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SCHROCK,C.A. Wisconsin Public Service Corp.
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SUBJECT: Forwards results of Zetec reanalysis for sample of SG tubes, as followup to util 930610 ltr providing summary info on util assessment of Eddynet program changes.Concludes that 1993 eddy current exam results remain unchanged.

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June 21, 1993

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Ladies/Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Additional Information on Eddy Current Data Reanalysis

Reference: 1) Letter from C.A. Schrock to Document Control Desk dated June 10, 1993

On June 10, 1993, Wisconsin Public Service Corporation provided the NRC with summary information on our assessment of the Eddynet program changes. This summary information was provided on an expedited schedule to support plant startup with a commitment that additional information would be provided by June 21, 1993. To fulfill this commitment please find attached the results of Zetec's reanalysis for a sample of steam generator tubes. Our previously stated conclusion that the changes in Eddynet program have no consequential effect on the 1993 eddy current examination results remains unchanged.

If you have any questions or need additional information, please contact a member of my staff.

Sincerely,

C.A. Schrock

C. A. Schrock
Manager-Nuclear Engineering

SLB/cjt

280079

Attach.

cc - US NRC Senior Resident Inspector
US NRC, Region III

A001
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ATTACHMENT 1

LETTER FROM C. A. SCHROCK TO DOCUMENT CONTROL DESK

DATED

JUNE 21, 1993

ADDITIONAL INFORMATION REGARDING ZETEC STUDY

TO ASSESS DIFFERENCES IN REVISED MIX ALGORITHM

BACKGROUND

On June 1, 1993, Zetec, Inc. issued a letter to their Eddynet[1] customers notifying them of an anomaly in the mixing algorithm used to calculate and display simple two frequency mixes, and their intent to make available a corrected version of the Eddynet program. Zetec issued this letter based on follow-up work they performed to address an issue raised during a steam generator (SG) eddy current (EC) program inspection performed by the NRC at the Kewaunee Nuclear Power Plant (KNPP) on May 12 and 13, 1993.

During the inspection, a comparison of data from the 1991 and 1993 SG EC inspections showed an increase in the mix residual noise level for the 1993 data. The inspectors felt that this noise level increase could inhibit the ability to detect small indications at the edges of the tube support plates. A representative from Zetec present at the exit meeting committed to evaluate this concern.

Subsequent to the inspection, Zetec researched such factors as probe pull speed, eddy current standard material and probe type to determine impact on the mix residual noise level. Zetec's review discovered a subtle mathematical error in the Eddynet mixing algorithm. This prompted Zetec to issue the June 1, 1993, letter referred to above. Kewaunee is affected since Conam, our primary EC data analyst, and Zetec, our independent data analyst, use the Eddynet program.

WPSC PRELIMINARY ASSESSMENT

Upon receipt of the Zetec letter, Wisconsin Public Service Corporation (WPSC) performed a preliminary assessment of the change to the Eddynet program. This assessment concluded that the program changes did not result in a significant change to the EC analysis recently completed during the 1993 refueling outage, and therefore that analysis continued to demonstrate Technical Specification compliance. This determination was made based on our discussions with Zetec and the following:

1) The "old" Eddynet program used for data analysis during the 1993 SG examination satisfies Appendix H of the EPRI PWR Steam Generator Examination Guidelines (NF-6201, Revision 3) and has been qualified as a detection technique for outside diameter stress corrosion cracking (ODSCC). Axial ODSCC is the degradation mechanism occurring in the Kewaunee SGs.

2) The industry, via EPRI, has sponsored a significant amount of work to characterize the ODSCC occurring at the SG tube support plates. The results of pulled tube and model boiler tube data has found, among other things, that the axial ODSCC crack network starts at the center of the tube support plate and propagates upwards and downwards. The noise level in the mix residual algorithm potentially affects the observability of small flaw signals at the entrance

[1]Eddynet is an eddy current data analysis program owned by Zetec, Inc.

to and exit from the tube support plates. Based on the characteristics of ODSCC initiation, there is a very low probability of small flaws being present at the edges of the support plate that are not associated with a pre-existing crack network. The ability to detect ODSCC within the bounds of the support plate is not affected by the error in this mixing algorithm.

3) Kewaunee uses Level II and III analysts to perform the EC data analysis. Prior to performing the EC data analysis, they receive Kewaunee site-specific training and testing on our analyst guidelines. The analysts are instructed to be conservative when making a call at the tube support plates due to the presence of ODSCC. In particular, the analysts are trained to look carefully for any changes in the lissajous patterns at both the tube support plates and tube sheet crevice area. Lissajous patterns that do not produce a clear phase angle used to make the depth based determination are classified as distorted support plate indications (DSI) and subject to further examination with the motorized rotating pancake coil (MRPC) probe.

ZETEC REANALYSIS

To further support our preliminary assessment of the Zetec letter, WPSC requested Zetec to perform a limited scope reanalysis of the 1993 Eddy Current data using both the "old" (Version 21) and "new" (Version 22) versions of the Eddynet software. The results of this reanalysis are detailed below.

The purpose of this reanalysis was to provide assurance that the higher than desired mix residual noise level in the "old" (Version 21) of the Eddynet program would not result in masking small indications at the tube support plate edges. The reanalysis was also performed to compare the reported depth measurements between the "old" and "new" versions of the Eddynet program.

The Zetec study consisted of independent analyses of the output from both the old and new Eddynet programs with a subsequent comparison to the 1993 outage results. A population of 106 tubes, consisting of 1463 tube support plate intersections, was selected for this comparison study. The tubes were selected to ensure a sample of previously reported indications as well as tube support plate intersections with no detectable defects (NDD). This allowed for comparison of existing flaw signals to monitor possible changes in the reported depth measurement and a population of reported NDD tube support plate locations for the possibility of a flaw being masked by the mix residual noise level.

The study was carried out by two level III eddy current data analysts and was performed in accordance with the KNPP plant specific data analysis guidelines used during the field inspection. One analyst reviewed the old mix output and the second analyst reviewed the new mix output. Each analyzed the entire tube entry paying particular attention to the tube support plate intersections. Both analysts reanalyzed the 1993 eddy current sample data without prior

knowledge of the previously reported results. Graphics were produced for each tube support plate intersection, and a side-by-side comparison of each analyst's results was performed to detect any deviations between the two mixes.

Table 1 shows the results of the Zetec comparison study. This table shows the call reported during the 1993 refueling outage (original %) the reanalysis call with the "old" mix (old %) and reanalysis call with the "new" mix (new %). Intersections not specifically identified on Table 1 contained no detectable defects in both the 1993 outage results, and the old and new reanalysis.

Several conclusions can be drawn from Table 1. These are:

1) There were no indications reported using the old Eddynet program that were not detected with the new Eddynet program. The new Eddynet program better discriminates the noise component in the mix residual and is capable, in some instances, of improved detection of small signals at the tube support plate edges. However, the review of the 1463 tube support plate intersections identified no flaw-like indications detected by the new version that were not detected by the old version of the Eddynet program.

2) No previously reported depth of an indication was affected by the new Eddynet program such that it exceeded the Technical Specification repair limit;

3) There are seven (7) indications listed in Table 1 that were reported as DSIs during the 1993 refueling outage and subjected to further examination with the MRPC probe. The MRPC test results did not confirm the presence of an indications. With the new mix algorithm these tubes were reported as NDD. This supports our original assessment that the anomaly in the old mix algorithm tended to result in a more conservative assessment of the eddy current data at the tube support plates.

4) There was very good agreement between the old and the new Eddynet program,

5) The few number of deviations noted were within the variability expected in a reanalysis of data. This is discussed in greater detail below.

In the data set of 1463 tube support plate intersections, 67 of the intersections had a reported depth measurement from the 1993 outage. Of the 67, 34 intersections actually decreased in reported depth, 23 intersections showed an increase in reported depth, and 10 intersections were reported at the same depth when comparing the old and the new Eddynet reanalysis results. Reported depth decreases ranged from 1 to 18 percent while reported depth increases ranged from 1 to 12 percent. All but 2 indications reported greater than 30% through wall depth decreased in reported depth with the new mix algorithm. The two indications which increased in depth increased by one and two percent respectively. Those indications with the largest depth increases were initially sized less than 20% through wall, and were sized with the new mix algorithm up to 23% through wall.

The following is an account of five of the tubes that exhibited the more pronounced inconsistencies between the original eddy current results and the new Eddynet program results. Graphics for each of the indications discussed are provided in the attached figures.

* Steam Generator A Row 38 Col 49 07C

The reported history during the field inspection was 21 % through wall. Reanalysis using a conventional peak to peak measurement with the old mix (Figure 1) indicates degradation at 27% through wall. Reanalysis with the new mix setup indicates degradation at 31 % through wall (Figure 2). Figure 2 illustrates a more clearly defined vector transition. In both cases, however, the indication is readily distinguishable from the lissajous pattern.

* Steam Generator A Row 40 Col 24 07H

Figures 3 and 4 show the eddy current traces of the reanalysis using the old and the new mix setups, respectively. Although the mix residual signal pattern has changed, the signal to noise of the indication remains approximately one to one. Therefore, with either the new or old mix the evaluation is affected by the noise in the mix residual. The new mix tends to have a straighter transition and in this case appears to be a bit deeper. This indication was subject to a MRPC exam during the 1993 outage and was not confirmed.

* Steam Generator A Row 44 Col 45 01H

Figures 5 and 6 show the eddy current traces of the old and new mix setups, respectively. Although the mix residual signal pattern has changed, the signal to noise of the indication remains a factor. In both the new and old mix, the evaluation is affected by the noise level in the mix residual. The new mix tends to have a straighter transition and appears to be a bit deeper.

* Steam Generator B Row 19 Col 9 01C

Figures 7 and 8 show the eddy current traces of the old and the new mix setups, respectively. The mix residual signal pattern has changed. The signal to noise of the indication remains a factor. In both the new and old mix, the evaluation is affected by the noise level in the mix residual. The old mix in this case appears to be a bit deeper which would indicate when the signal to noise is less than optimum, the variation in the two mixes could show either an increase or decrease in depth.

* Steam Generator B Row 21 Col 6 02C

Figure 9 and 10 show the eddy current traces from both the old and the new mix setups, respectively. Once again the old mix in this case appears to be a bit deeper which would indicate when the signal to noise is less than optimum, the variation in the two mixes

could show an increase or decrease in depth measurement using phase analysis. Reanalysis with the old mix setup reported degradation at 50% through wall. Original field analysis reported degradation at 46% through wall. Reanalysis with the new mix dispositioned this indication at 35% through wall.

During discussions with the NRC staff we originally reported one tube with degradation at 45% through wall that was apparently reported as NDD during the field analysis. It appeared that an indication at the seventh cold leg tube support plate in row 15 col 3 in steam generator B was flagged by a secondary analyst during the initial inspection and subsequently dispositioned as NDD by resolution during the last outage. Subsequent to our reporting this information to the NRC, a Zetec investigation found that this indication was not missed, but had been incorrectly encoded, not incorrectly dispositioned. The Zetec investigation found that two tubes had been encoded as row 15 col 3. The second run of row 15 col 3 was actually the data for row 17 col 4. When this error was discovered during the 1993 outage review of the data, row 17 col 4 was reexamined, correctly encoded as row 17 col 4, and the second run of row 15 col 3 was disregarded.

Typically the analyst places a comment in the database warning future analysts of the wrong encode, but in this case no comment was made. When row 15 col 3 was reexamined for this study, the second run of row 15 col 3 was analyzed, which led us to the belief that an indication had been missed.

CONCLUSION

The Zetec study concluded that the changes in the signals from indications derived from the new version of the Eddynet program versus the old version of the Eddynet program are insignificant. This confirmed our preliminary assessment that the Eddynet program change had no consequential effect on the 1993 EC examination results.

Steam Generator A

ROW	COL	LOCATION	ORIGINAL %	OLD %	NEW %	COMMENTS
3	1	2H	22	21	20	
9	2	2H	36	39	21	
11	2		NDD	NDD	NDD	
12	2		NDD	NDD	NDD	
11	3		NDD	NDD	NDD	
12	3		NDD	NDD	NDD	
13	3		NDD	NDD	NDD	
14	3		NDD	NDD	NDD	
14	4		NDD	NDD	NDD	
16	4		NDD	NDD	NDD	
17	4	2C	23	20	16	
5	5	6H	DSI	DSI	DSI	Original Primary
12	5		NDD	NDD	NDD	
13	5		NDD	NDD	NDD	
15	5		NDD	NDD	NDD	
17	5	6C	DSI	NDD	NDD	Not confirmed with MRPC
18	5		NDD	NDD	NDD	
19	5		NDD	NDD	NDD	
3	6		NDD	NDD	NDD	
4	6		NDD	NDD	NDD	
6	6		NDD	NDD	NDD	
8	6		NDD	NDD	NDD	
11	6		NDD	NDD	NDD	
12	6		NDD	NDD	NDD	
13	6		NDD	NDD	NDD	
14	6		NDD	NDD	NDD	
16	6		NDD	NDD	NDD	
16	6	1H	32	33	25	
		2C	20	20	16	
19	6		NDD	NDD	NDD	
20	6		NDD	NDD	NDD	
21	6	1H	<20	10	0	
3	7		NDD	NDD	NDD	
8	7	2H	DSI	NDD	NDD	Not confirmed with MRPC
9	7	1H	DSI	DSI	DSI	Plugged in 1993
16	7		NDD	NDD	NDD	
22	7		NDD	NDD	NDD	
23	7		NDD	NDD	NDD	
13	8	1H	48	42	36	
16	9	1H	<20	9	3	
18	9		NDD	NDD	NDD	
19	9		NDD	NDD	NDD	
21	9		NDD	NDD	NDD	
22	9	1H	43	39	37	

Table 1 - Kewaunee Mix Comparison Results

Steam Generator A

ROW	COL	LOCATION	ORIGINAL %	OLD %	NEW %	COMMENTS
23	9	7C	DSI	NDD	NDD	Not confirmed with MRPC
		2C	21	21	20	
12	10	1H	25	22	23	
19	10		NDD	NDD	NDD	
20	10		NDD	NDD	NDD	
22	10		NDD	NDD	NDD	
23	10	1H	47	47	43	
24	10		NDD	NDD	NDD	
26	10		NDD	NDD	NDD	
27	10		NDD	NDD	NDD	
27	11	6H	20	23	3	
23	16	6C	<20	9	14	
31	16	1C	20	17	26	
33	16	1H	29	29	25	
27	17	6C	24	23	23	
		7C	22	24	27	
28	18	7C	<20	18	15	
8	19	2C	<20	9	9	
23	19	7C	<20	3	6	
40	24	4H	DSI	DSI	DSI	Plugged in 1993
		7H	DSI	8	19	Not confirmed with MRPC
40	26	2C	<20	11	22	
		1H	31	27	30	
42	36	3H	34	33	21	
43	42	6C	<20	2	0	NDD New Mix
		7H	30	29	30	
44	43	1H	DSI	DSI	DSI	Plugged in 1993
44	45	1H	20	19	28	
38	49	7C	21	27	31	
11	53	1C	29	29	29	
35	53	1H	34	36	32	
42	54		NDD	NDD	NDD	
11	55		NDD	NDD	NDD	
12	55	2C	39	38	39	
24	55	2C	<20	19	17	
27	55		NDD	NDD	NDD	
11	57	2C	<20	19	18	
13	58	1H	21	20	18	
		2C	<20	12	10	
		1C	<20	14	8	
11	59	2C	<20	16	12	
1	61	6C	60	57	58	Plugged In 1993
7	62	1C	DSI	NDD	NDD	Not confirmed with MRPC
18	62	1C	35	36	36	

Table 1 - Kewaunee Mix Comparison Results

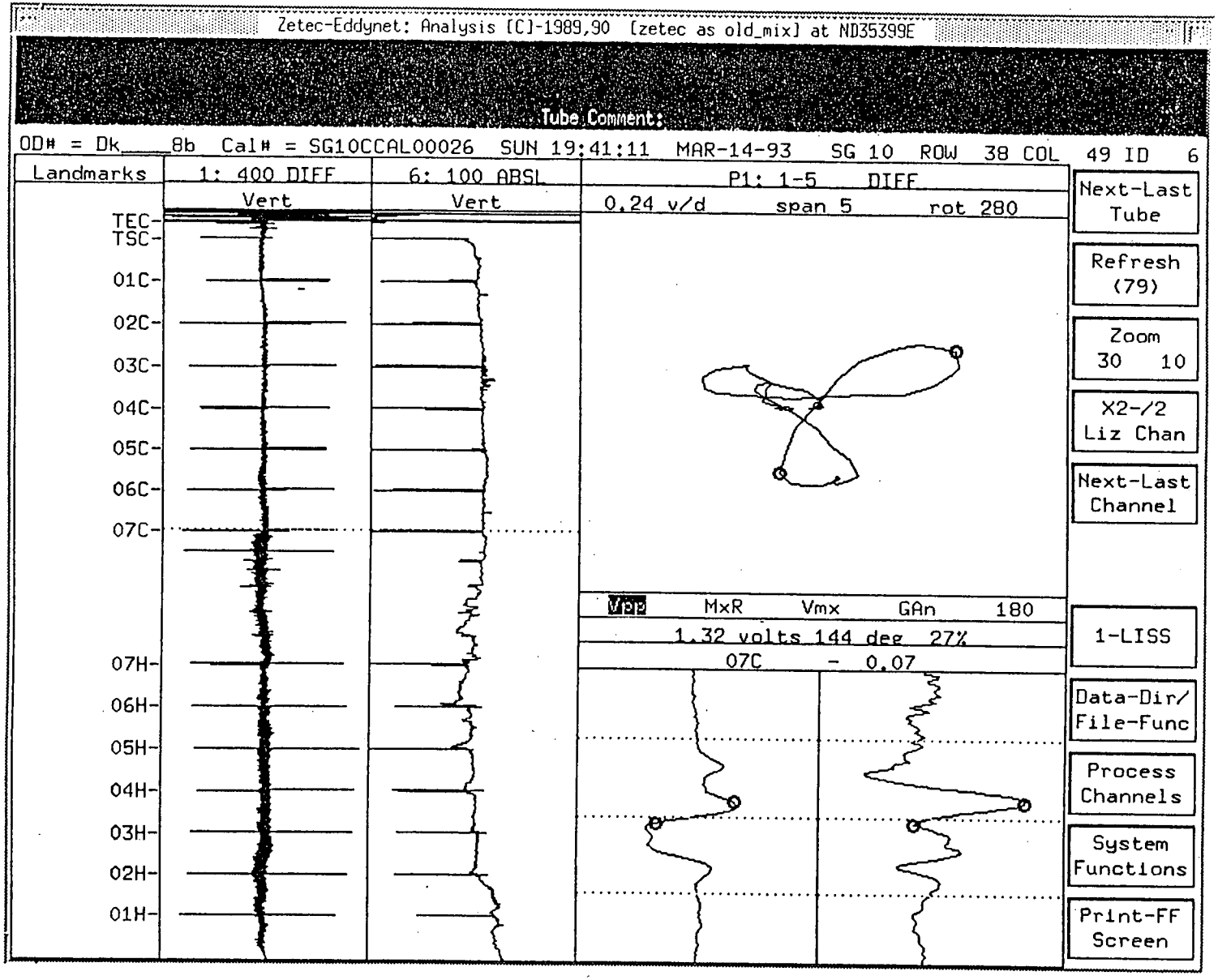
Steam Generator A

ROW	COL	LOCATION	ORIGINAL %	OLD %	NEW %	COMMENTS
34	62	7C	34	32	34	
13	64	2C	DSI	NDD	NDD	Not confirmed with MRPC
7	70	7C	23	26	28	
29	73	2C	<20	15	3	
4	74	1C	<20	21	24	
18	74		NDD	NDD	NDD	
29	74	7C	37	38	37	
32	74	7C	37	38	38	
25	75	2C	20	21	22	
25	78	1C	<20	12	17	
6	77	7C	<20	12	18	
		2C	<20	19	18	
18	77	1H	36	38	36	
23	78	7C	23	23	23	
24	78	7C	37	37	33	
		6C	23	23	27	
2	80	7C	<20	21	22	
		5C	22	23	23	
		1C	<20	NDD	NDD	
24	80	3C	22	21	20	
		2C	24	23	24	
28	80	1H	37	35	33	

Steam Generator B

ROW	COL	LOCATION	ORIGINAL %	OLD %	NEW %	COMMENTS
10	3	1H	24	21	1	
12	4	2C	<20	12	12	
15	4	2C	45	46	45	
16	4	2C	<20	9	18	
		3C	NDD	9	7	
17	8	8C	39	42	32	
21	6	2C	46	50	35	
19	8	5H	DSI	NDD	NDD	Not confirmed with MRPC
24	8	2C	<20	12	23	
19	9	1C	23	19	7	

Table 1 - Kewaunee Mix Comparison Results


Zetec-Eddynet: Analysis [C]-1989,90 [zetec as old_mix] at ND35399E
Tube Comment:
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Landmarks
1: 400 DIFF
Vert
6: 100 ABSL
Vert
P1: 1-5 DIFF
0.24 v/d span 5 rot 280
TEC-
TSC-
01C-
02C-
03C-
04C-
05C-
06C-
07C-
07H-
06H-
05H-
04H-
03H-
02H-
01H-
Vpp MxR Vmx GAn 180
1.32 volts 144 deg 27%
07C - 0.07
Next-Last Tube
Refresh (79)
Zoom 30 10
X2-/2 Liz Chan
Next-Last Channel
1-LISS
Data-Dir/ File-Func
Process Channels
System Functions
Print-FF Screen

FIGURE 1

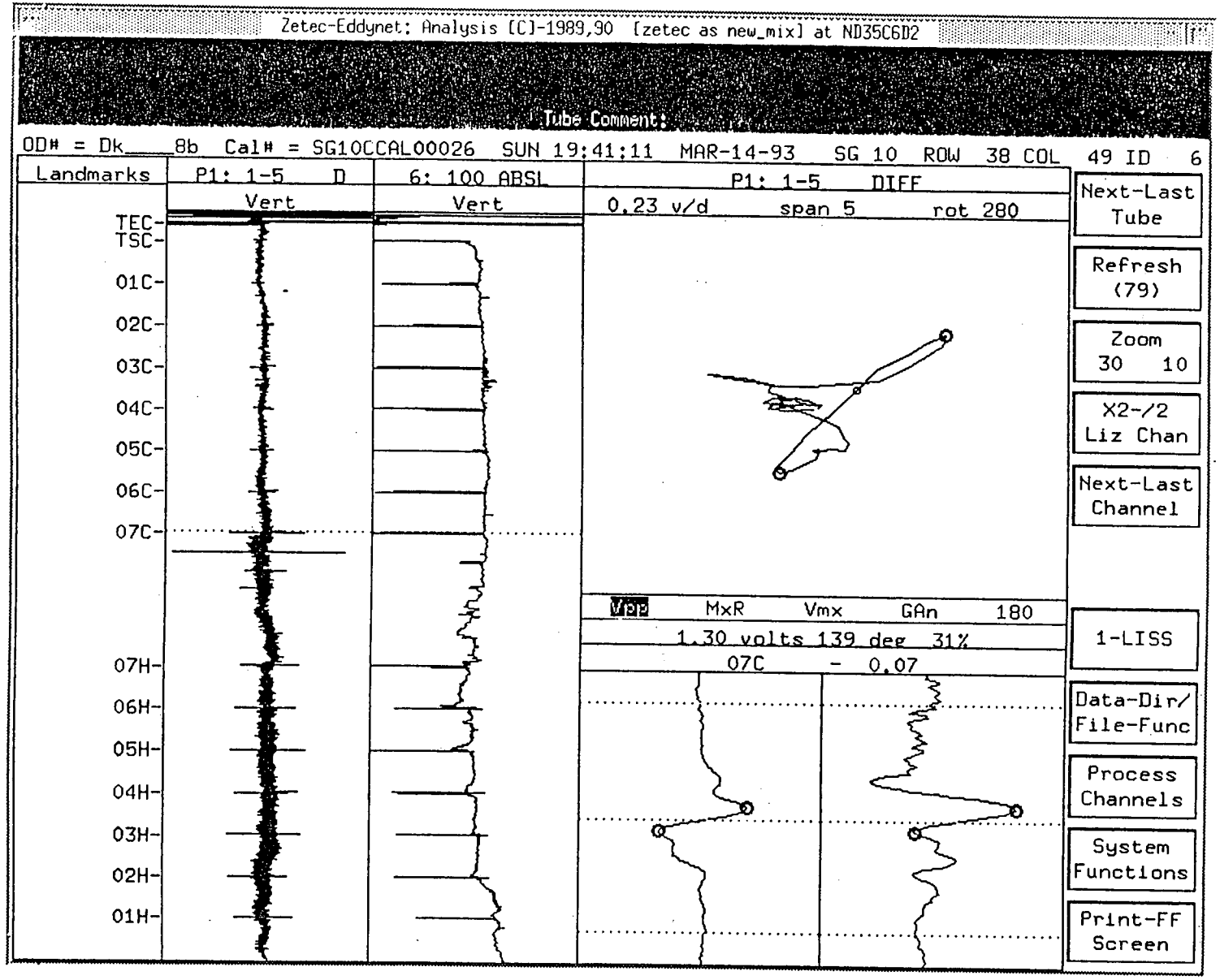
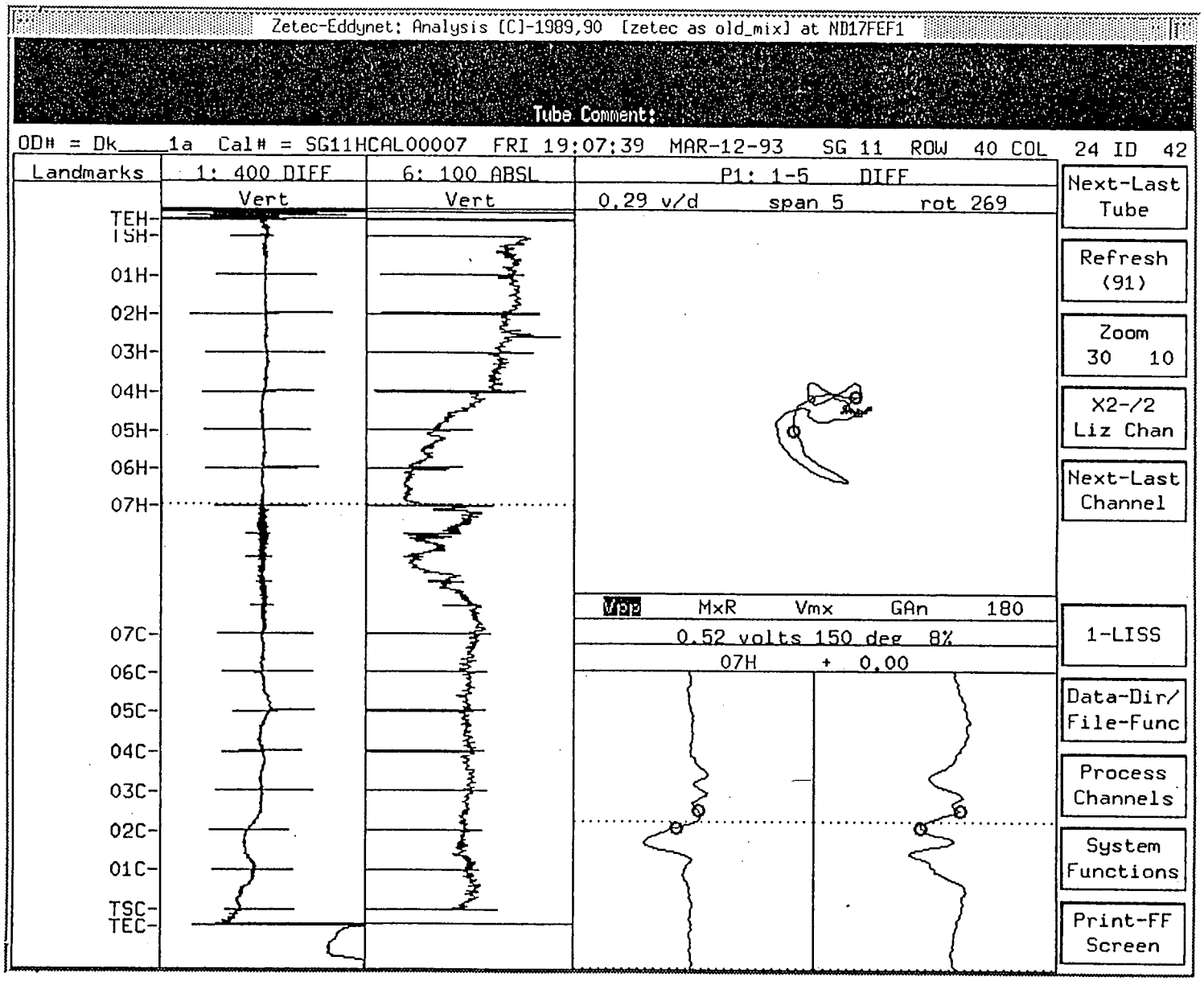

Zetec-Eddynet: Analysis [C]-1989,90 [zetec as new_mix] at ND35C6D2
Tube Comment:
OD# = Dk 8b Cal# = SG10CCAL00026 SUN 19:41:11 MAR-14-93 SG 10 ROW 38 COL 49 ID 6
Landmarks
P1: 1-5 D
Vert
6: 100 ABSL
Vert
P1: 1-5 DIFF
0.23 v/d span 5 rot 280
TEC-
TSC-
01C-
02C-
03C-
04C-
05C-
06C-
07C-
07H-
06H-
05H-
04H-
03H-
02H-
01H-
Vpp MxR Vmx GAn 180
1.30 volts 139 deg 31%
07C - 0.07
Next-Last Tube
Refresh (79)
Zoom 30 10
X2-/2 Liz Chan
Next-Last Channel
1-LISS
Data-Dir/ File-Func
Process Channels
System Functions
Print-FF Screen

FIGURE 2


Zetec-Eddynet: Analysis (C)-1989,90 [zetec as old_mix] at ND17FEF1
Tube Comment:
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Landmarks
1: 400 DIFF
Vert
6: 100 ABSL
Vert
P1: 1-5 DIFF
0.29 v/d span 5 rot 269
TEH-
1SH-
01H-
02H-
03H-
04H-
05H-
06H-
07H-
07C-
06C-
05C-
04C-
03C-
02C-
01C-
TSC-
TEC-
Vpp MxR Vmx GAn 180
0.52 volts 150 deg 8%
07H + 0.00
Next-Last Tube
Refresh (91)
Zoom 30 10
X2-/2 Liz Chan
Next-Last Channel
1-LISS
Data-Dir/ File-Func
Process Channels
System Functions
Print-FF Screen

FIGURE 3

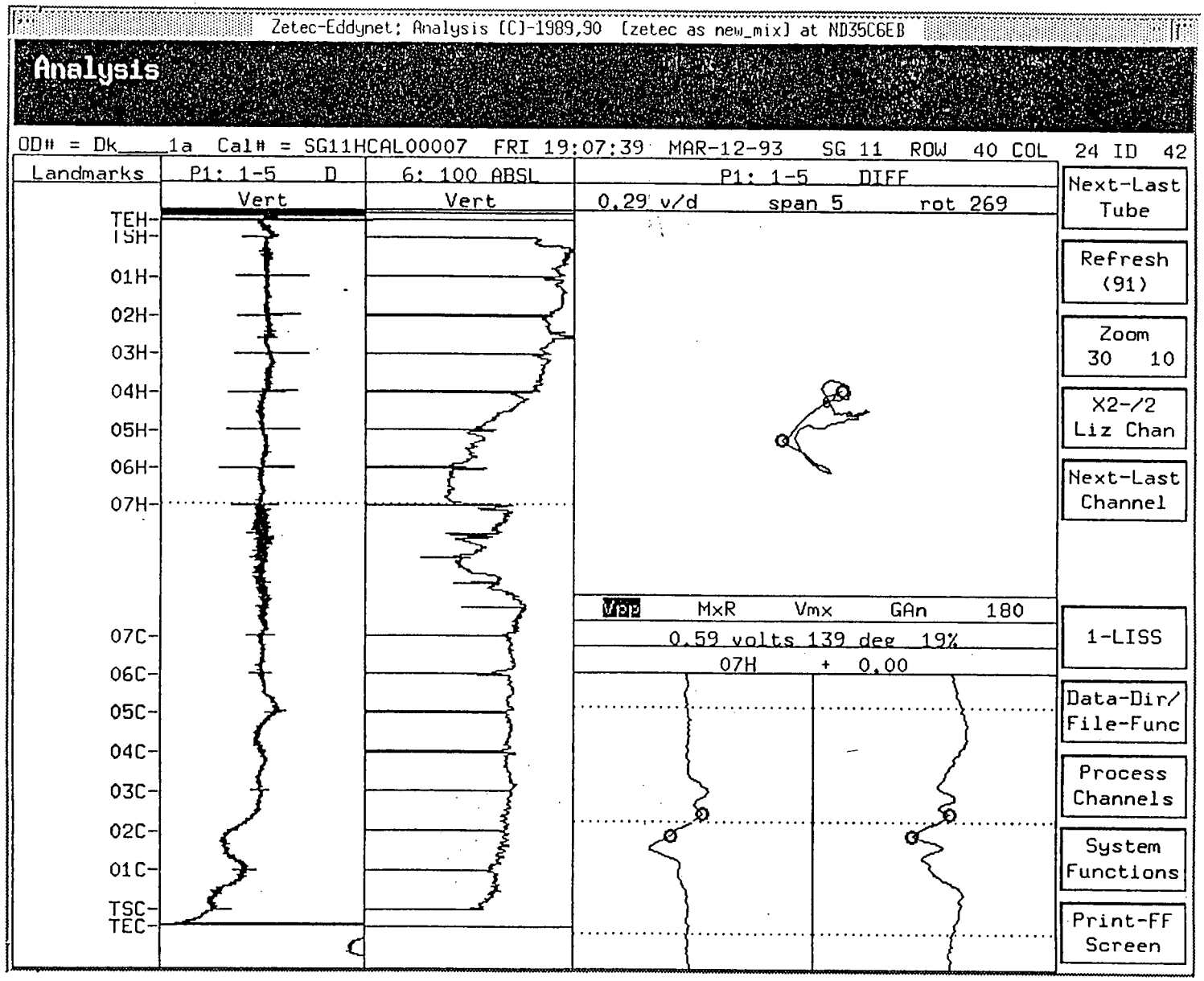
Zetec-Eddynet: Analysis (C)-1989,90 [zetec as new_mix] at ND35C6EB
Analysis
OD# = Dk____1a Cal# = SG11HCAL00007 FRI 19:07:39 MAR-12-93 SG 11 ROW 40 COL 24 ID 42
Landmarks
P1: 1-5 D
Vert
6: 100 ABSL
Vert
P1: 1-5 DIFF
0.29 v/d span 5 rot 269
TEH
TSH
01H
02H
03H
04H
05H
06H
07H
07C
06C
05C
04C
03C
02C
01C
TSC
TEC
Vpp MxR Vmx GAn 180
0.59 volts 139 deg 19%
07H + 0.00
Next-Last Tube
Refresh (91)
Zoom 30 10
X2-/2 Liz Chan
Next-Last Channel
1-LISS
Data-Dir/ File-Func
Process Channels
System Functions
Print-FF Screen

FIGURE 4

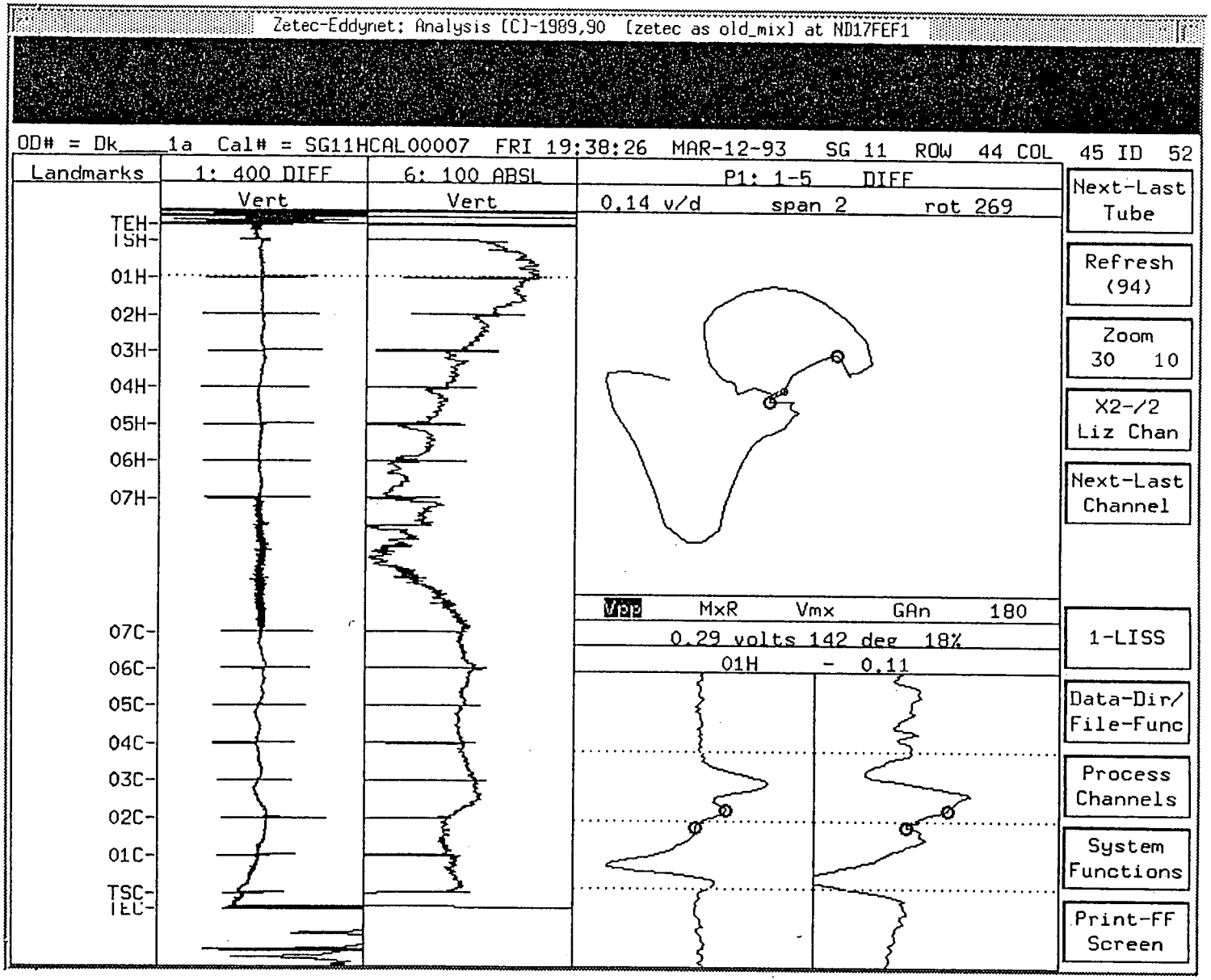
Zetec-Eddynet: Analysis (C)-1989,90 [zetec as old_mix] at ND17FEF1
OD# = Dk___1a Cal# = SG11HCAL00007 FRI 19:38:26 MAR-12-93 SG 11 ROW 44 COL 45 ID 52
Landmarks
1: 400 DIFF
Vert
6: 100 ABSL
Vert
P1: 1-5 DIFF
0.14 v/d span 2 rot 269
TEH-
TSH-
01H-
02H-
03H-
04H-
05H-
06H-
07H-
07C-
06C-
05C-
04C-
03C-
02C-
01C-
TSC-
TEC-
MxR Vmx GAn 180
0.29 volts 142 deg 18%
01H - 0.11
Next-Last Tube
Refresh (94)
Zoom 30 10
X2-/2 Liz Chan
Next-Last Channel
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FIGURE 5

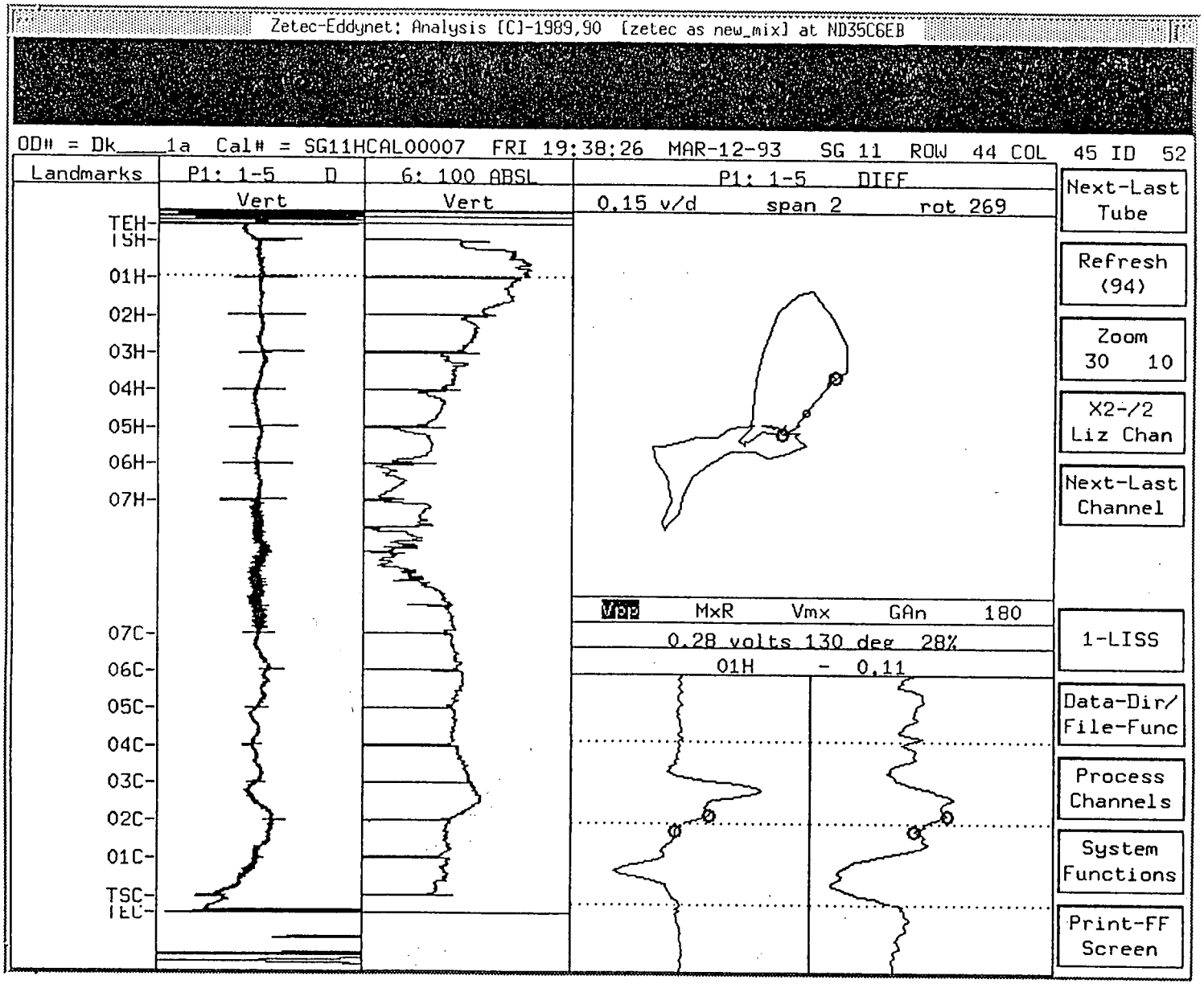
Zetec-Eddynet: Analysis (C)-1989,90 (zetec as new_mix) at ND35C6EB
OD# = Dk 1a Cal# = SG11HCAL00007 FRI 19:38:26 MAR-12-93 SG 11 ROW 44 COL 45 ID 52
Landmarks
P1: 1-5 D
Vert
6: 100 ABSL
Vert
P1: 1-5 DIFF
0.15 v/d span 2 rot 269
TEH-
TSH-
01H-
02H-
03H-
04H-
05H-
06H-
07H-
07C-
06C-
05C-
04C-
03C-
02C-
01C-
TSC-
TEC-
Vpp MxR Vmx GAn 180
0.28 volts 130 deg 28%
01H - 0.11
Next-Last Tube
Refresh (94)
Zoom 30 10
X2-/2 Liz Chan
Next-Last Channel
1-LISS
Data-Dir/ File-Func
Process Channels
System Functions
Print-FF Screen

FIGURE 6

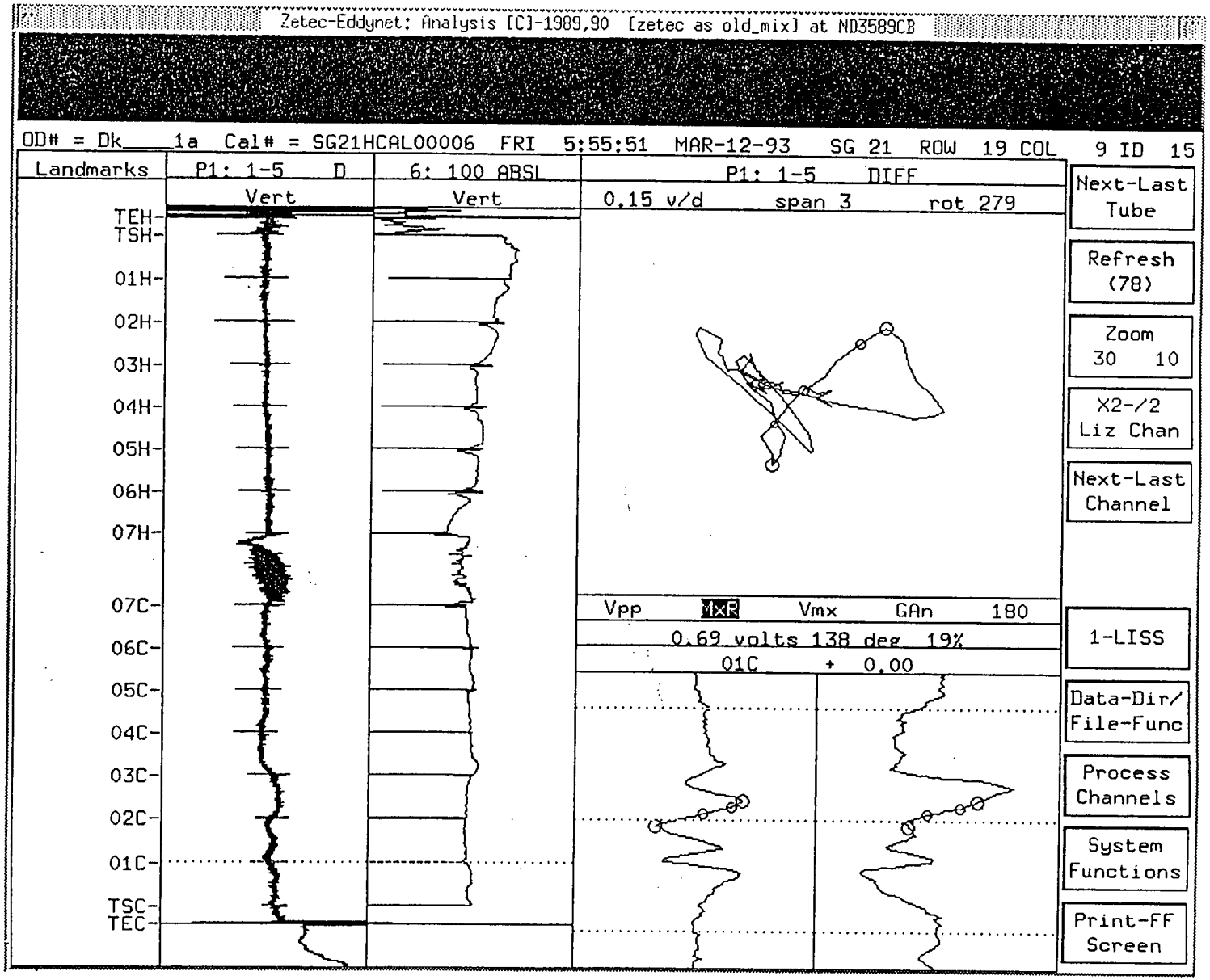
Zetec-Eddynet: Analysis [C]-1989,90 [zetec as old_mix] at ND3589CB
OD# = Dk 1a Cal# = SG21HCAL00006 FRI 5:55:51 MAR-12-93 SG 21 ROW 19 COL 9 ID 15
Landmarks
P1: 1-5 D
Vert
6: 100 ABSL
Vert
P1: 1-5 DIFF
0.15 v/d span 3 rot 279
TEH-
TSH-
01H-
02H-
03H-
04H-
05H-
06H-
07H-
07C-
06C-
05C-
04C-
03C-
02C-
01C-
TSC-
TEC-
Vpp MxR Vmx GAn 180
0.69 volts 138 deg 19%
01C + 0.00
Next-Last Tube
Refresh (78)
Zoom 30 10
X2-/2 Liz Chan
Next-Last Channel
1-LISS
Data-Dir/ File-Func
Process Channels
System Functions
Print-FF Screen

FIGURE 7

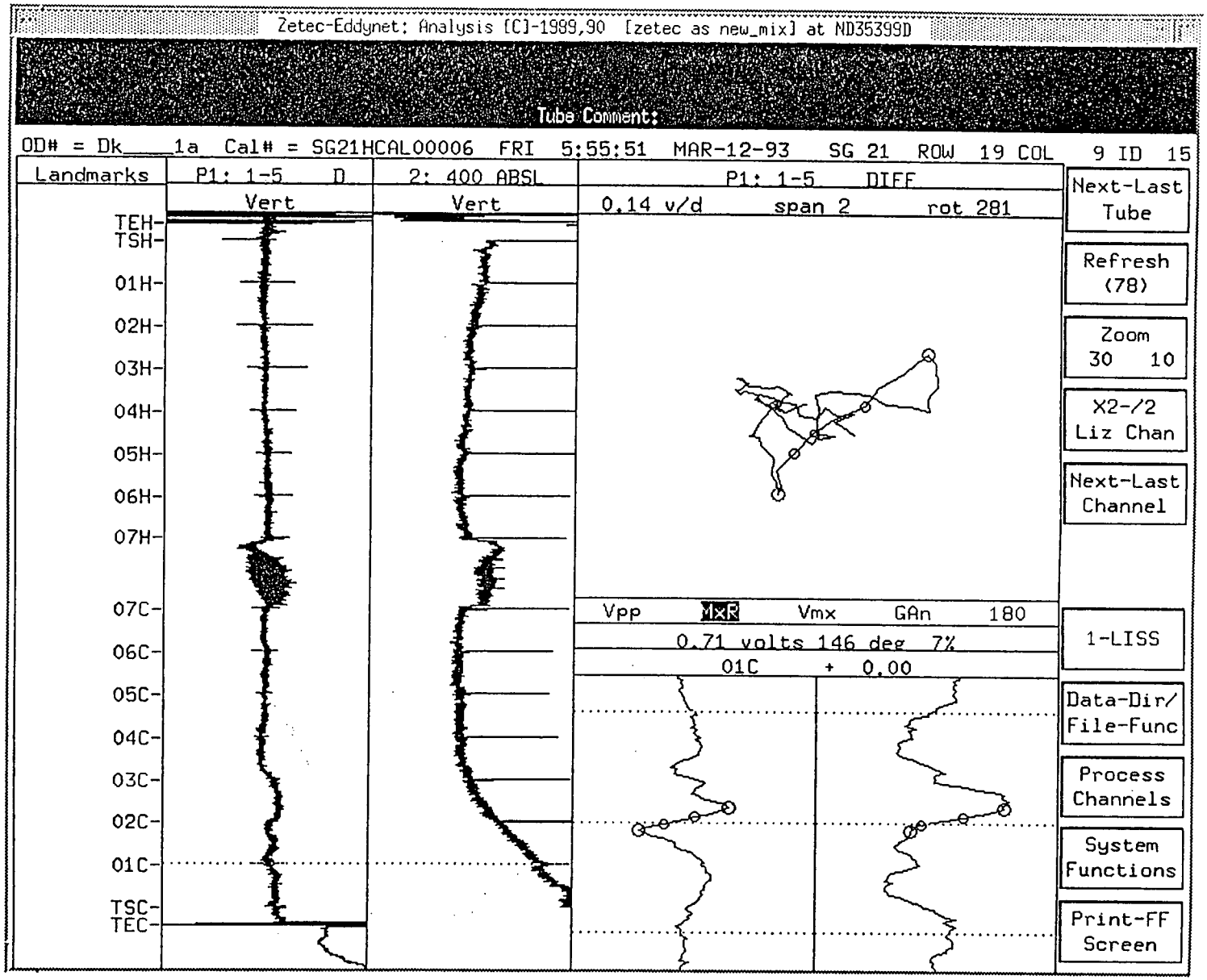
Zetec-Eddynet: Analysis (C)-1989,90 [zetec as new_mix] at ND35399D
Tube Comment:
OD# = Dk____1a Cal# = SG21HCAL00006 FRI 5:55:51 MAR-12-93 SG 21 ROW 19 COL 9 ID 15
Landmarks
P1: 1-5 D
Vert
2: 400 ABSL
Vert
P1: 1-5 DIFF
0.14 v/d span 2 rot 281
TEH-
TSH-
01H-
02H-
03H-
04H-
05H-
06H-
07H-
07C-
06C-
05C-
04C-
03C-
02C-
01C-
TSC-
TEC-
Vpp MxR Vmx GAn 180
0.71 volts 146 deg 7%
01C + 0.00
Next-Last Tube
Refresh (78)
Zoom 30 10
X2-/2 Liz Chan
Next-Last Channel
1-LISS
Data-Dir/ File-Func
Process Channels
System Functions
Print-FF Screen

FIGURE 8

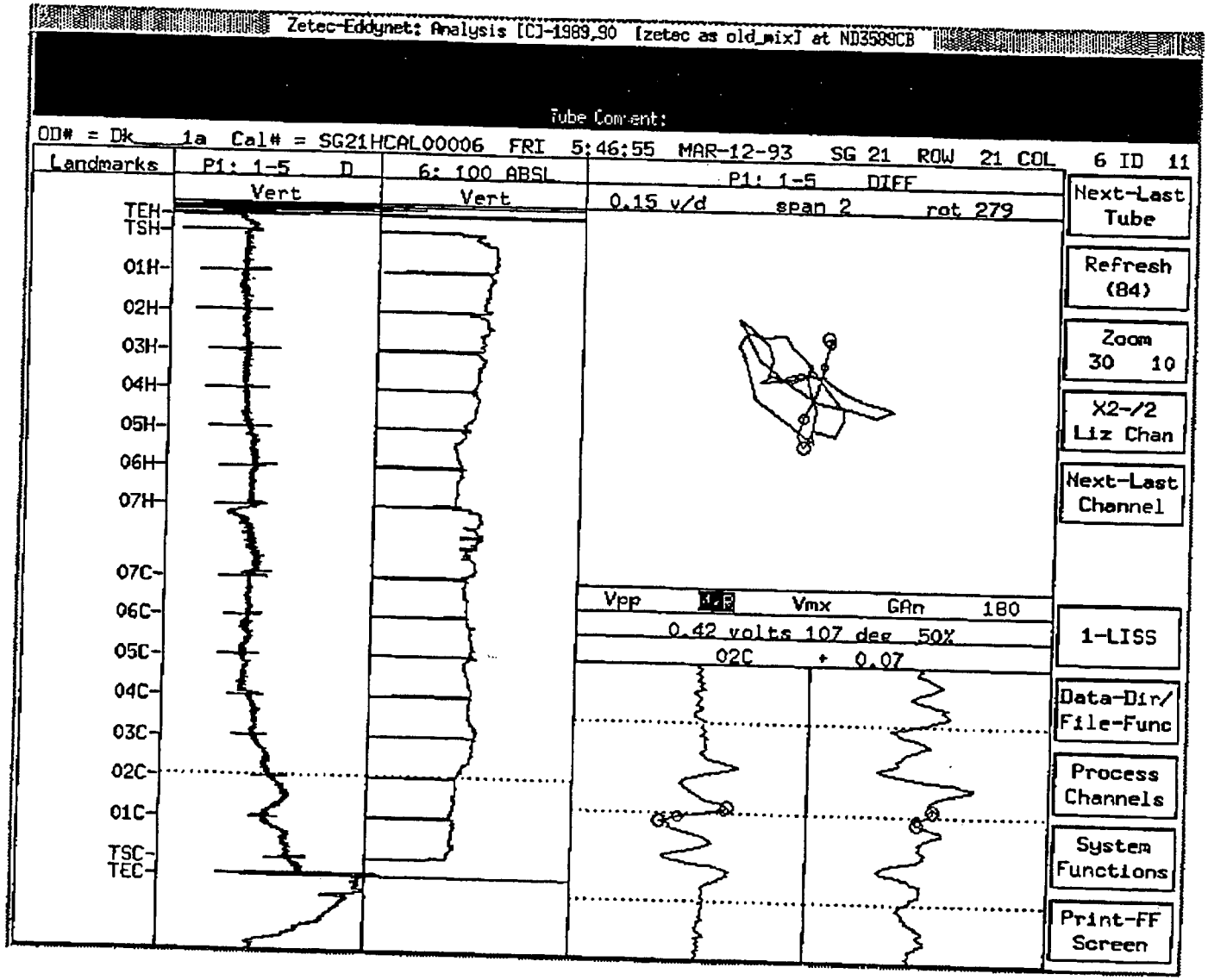
Zetec-Eddynet: Analysis [C]-1989,90 [zetec as old_mix] at ND3589CB
Tube Comment:
OD# = Dk 1a Cal# = SG21HCAL00006 FRI 5:46:55 MAR-12-93 SG 21 ROW 21 COL 6 ID 11
Landmarks
P1: 1-5 D
Vert
6: 100 ABSL
Vert
P1: 1-5 DIFF
0.15 v/d span 2 rot 279
TEH
TSH
01H
02H
03H
04H
05H
06H
07H
07C
06C
05C
04C
03C
02C
01C
TSC
TEC
Vpp
Vmx
GAn 180
0.42 volts 107 deg 50%
02C + 0.07
Next-Last Tube
Refresh (84)
Zoom 30 10
X2-/2 Liz Chan
Next-Last Channel
1-LISS
Data-Dir/ File-Func
Process Channels
System Functions
Print-FF Screen

FIGURE 9

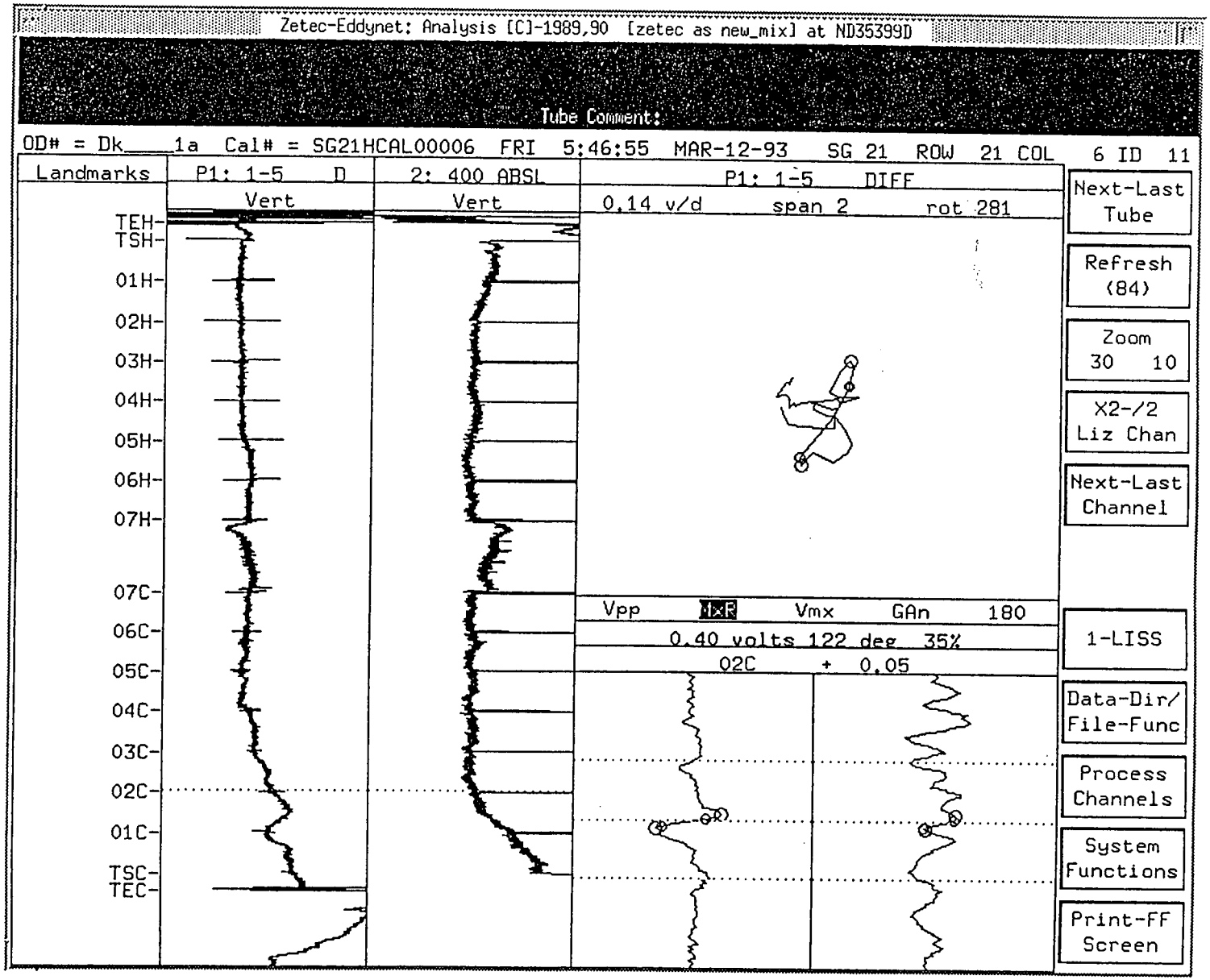
Zetec-Eddynet: Analysis [C]-1989,90 [zetec as new_mix] at ND35399D
Tube Comment:
OD# = Dk 1a Cal# = SG21HCAL00006 FRI 5:46:55 MAR-12-93 SG 21 ROW 21 COL 6 ID 11
Landmarks
P1: 1-5 D
Vert
2: 400 ABSL
Vert
P1: 1-5 DIFF
0.14 v/d span 2 rot 281
TEH-
TSH-
01H-
02H-
03H-
04H-
05H-
06H-
07H-
07C-
06C-
05C-
04C-
03C-
02C-
01C-
TSC-
TEC-
Vpp 1xF Vmx GAn 180
0.40 volts 122 deg 35%
02C + 0.05
Next-Last Tube
Refresh (84)
Zoom 30 10
X2-/2 Liz Chan
Next-Last Channel
1-LISS
Data-Dir/ File-Func
Process Channels
System Functions
Print-FF Screen

FIGURE 10