(b) If such indications developed in the first span of a tube that was included in the list of tubes in the OTSG Inservice Inspection Surveillance Procedure, describe the specific procedures that would identify the degradation as a mode of degradation dissimilar from the pit-like IGA indications.*

**Response to Question 5**

(a) As described in the protocol listed in the response to Question 4, any first span indication which demonstrates that it has grown by more than 10% throughwall [via the regression technique] since the previous tube inspection will be plugged. Tubes with an INF indication for the historical high frequency data will be assigned an initial % throughwall of zero at that indication location. This is a conservative approach, since the detection threshold of the bobbin probe is not near zero. Thus, if the indication has demonstrated growth of greater than 10% by the use of the regression technique data, the tube will be plugged. The protocol described above (the use of the INF code when reviewing historical data in which an indication is not readily apparent or sizable) will ensure that any "new" degradation is identifiable. Additionally, the routine and thorough monitoring of the growth rates will ensure that any active degradation is immediately identified. Tubes included in Table 1 will be inspected with both a high frequency bobbin and rotating coil probe during each future inspection of the B OTSG.

(b) The rotating coil data, when displayed in the c-scan format, provides the capability for the analysts to differentiate these small, volumetric IGA indications from crack-like indications or other anomalous volumetric indications. If crack-like degradation manifests itself in these first span tubes, the current CR-3 OTSG ET Inspection Guidelines provide guidance for the analysts to identify these indications with appropriate three letter codes [Single Axial Indication (SAI), Single Circumferential Indication (SCI), etc.]. In the event that a volumetric indication appears in the first span that does not exhibit the characteristics described above, the analyst is directed by the guidelines to identify the indication with the code SVI (single volumetric indication). The SVI code is used at CR-3 to identify (non-wear) volumetric indications which are not readily identifiable as B OTSG first span (pit-like) IGA. Per the CR-3 OTSG ET Inspection Guidelines, the SVI code is a pluggable indication at CR-3.

**Question 6**

*Other steam generator alternate repair criteria (ARC) approved by the NRC include requirements in the TS for reporting routine and abnormal results obtained during each inservice inspection of the critical areas (e.g., Generic Letter 95-05, F-star). Although the proposed amendment does not propose any changes to the existing repair criteria (i.e., 40 percent depth), the staff has concluded that the proposed amendment request would permit degradation to remain in service in a manner that is more consistent with ARC than generally applied industry practice toward dispositioning steam generator tube degradation. On this basis, the staff considers additional periodic reporting requirements necessary to document the future progress, or lack thereof, of this mode of degradation. Provide the basis for not including reporting requirements in the TS that specifically address the inspection results of pit-like IGA degradation at each outage.*

**Response to Question 6**

Consistent with CR-3 ITS 5.7.2. Amendment 154 reporting requirements, Crystal River proposes to supply the NRC with this information following each inservice inspection of steam generator tubes, prior to ascension into Mode 4:

1. Number of tubes plugged and sleeved
2. Crack like indications in the first span
3. An assessment of growth in the first span indications
4. Results of in-situ pressure testing, if performed

The complete results of the OTSG tube inservice inspection shall be submitted to the NRC within 90 days following the completion of the inspection. The report shall include:

I. Number and extent of tubes inspected,
II. Location and percent of wall-thickness penetration for each indication of an imperfection,
III. Location, bobbin coil amplitude, and axial and circumferential extent (if determined) for each first span IGA indication, and
IV. Identification of tubes plugged and tubes sleeved.

This reporting information will be more extensive than the originally proposed reporting requirements in TSCRN 211, Revision 0. Revised CR-3 ITS pages reflecting these reporting requirements will be submitted under separate cover.

To ensure adequate background information is provided to the NRC, these additional items will be provided to support the presentation of the above listed items:

a) Number of and identities of tubes with B OTSG first span IGA indications left in service (per III).
b) Number of and identities of tubes with B OTSG first span IGA indications plugged or sleeved (per I, II, III & IV)
c) A distribution curve showing axial location of indications for those tubes left in service with B OTSG first span IGA (to verify the one inch clearance from support structures was implemented).
d) A distribution curve showing the sizes of the B OTSG first span IGA as determined by the regression technique. The curve shall distinguish between

indications left in service and indications removed from service (to supplement II & III).

e) A distribution curve showing the apparent growth of B OTSG first span IGA indications as determined by the regression technique sizing. The curve shall distinguish between indications left in service and indications removed from service (per 3).

f) A distribution curve showing the apparent axial and circumferential growth of B OTSG first span IGA indications as determined by clip plot sizing [when performed] (per 3).

Information provided in curve format will also be provided to the NRC in tabular format. For the results of the 1997 inspection, the information used to determine the specific growth of each indication left in service will identify the year used to determine the historical depth of the indication (since 100% bobbin inspections were not previously performed at CR-3, a variety of inspection years must be used to determine a "historical depth" for the indications).

# B OTSG KNOWN TUBES WITH FIRST SPAN IGA
## *TUBES IN SERVICE*

| count | ROW | NUMBER |
|---|---|---|
| 1 | 4 | 40 |
| 2 | 16 | 22 |
| 3 | 24 | 43 |
| 4 | 37 | 50 |
| 5 | 38 | 45 |
| 6 | 38 | 64 |
| 7 | 39 | 44 |
| 8 | 40 | 45 |
| 9 | 41 | 39 |
| 10 | 42 | 42 |
| 11 | 42 | 63 |
| 12 | 43 | 48 |
| 13 | 43 | 49 |
| 14 | 43 | 82 |
| 15 | 45 | 40 |
| 16 | 45 | 48 |
| 17 | 46 | 39 |
| 18 | 46 | 41 |
| 19 | 46 | 49 |
| 20 | 48 | 43 |
| 21 | 48 | 61 |
| 22 | 49 | 56 |
| 23 | 50 | 39 |
| 24 | 50 | 41 |
| 25 | 51 | 30 |
| 26 | 51 | 55 |
| 27 | 51 | 79 |
| 28 | 51 | 80 |
| 29 | 52 | 37 |
| 30 | 52 | 49 |
| 31 | 53 | 44 |
| 32 | 54 | 82 |
| 33 | 56 | 53 |
| 34 | 57 | 33 |
| 35 | 57 | 89 |
| 36 | 58 | 25 |
| 37 | 58 | 33 |
| 38 | 58 | 89 |
| 39 | 59 | 30 |
| 40 | 59 | 40 |

| ROW | NUMBER |
|---|---|
| 59 | 80 |
| 60 | 34 |
| 60 | 44 |
| 61 | 25 |
| 61 | 82 |
| 61 | 88 |
| 62 | 15 |
| 62 | 28 |
| 62 | 44 |
| 62 | 99 |
| 63 | 26 |
| 63 | 41 |
| 65 | 37 |
| 65 | 42 |
| 65 | 44 |
| 65 | 48 |
| 65 | 50 |
| 66 | 34 |
| 67 | 50 |
| 68 | 38 |
| 68 | 39 |
| 69 | 42 |
| 70 | 38 |
| 70 | 58 |
| 73 | 44 |
| 74 | 110 |
| 77 | 86 |
| 78 | 41 |
| 78 | 45 |
| 79 | 22 |
| 79 | 97 |
| 80 | 99 |
| 81 | 94 |
| 81 | 104 |
| 83 | 100 |
| 84 | 31 |
| 84 | 93 |
| 84 | 96 |
| 84 | 98 |
| 84 | 100 |

| ROW | NUMBER |
|---|---|
| 85 | 92 |
| 85 | 96 |
| 85 | 98 |
| 85 | 99 |
| 86 | 24 |
| 87 | 98 |
| 89 | 89 |
| 90 | 40 |
| 90 | 88 |
| 91 | 93 |
| 92 | 26 |
| 92 | 34 |
| 92 | 39 |
| 93 | 39 |
| 93 | 46 |
| 93 | 79 |
| 93 | 87 |
| 93 | 94 |
| 95 | 36 |
| 95 | 45 |
| 95 | 47 |
| 96 | 40 |
| 96 | 41 |
| 96 | 42 |
| 96 | 44 |
| 96 | 45 |
| 96 | 91 |
| 97 | 37 |
| 97 | 41 |
| 97 | 49 |
| 98 | 39 |
| 98 | 45 |
| 98 | 47 |
| 99 | 41 |
| 100 | 33 |
| 100 | 36 |
| 100 | 38 |
| 100 | 41 |
| 100 | 45 |
| 100 | 66 |

TABLE 1
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## B OTSG KNOWN TUBES WITH FIRST SPAN IGA
## *TUBES IN SERVICE*

| count | ROW | NUMBER |
|---|---|---|
| 1 | 100 | 92 |
| 2 | 101 | 43 |
| 3 | 101 | 47 |
| 4 | 101 | 90 |
| 5 | 101 | 98 |
| 6 | 102 | 41 |
| 7 | 102 | 43 |
| 8 | 103 | 37 |
| 9 | 103 | 41 |
| 10 | 104 | 40 |
| 11 | 104 | 44 |
| 12 | 104 | 90 |
| 13 | 106 | 42 |
| 14 | 106 | 48 |
| 15 | 106 | 50 |
| 16 | 106 | 72 |
| 17 | 106 | 74 |
| 18 | 107 | 47 |
| 19 | 107 | 66 |
| 20 | 107 | 74 |
| 21 | 108 | 34 |
| 22 | 108 | 74 |
| 23 | 109 | 46 |
| 24 | 110 | 40 |
| 25 | 110 | 43 |
| 26 | 110 | 46 |
| 27 | 110 | 52 |
| 28 | 111 | 42 |
| 29 | 111 | 51 |
| 30 | 113 | 44 |
| 31 | 113 | 45 |
| 32 | 114 | 42 |
| 33 | 114 | 43 |
| 34 | 114 | 46 |
| 35 | 116 | 43 |
| 36 | 118 | 41 |
| 37 | 123 | 77 |
| 38 | 129 | 41 |
| 39 | 131 | 3 |

***159 B OTSG TUBES REMAIN IN SERVICE WITH FIRST SPAN IGA.***

TABLE 1

# B OTSG KNOWN TUBES WITH FIRST SPAN IGA
## *TUBES REMOVED FROM SERVICE*

| count | ROW | NUMBER |
|---|---|---|
| 1 | 30 | 36 |
| 2 | 31 | 37 |
| 3 | 33 | 37 |
| 4 | 33 | 39 |
| 5 | 34 | 37 |
| 6 | 35 | 37 |
| 7 | 35 | 38 |
| 8 | 36 | 39 |
| 9 | 36 | 40 |
| 10 | 36 | 44 |
| 11 | 37 | 40 |
| 12 | 37 | 41 |
| 13 | 37 | 44 |
| 14 | 37 | 93 |
| 15 | 38 | 41 |
| 16 | 38 | 42 |
| 17 | 38 | 44 |
| 18 | 38 | 51 |
| 19 | 39 | 33 |
| 20 | 39 | 41 |
| 21 | 39 | 42 |
| 22 | 39 | 45 |
| 23 | 39 | 46 |
| 24 | 40 | 38 |
| 25 | 40 | 42 |
| 26 | 40 | 43 |
| 27 | 40 | 44 |
| 28 | 40 | 47 |
| 29 | 41 | 29 |
| 30 | 41 | 45 |
| 31 | 41 | 47 |
| 32 | 41 | 51 |
| 33 | 42 | 29 |
| 34 | 42 | 39 |
| 35 | 42 | 41 |
| 36 | 42 | 45 |
| 37 | 42 | 48 |
| 38 | 43 | 32 |
| 39 | 43 | 34 |
| 40 | 43 | 39 |

| ROW | NUMBER |
|---|---|
| 43 | 40 |
| 43 | 42 |
| 43 | 43 |
| 43 | 45 |
| 43 | 46 |
| 44 | 37 |
| 44 | 40 |
| 44 | 42 |
| 44 | 44 |
| 44 | 46 |
| 45 | 31 |
| 45 | 37 |
| 45 | 43 |
| 45 | 45 |
| 45 | 46 |
| 45 | 47 |
| 46 | 33 |
| 46 | 37 |
| 46 | 44 |
| 46 | 46 |
| 47 | 34 |
| 47 | 37 |
| 47 | 40 |
| 47 | 47 |
| 47 | 48 |
| 48 | 33 |
| 48 | 38 |
| 48 | 41 |
| 48 | 42 |
| 48 | 47 |
| 48 | 48 |
| 48 | 49 |
| 49 | 35 |
| 49 | 37 |
| 49 | 38 |
| 49 | 41 |
| 49 | 42 |
| 49 | 47 |
| 49 | 48 |
| 49 | 49 |

| ROW | NUMBER |
|---|---|
| 49 | 50 |
| 50 | 33 |
| 50 | 34 |
| 50 | 42 |
| 50 | 48 |
| 51 | 34 |
| 51 | 35 |
| 51 | 42 |
| 51 | 47 |
| 51 | 48 |
| 51 | 49 |
| 51 | 65 |
| 52 | 34 |
| 52 | 36 |
| 52 | 39 |
| 52 | 40 |
| 52 | 41 |
| 52 | 43 |
| 52 | 81 |
| 53 | 37 |
| 53 | 39 |
| 53 | 43 |
| 53 | 49 |
| 53 | 81 |
| 54 | 33 |
| 54 | 35 |
| 54 | 37 |
| 54 | 40 |
| 54 | 43 |
| 54 | 51 |
| 55 | 26 |
| 55 | 32 |
| 55 | 41 |
| 55 | 46 |
| 55 | 49 |
| 55 | 52 |
| 55 | 81 |
| 55 | 82 |
| 56 | 31 |
| 56 | 32 |

TABLE 1
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# B OTSG KNOWN TUBES WITH FIRST SPAN IGA

## *TUBES REMOVED FROM SERVICE*

| count | ROW | NUMBER |
|---|---|---|
| 1 | 56 | 35 |
| 2 | 56 | 42 |
| 3 | 56 | 44 |
| 4 | 56 | 49 |
| 5 | 56 | 50 |
| 6 | 56 | 51 |
| 7 | 56 | 82 |
| 8 | 57 | 27 |
| 9 | 57 | 38 |
| 10 | 57 | 40 |
| 11 | 57 | 43 |
| 12 | 57 | 44 |
| 13 | 57 | 45 |
| 14 | 57 | 47 |
| 15 | 57 | 50 |
| 16 | 57 | 51 |
| 17 | 57 | 52 |
| 18 | 57 | 96 |
| 19 | 58 | 27 |
| 20 | 58 | 29 |
| 21 | 58 | 31 |
| 22 | 58 | 37 |
| 23 | 58 | 41 |
| 24 | 58 | 43 |
| 25 | 58 | 44 |
| 26 | 58 | 45 |
| 27 | 58 | 51 |
| 28 | 58 | 83 |
| 29 | 58 | 88 |
| 30 | 58 | 92 |
| 31 | 59 | 25 |
| 32 | 59 | 26 |
| 33 | 59 | 28 |
| 34 | 59 | 31 |
| 35 | 59 | 39 |
| 36 | 59 | 49 |
| 37 | 60 | 32 |
| 38 | 60 | 38 |
| 39 | 60 | 43 |
| 40 | 60 | 53 |
| 41 | 61 | 26 |
| 42 | 61 | 29 |
| 43 | 61 | 38 |
| 44 | 61 | 48 |
| 45 | 62 | 26 |
| 46 | 62 | 27 |
| 47 | 62 | 29 |
| 48 | 62 | 33 |
| 49 | 62 | 36 |
| 50 | 62 | 40 |
| 51 | 62 | 42 |
| 52 | 62 | 50 |
| 53 | 63 | 27 |
| 54 | 63 | 28 |
| 55 | 63 | 29 |
| 56 | 63 | 39 |
| 57 | 63 | 44 |
| 58 | 63 | 45 |
| 59 | 64 | 28 |
| 60 | 64 | 39 |
| 61 | 64 | 46 |
| 62 | 64 | 51 |
| 63 | 65 | 27 |
| 64 | 65 | 28 |
| 65 | 65 | 33 |
| 66 | 65 | 38 |
| 67 | 66 | 28 |
| 68 | 66 | 52 |
| 69 | 67 | 27 |
| 70 | 67 | 35 |
| 71 | 67 | 36 |
| 72 | 67 | 41 |
| 73 | 67 | 43 |
| 74 | 67 | 45 |
| 75 | 68 | 35 |
| 76 | 68 | 39 |
| 77 | 69 | 27 |
| 78 | 69 | 28 |
| 79 | 69 | 29 |
| 80 | 69 | 41 |
| 81 | 69 | 99 |
| 82 | 70 | 26 |
| 83 | 70 | 42 |
| 84 | 73 | 37 |
| 85 | 74 | 4 |
| 86 | 74 | 46 |
| 87 | 74 | 47 |
| 88 | 74 | 51 |
| 89 | 76 | 93 |
| 90 | 77 | 93 |
| 91 | 77 | 94 |
| 92 | 78 | 25 |
| 93 | 79 | 47 |
| 94 | 79 | 93 |
| 95 | 80 | 22 |
| 96 | 81 | 93 |
| 97 | 81 | 96 |
| 98 | 81 | 98 |
| 99 | 82 | 29 |
| 100 | 82 | 94 |
| 101 | 82 | 95 |
| 102 | 83 | 30 |
| 103 | 83 | 92 |
| 104 | 83 | 95 |
| 105 | 83 | 96 |
| 106 | 84 | 30 |
| 107 | 84 | 95 |
| 108 | 84 | 99 |
| 109 | 85 | 26 |
| 110 | 85 | 29 |
| 111 | 85 | 30 |
| 112 | 85 | 93 |
| 113 | 85 | 95 |
| 114 | 85 | 97 |
| 115 | 86 | 30 |
| 116 | 86 | 32 |
| 117 | 86 | 35 |
| 118 | 86 | 94 |
| 119 | 86 | 99 |
| 120 | 87 | 43 |

TABLE 1
Page 4 of 6

# B OTSG KNOWN TUBES WITH FIRST SPAN IGA
## *TUBES REMOVED FROM SERVICE*

| count | ROW | NUMBER |
|---|---|---|
| 1 | 87 | 94 |
| 2 | 88 | 26 |
| 3 | 88 | 32 |
| 4 | 89 | 32 |
| 5 | 89 | 43 |
| 6 | 89 | 95 |
| 7 | 89 | 96 |
| 8 | 90 | 21 |
| 9 | 90 | 43 |
| 10 | 90 | 44 |
| 11 | 90 | 90 |
| 12 | 90 | 94 |
| 13 | 90 | 95 |
| 14 | 90 | 96 |
| 15 | 90 | 97 |
| 16 | 90 | 98 |
| 17 | 90 | 99 |
| 18 | 91 | 23 |
| 19 | 91 | 37 |
| 20 | 91 | 43 |
| 21 | 91 | 44 |
| 22 | 91 | 97 |
| 23 | 92 | 25 |
| 24 | 92 | 44 |
| 25 | 92 | 45 |
| 26 | 92 | 93 |
| 27 | 92 | 96 |
| 28 | 93 | 27 |
| 29 | 93 | 32 |
| 30 | 93 | 41 |
| 31 | 94 | 39 |
| 32 | 94 | 41 |
| 33 | 94 | 42 |
| 34 | 94 | 43 |
| 35 | 94 | 44 |
| 36 | 94 | 45 |
| 37 | 94 | 46 |
| 38 | 94 | 91 |
| 39 | 94 | 96 |
| 40 | 94 | 97 |

| ROW | NUMBER |
|---|---|
| 95 | 28 |
| 95 | 32 |
| 95 | 33 |
| 95 | 37 |
| 95 | 40 |
| 95 | 42 |
| 95 | 44 |
| 95 | 46 |
| 95 | 92 |
| 95 | 95 |
| 95 | 96 |
| 95 | 97 |
| 96 | 27 |
| 96 | 28 |
| 96 | 29 |
| 96 | 30 |
| 96 | 39 |
| 96 | 43 |
| 96 | 47 |
| 96 | 95 |
| 97 | 27 |
| 97 | 36 |
| 97 | 42 |
| 97 | 45 |
| 97 | 95 |
| 98 | 36 |
| 98 | 38 |
| 98 | 43 |
| 98 | 46 |
| 98 | 92 |
| 98 | 93 |
| 98 | 95 |
| 99 | 34 |
| 99 | 42 |
| 99 | 43 |
| 99 | 45 |
| 99 | 94 |
| 99 | 95 |
| 100 | 27 |
| 100 | 30 |

| ROW | NUMBER |
|---|---|
| 100 | 32 |
| 100 | 37 |
| 100 | 46 |
| 100 | 47 |
| 100 | 91 |
| 100 | 94 |
| 101 | 31 |
| 101 | 32 |
| 101 | 37 |
| 101 | 41 |
| 101 | 42 |
| 101 | 45 |
| 101 | 48 |
| 101 | 91 |
| 101 | 93 |
| 102 | 46 |
| 102 | 47 |
| 102 | 91 |
| 102 | 93 |
| 103 | 34 |
| 103 | 35 |
| 103 | 44 |
| 103 | 45 |
| 103 | 46 |
| 103 | 47 |
| 103 | 90 |
| 103 | 91 |
| 103 | 93 |
| 104 | 31 |
| 104 | 33 |
| 104 | 36 |
| 104 | 37 |
| 104 | 48 |
| 104 | 51 |
| 104 | 77 |
| 105 | 32 |
| 105 | 34 |
| 105 | 35 |
| 105 | 36 |
| 105 | 41 |

TABLE 1

## B OTSG KNOWN TUBES WITH FIRST SPAN IGA
## *TUBES REMOVED FROM SERVICE*

| count | ROW | NUMBER |
|---|---|---|
| 1 | 105 | 43 |
| 2 | 105 | 45 |
| 3 | 105 | 47 |
| 4 | 105 | 67 |
| 5 | 105 | 90 |
| 6 | 106 | 33 |
| 7 | 106 | 35 |
| 8 | 106 | 44 |
| 9 | 106 | 47 |
| 10 | 106 | 87 |
| 11 | 107 | 30 |
| 12 | 107 | 32 |
| 13 | 107 | 33 |
| 14 | 107 | 37 |
| 15 | 107 | 41 |
| 16 | 107 | 44 |
| 17 | 107 | 45 |
| 18 | 107 | 48 |
| 19 | 107 | 50 |
| 20 | 107 | 81 |
| 21 | 108 | 31 |
| 22 | 108 | 33 |
| 23 | 108 | 40 |
| 24 | 108 | 42 |
| 25 | 108 | 44 |
| 26 | 108 | 45 |
| 27 | 108 | 47 |
| 28 | 108 | 48 |
| 29 | 108 | 75 |
| 30 | 109 | 29 |
| 31 | 109 | 31 |
| 32 | 109 | 32 |
| 33 | 109 | 44 |
| 34 | 109 | 45 |
| 35 | 109 | 48 |
| 36 | 110 | 29 |
| 37 | 110 | 41 |
| 38 | 110 | 44 |
| 39 | 110 | 45 |
| 40 | 110 | 47 |

| ROW | NUMBER |
|---|---|
| 110 | 48 |
| 111 | 33 |
| 111 | 41 |
| 111 | 43 |
| 111 | 45 |
| 111 | 46 |
| 111 | 47 |
| 112 | 31 |
| 112 | 32 |
| 112 | 40 |
| 112 | 41 |
| 112 | 43 |
| 112 | 44 |
| 112 | 45 |
| 112 | 47 |
| 113 | 39 |
| 113 | 41 |
| 113 | 46 |
| 113 | 48 |
| 114 | 44 |
| 114 | 47 |
| 115 | 45 |
| 116 | 41 |
| 116 | 42 |
| 116 | 44 |
| 117 | 42 |
| 117 | 43 |
| 117 | 44 |
| 118 | 36 |
| 118 | 39 |
| 118 | 40 |

***431 B OTSG TUBES REMOVED FROM SERVICE DUE TO FIRST SPAN IGA.***

TABLE 1
Page 6 of 6

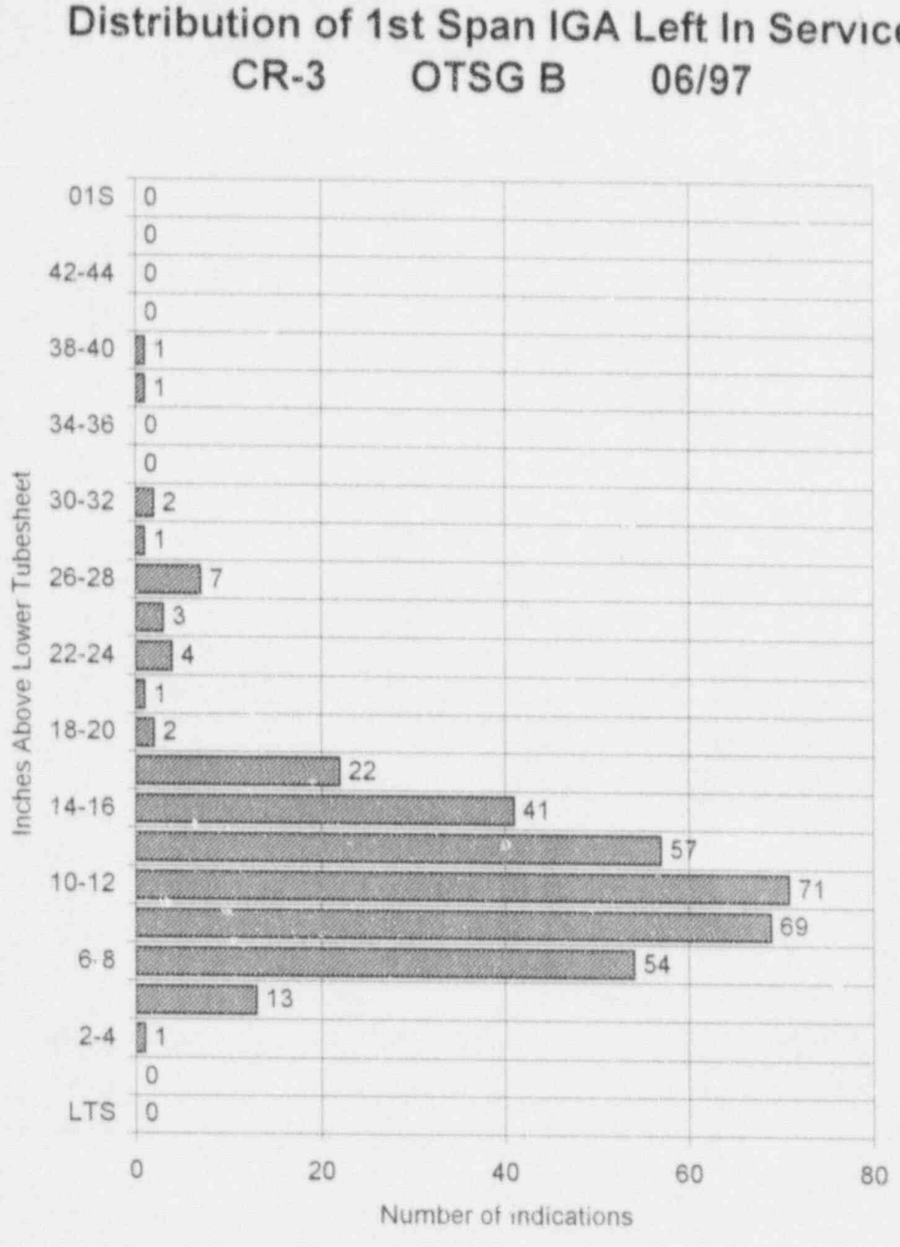


FIGURE 1
Page 1 of 1

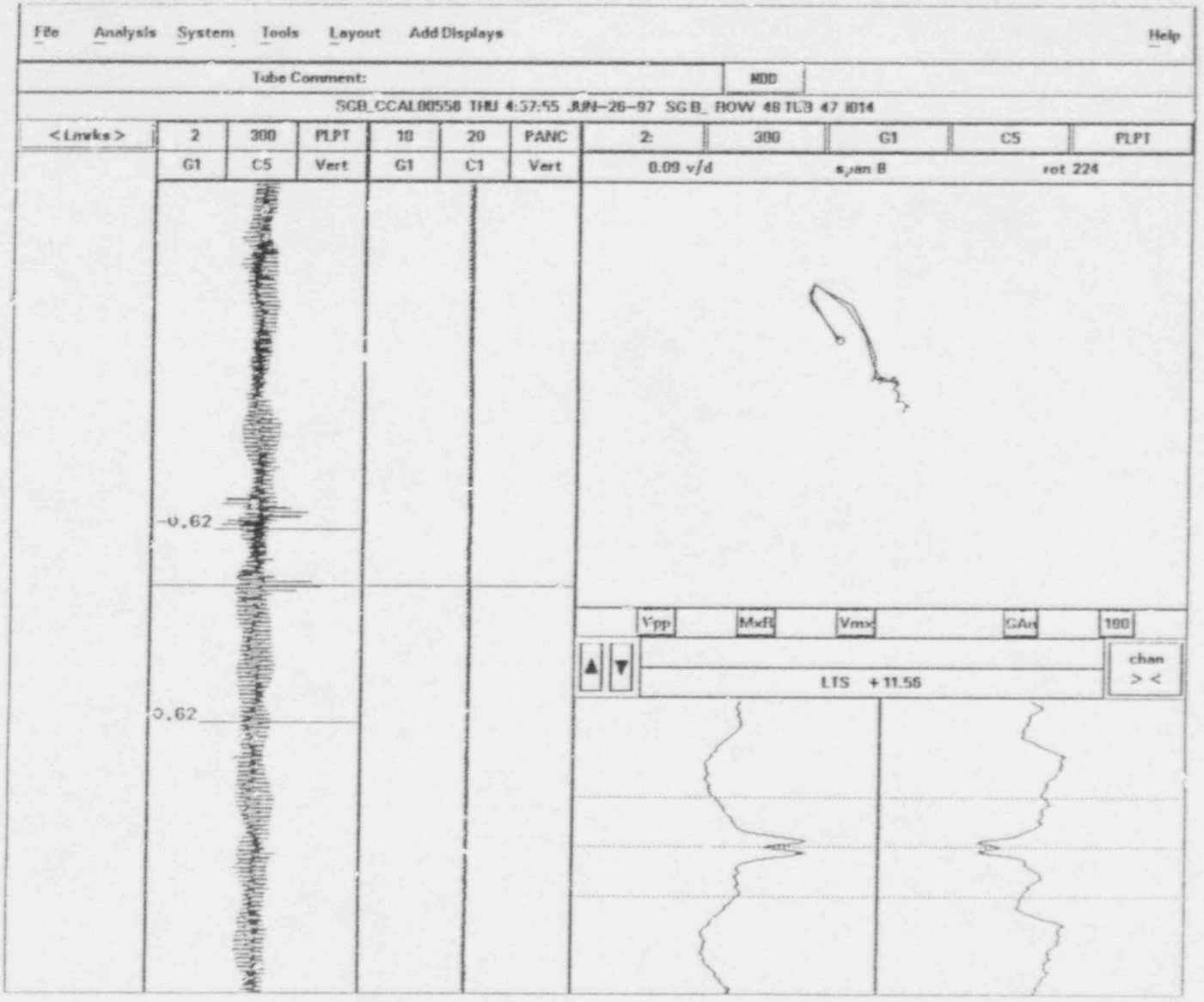


FIGURE 2
+Point Coil Lissajous of 36% Throughwall Indication
Page 1 of 4

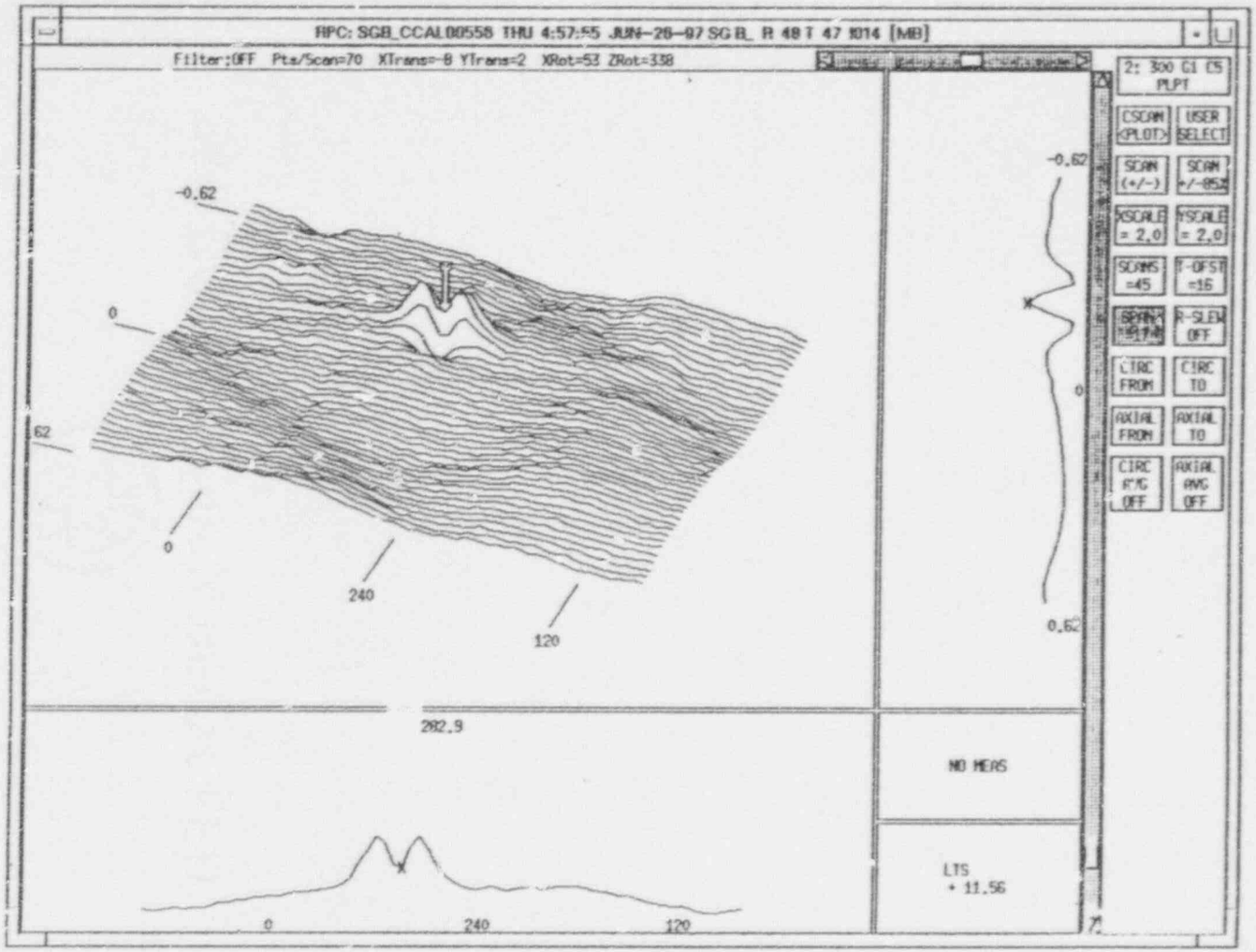


FIGURE 2
+Point Coil C-Scan of 36% Throughwall Indication
Page 2 of 4

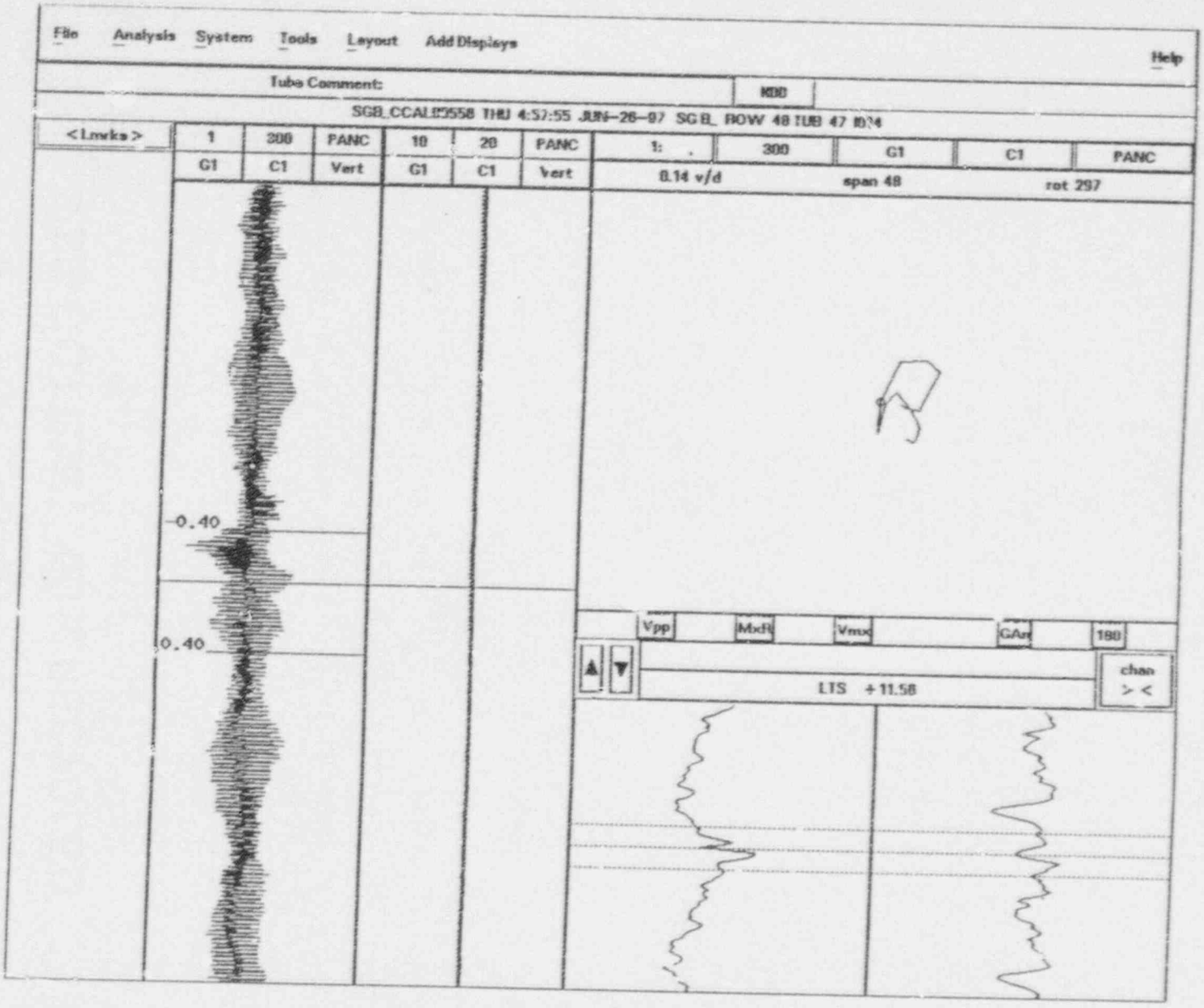


FIGURE 2
Pancake Coil Lissajous of 36% Throughwall Indication
Page 3 of 4

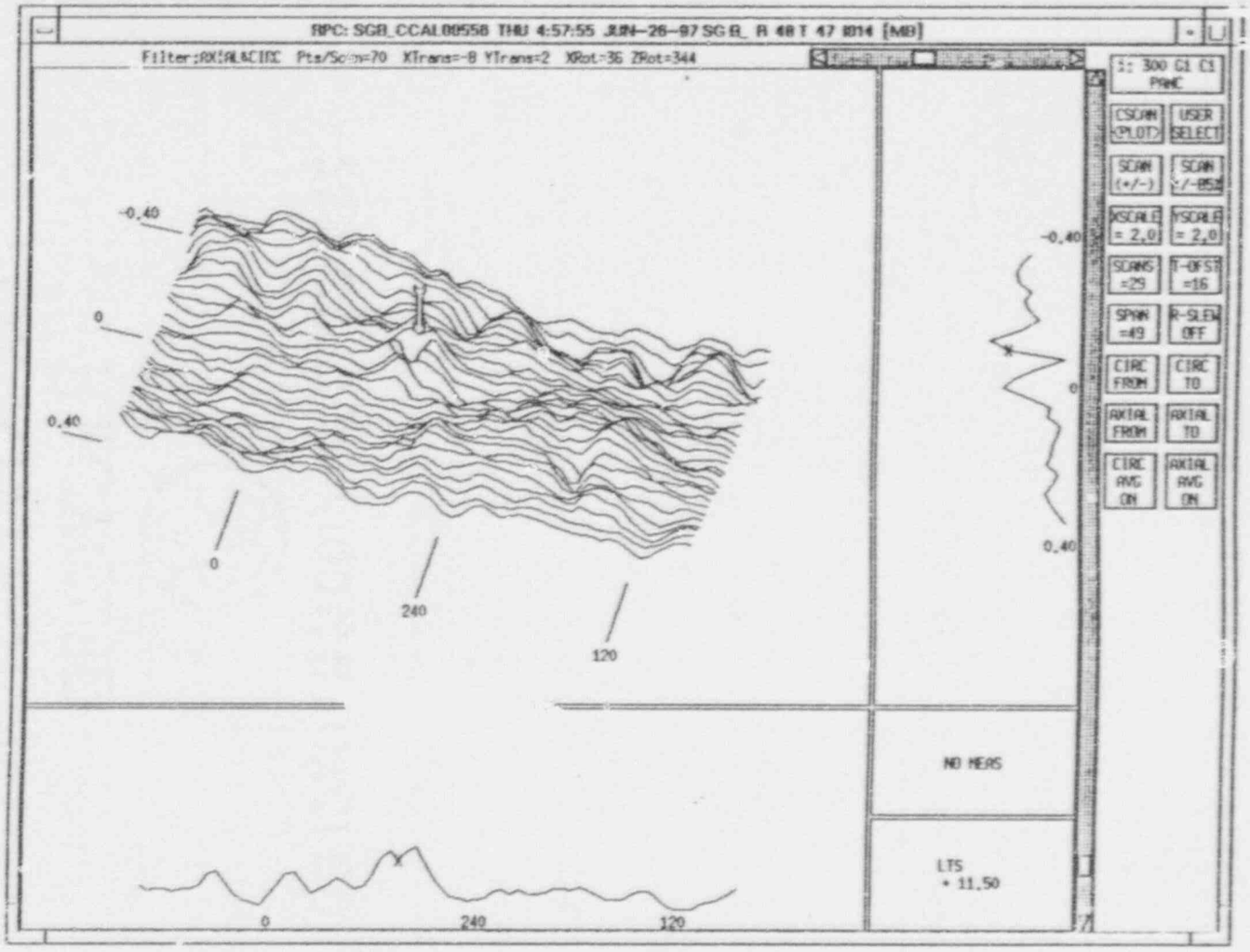


FIGURE 2
Pancake Coil C-Scan of 36% Throughwall Indication
Page 4 of 4

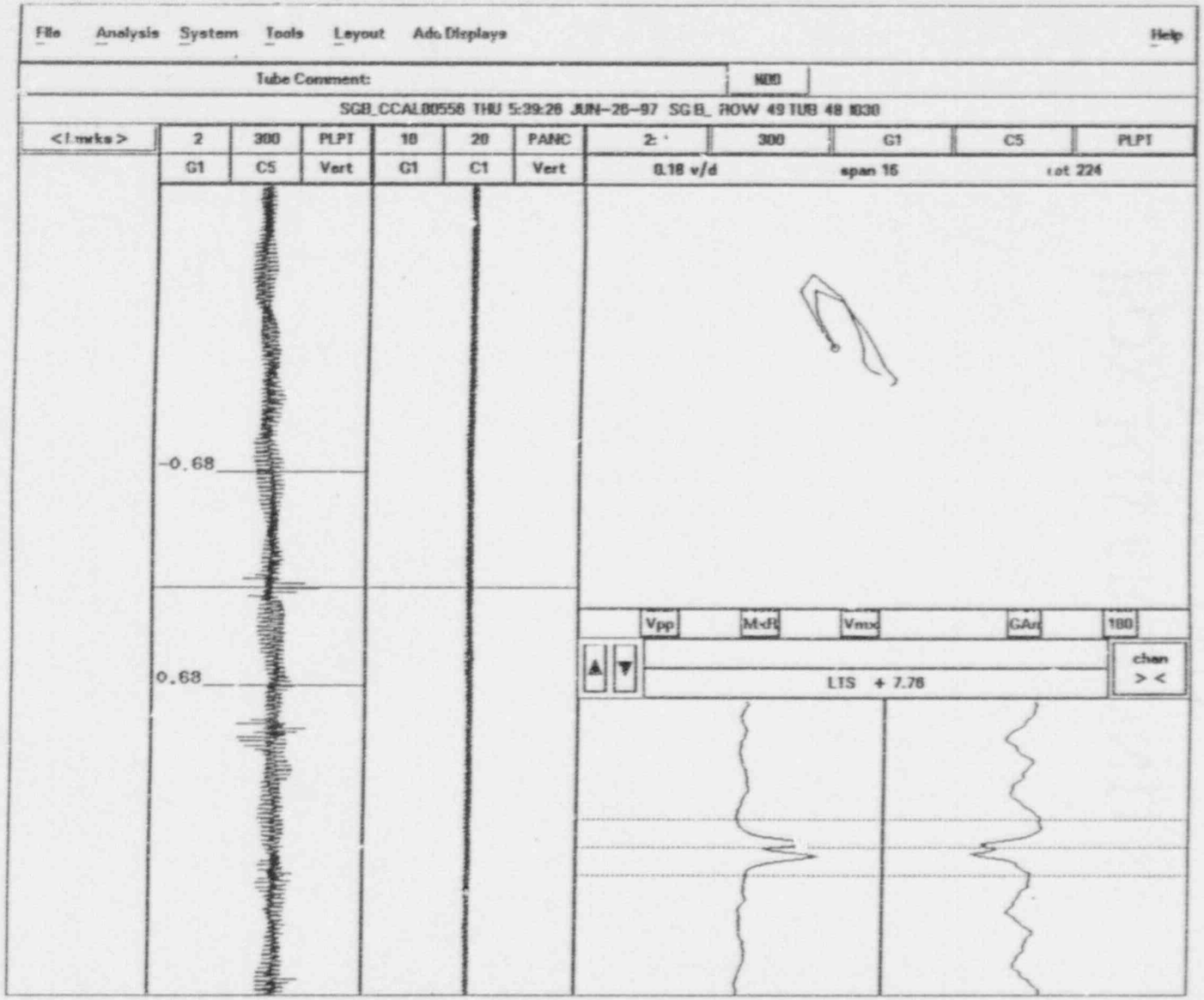


FIGURE 3
+Point Coil Lissajous of 41% Throughwall Indication
Page 1 of 4

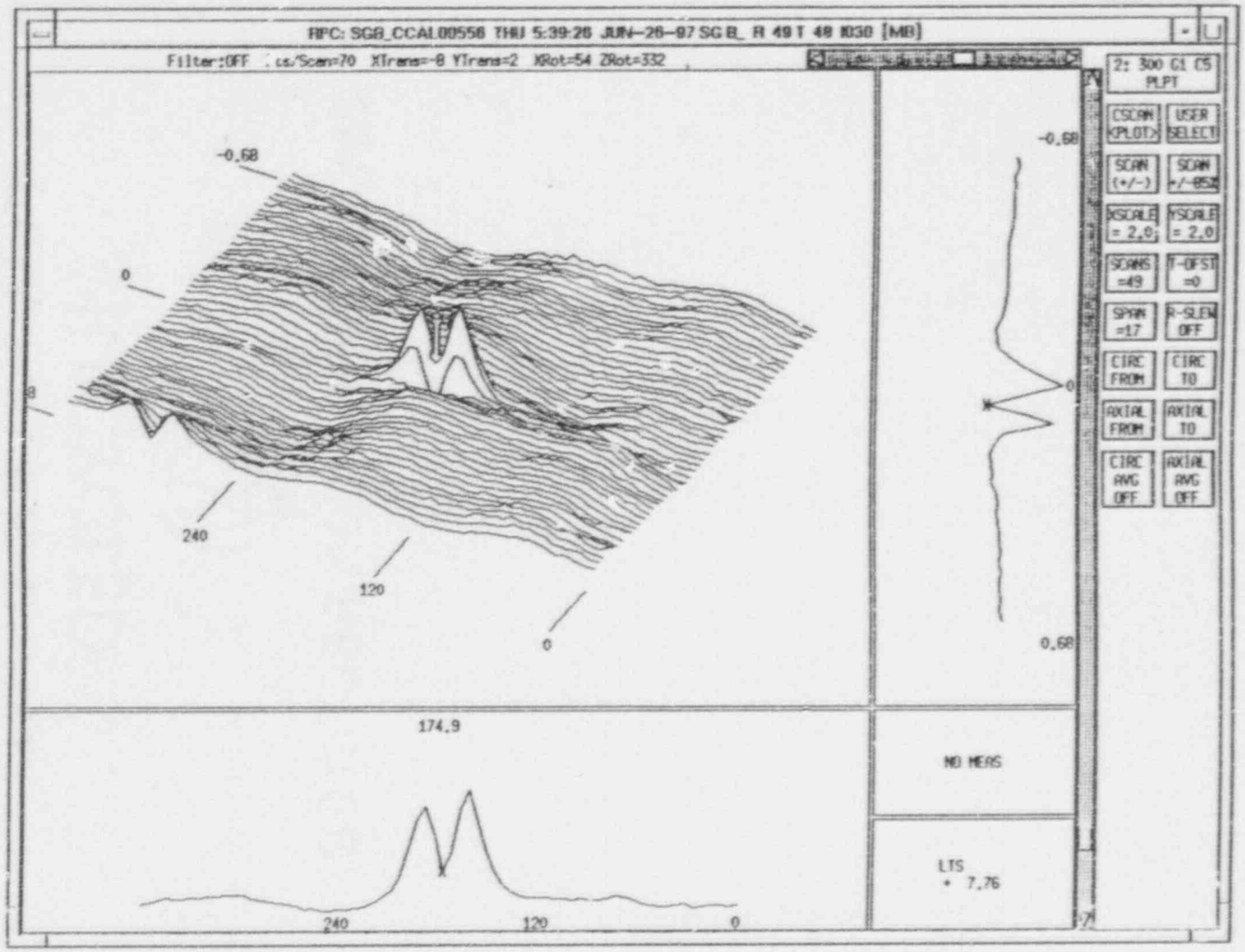


FIGURE 3
+Point Coil C-Scan of 41% Throughwall Indication
Page 2 of 4

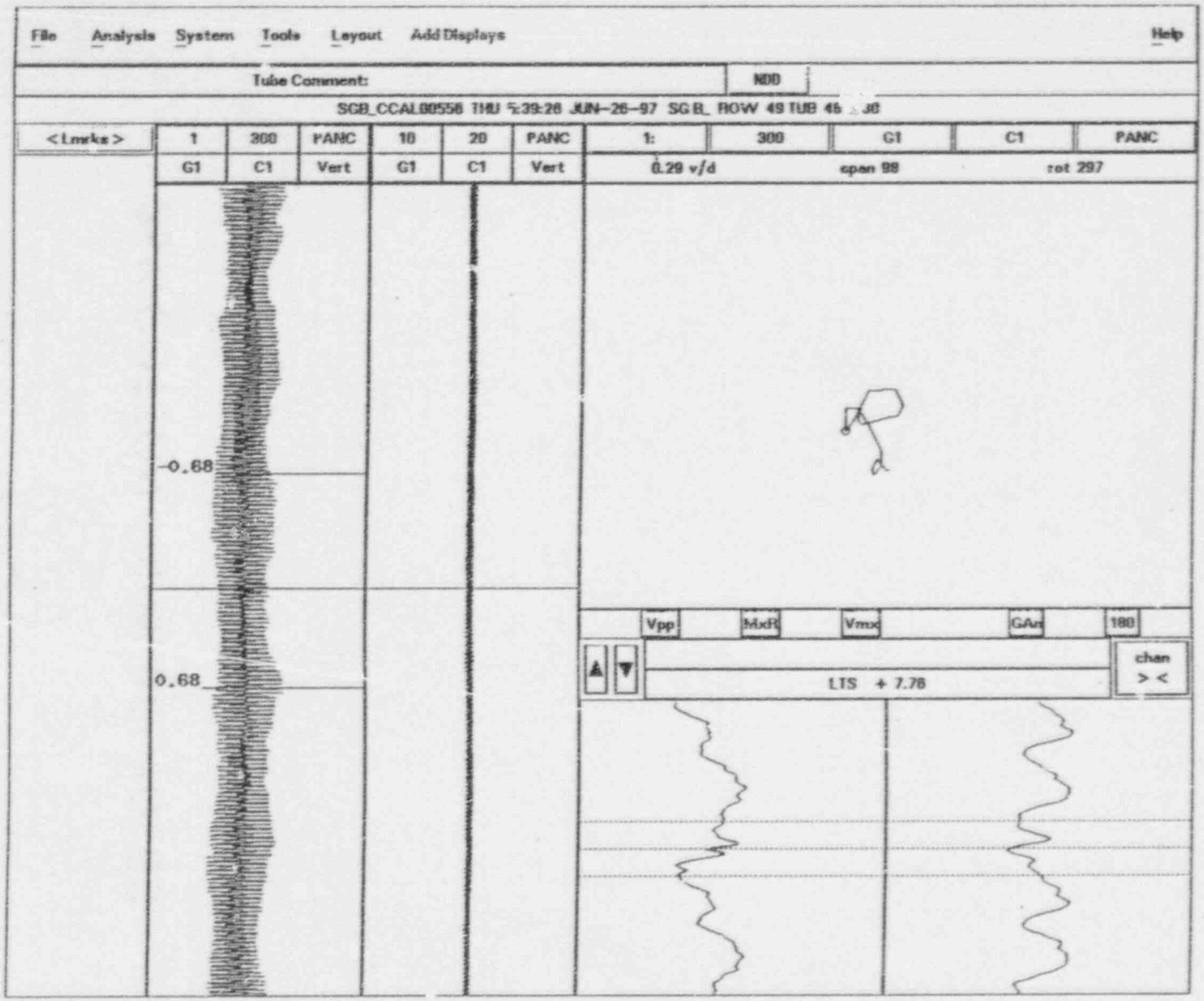


FIGURE 3
Pancake Coil Lissajous of 41% Throughwall Indication
Page 3 of 4

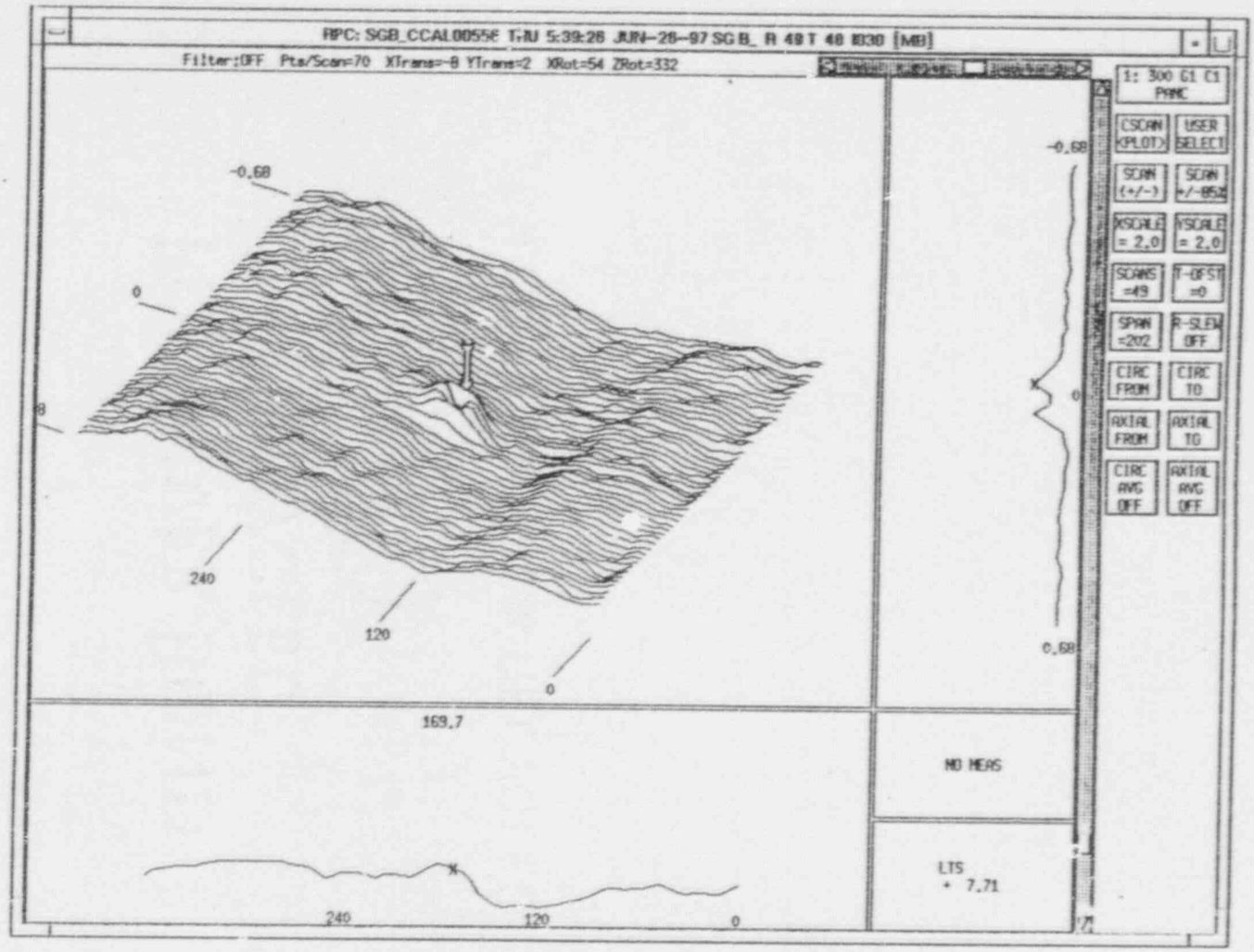


FIGURE 3
Pancake Coil C-Scan of 41% Throughwall Indication
Page 4 of 4

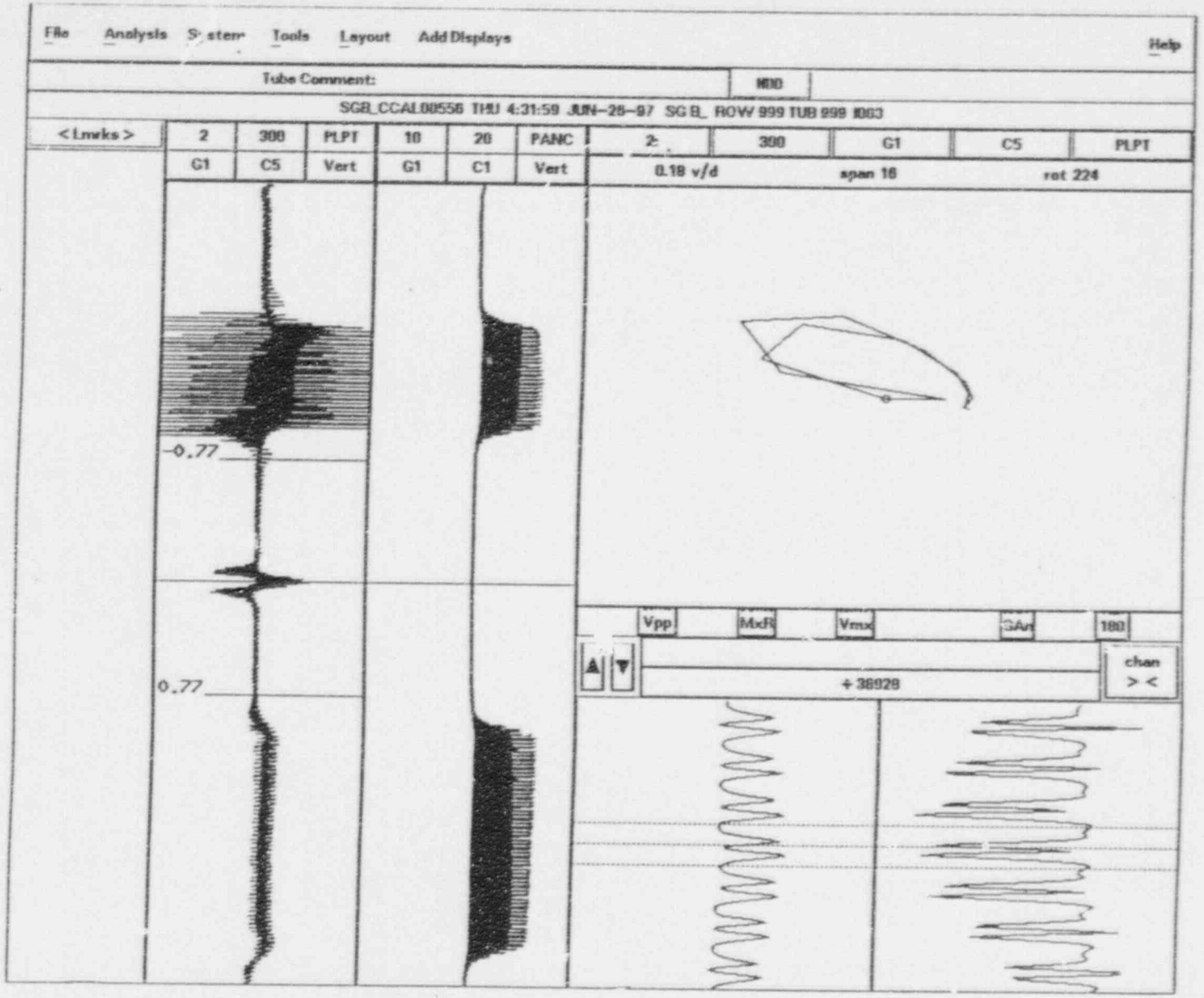


FIGURE 4
+Point Coil Lissajous of 20% Flat Bottom Holes in Calibration Standard
Page 1 of 4

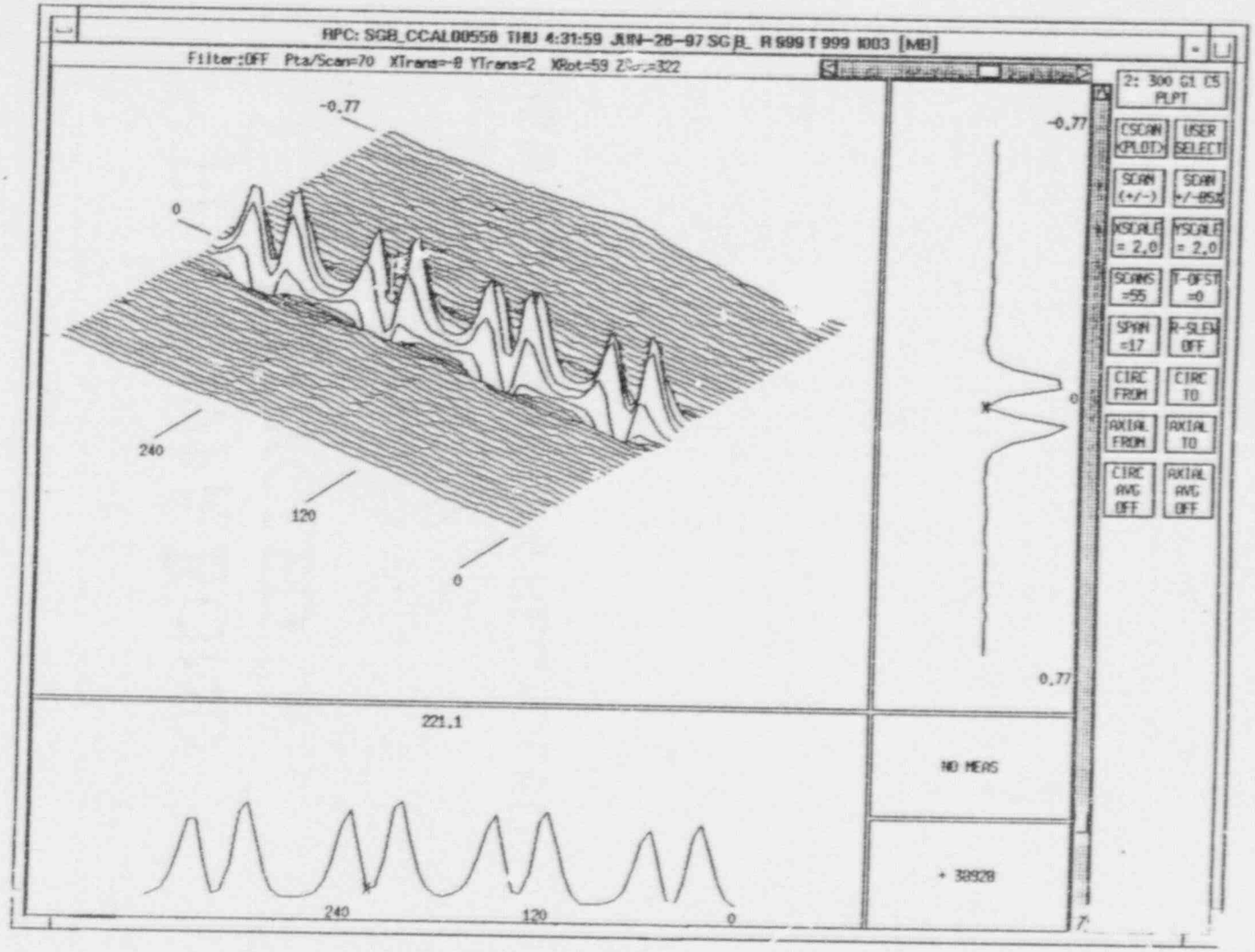


FIGURE 4
+Point Coil C-Scan of 20% Flat Bottom Holes in Calibration Standard
Page 2 of 4

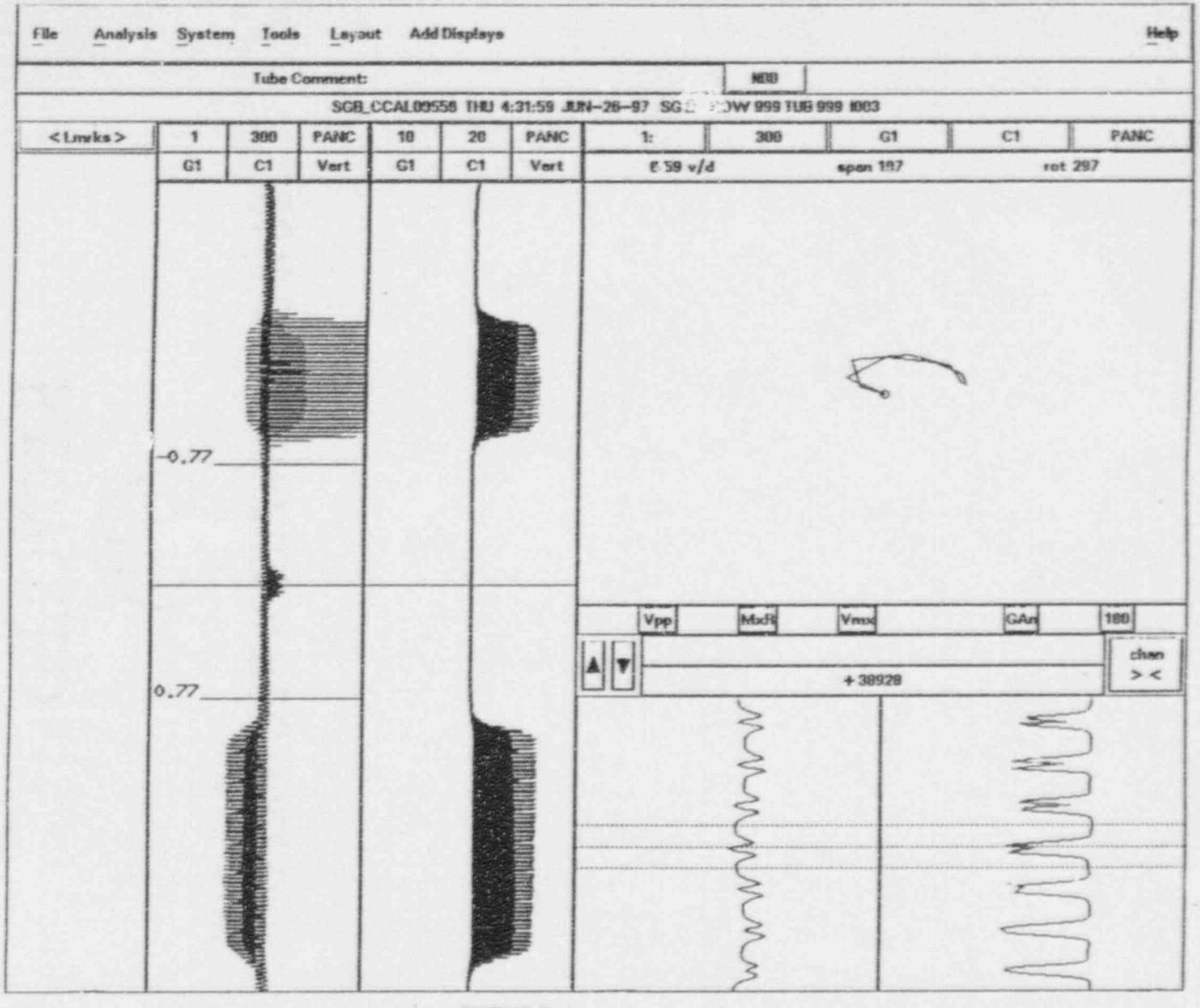


FIGURE 4
Pancake Coil Lissajous of 20% Flat Bottom Holes in Calibration Standard
Page 3 of 4

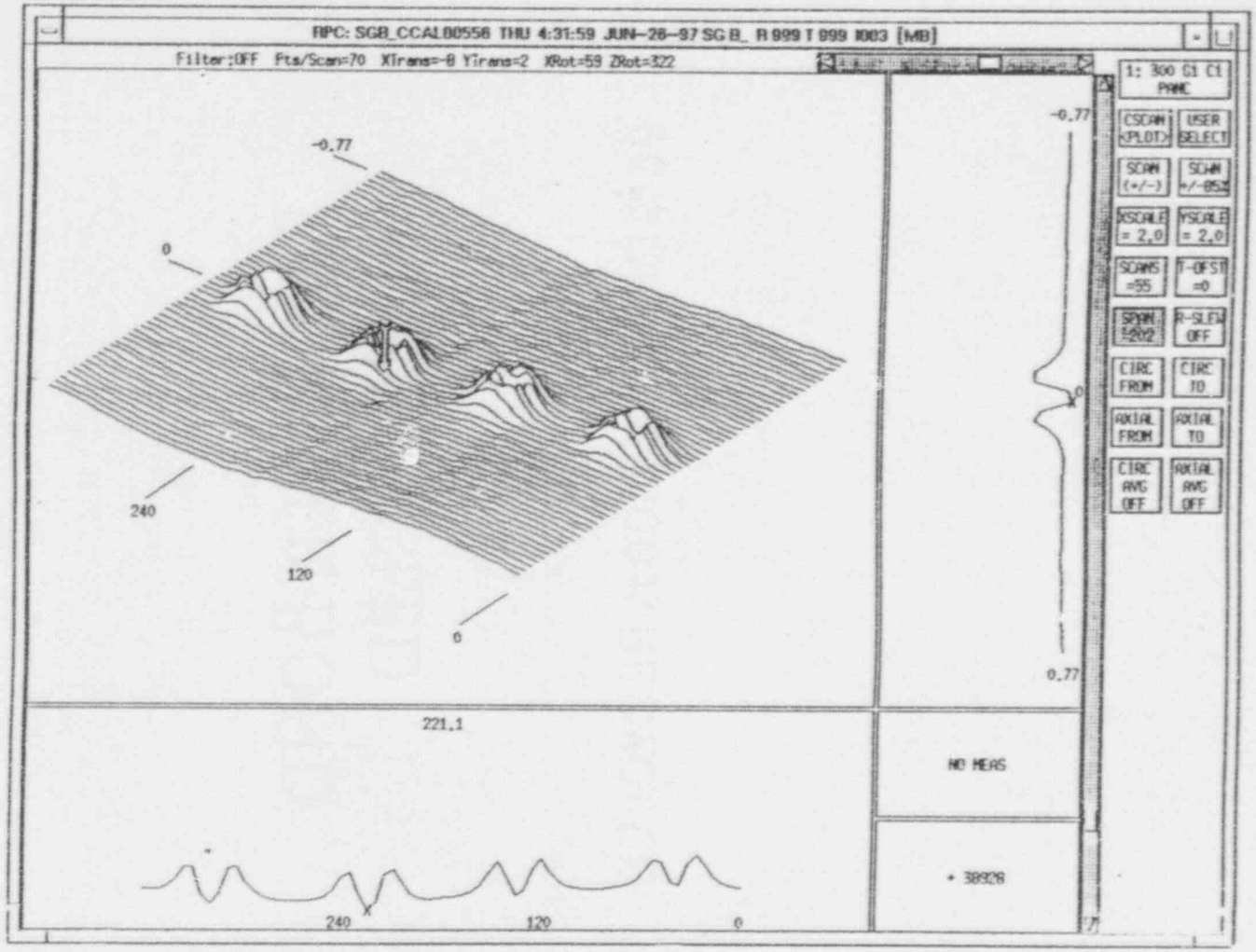


FIGURE 4
Pancake Coil C-Scan of 20% Flat Bottom Holes in Calibration Standard
Page 4 of 4