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 CONWAY, W.F. Arizona Public Service Co. (formerly Arizona Nuclear Power
 RECIP. NAME RECIPIENT AFFILIATION
 Document Control Branch (Document Control Desk)

SUBJECT: Forwards response to CAL, dtd 931004, map of tubes re-evaluated in SGs 31 & 32, cumulative rept of non-quantifiable indications, possible deposits, bowing, possible axial indications & eddy current graphics of notable indications.

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05000530

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Arizona Public Service Company

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102-02688-WFC/RAB/JRP

October 12, 1993

WILLIAM F. CONWAY
EXECUTIVE VICE PRESIDENT
NUCLEAR

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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- References:
1. Letter dated October 4, 1993, from B. H. Faulkenberry, Regional Administrator, Region V, USNRC, to W. F. Conway, Executive Vice President, Nuclear, APS
 2. Letter 102-02654, dated September 29, 1993, from W. F. Conway, Executive Vice President, Nuclear, APS, to USNRC

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 3
Docket No. STN 50-530
Response to Confirmatory Action Letter
File: 93-056-026

By letter dated October 4, 1993, (Reference 1), the NRC required that Arizona Public Service Company (APS), provide a written summary of the results of the re-analysis of Eddy Current Testing (ECT) data from Unit 3 third refueling outage (3R3), and the basis for disposition of all newly identified indications.

Based on ECT data from the recent Unit 2 refueling outage, a decision was made to re-evaluate the ECT data from Unit 1 and Unit 3. The re-evaluation of 3R3 rotating pancake coil (RPC) data was performed for specific midspan indications. This re-evaluation focused on tubes in row 90 and higher and in the area between 07H and the first vertical strap (VS). The findings of the RPC evaluation resulted in the decision to review all of 3R3 bobbin coil eddy current data in the area described above.

140015

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PDR

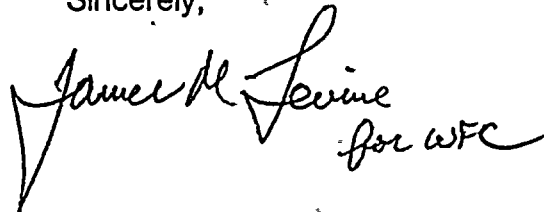
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U. S. Nuclear Regulatory Commission
ATTN: Document control Desk
Response to Confirmatory Action Letter
Page 2

The enclosure to this letter contains APS's response to the Confirmatory Action Letter, a map of the tubes re-evaluated in Steam Generators 31 and 32, a cumulative report of the non-quantifiable indications (NQI's), possible deposits (PDP's), bowing (BOW), and possible axial indications (PAI's). Also included are actual Eddy Current graphics of notable indications identified during re-evaluation. The Unit 3 ECT data re-evaluation was performed using the guidelines as modified for the Unit 1 fourth refueling outage (1R4), based on the lessons learned from Unit 2.

Should you have any questions, please contact Richard A. Bernier at (602) 393-5882.

Sincerely,

A handwritten signature in cursive script that reads "James H. Levine" followed by "for WFC" in a smaller, less formal script.

WFC/RAB/JRP/bcf

Enclosure

cc: B. H. Faulkenberry
B. E. Holian
J. A. Sloan

ENCLOSURE

RESPONSE TO CONFIRMATORY ACTION LETTER

NRC REQUEST:

You will continue to review the Unit 3 ECT data to identify indications which were not identified in refueling outage 3R3 by bobbin coil ECT. Although not documented in your September 29, 1993, letter, you will provide a written summary of the results of this review, and your basis for disposition of all newly identified indications, to the NRC by October 12, 1993. This data and the experience of the Unit 1 ECT inspection will be used to define the scope of the inspection in Unit 3. The final scope of Unit 3 ECT inspection will be provided to the NRC prior to commencing the inspection.

APS RESPONSE:

The Unit 2 Steam Generator Tube Rupture Event Analysis identified an arc-shaped region of the PVNGS Steam Generators susceptible to thermal hydraulic conditions which could create an environment conducive to Outer Diameter Stress Corrosion Cracking (ODSCC). A re-evaluation of Motorized Rotating Pancake Coil (MRPC) data acquired in the arc of interest during the third refueling outage Unit 3 (3R3), which took place in Fall 1992, was conducted as a result of the findings of the ECT data from 2R4. During this review, two indications were observed in Steam Generator 31 which could not be characterized due to the use of a single coil pancake probe, and as a conservative measure, all available bobbin data for rows 90 and higher, were reviewed for both Steam Generator 31 and 32. This review included bobbin data for 3072 tubes in Steam Generator 31 and 1358 tubes in Steam Generator 32. The review was conducted using the analyst guidelines similar to those developed for the 1R4 outage based on lessons learned from the 2R4 outage ECT inspections. Each analyst was trained and tested to these guidelines prior to analyzing 3R3 bobbin data. The results of this review are attached to this response.

The disposition of indications in Steam Generator 31 includes three which have shown no change from previous data, one plugged tube, one weak non-quantifiable indication (NQI), one short (0.34") possible axial indication (PAI) and one NQI with absolute drift. The three indications which have not changed since the previous outage in 1991, do not appear to be actively growing defects. The plugged tube is not in service and, therefore, not a concern. Based on the critical flaw size analysis performed by APS, the short PAI would not be expected to rupture for Main Steam Line Break (MSLB) pressure, even if it penetrates through wall. The R144C57 tube NQI has some characteristics unique among the NQI's found which cannot be resolved without MRPC inspection. The absolute drift signal in the area around the NQI is approximately four to eight inches in length and may be indicative of intergranular attack or stress corrosion cracking, and there is indication of a deposit on the tube at the elevation of the NQI. However, the bobbin probe does not allow the analyst to determine if the deposit and NQI are at the same azimuth, and an MRPC inspection is necessary to resolve the issue.

The NQI in Steam Generator 32 is weak, and it was not evident in the 1991 data of 3R2. It requires MRPC to further characterize it.

APS analysts have completed the review of ECT data from 3R3, the results of which are included in the following pages. This data and the Unit 1 ECT data, which is being gathered during the ongoing refueling outage, will be used to determine if additional actions are necessary for the continued operation of Unit 3.

With over 80% of the arc of interest in both Unit 1 Steam Generators inspected, there has been no pattern of axial indications identified in Unit 1. Although the inspection in Unit 1 is not complete at this time, the evidence from the Unit 1 inspection supports the hypothesis that enough differences exist between the units to conclude that accelerated tube degradation, as experienced in Unit 2, is not expected to occur in Unit 1 and Unit 3.

As stated in Reference 2, administrative controls on primary coolant dose equivalent iodine and enhanced leak detection methods provide assurance of prior warning to a tube rupture event and limit offsite dose consequences to less than 10CFR100 limits.

In summary, the continued operation of Unit 3 until the proposed midcycle outage does not present an undue risk for the following reasons: the PAI identified by RPC in Steam Generator 31 (R99C148), is short and may be volumetric; the evidence from Unit 1 inspections in progress do not presently show the Unit 2 failure mechanism to be fully transportable; enhanced leakage monitoring improves our ability in the identification of the precursors to a tube rupture event; and the safety assessment discussed in Reference 2, demonstrates that even in the unlikely event of a MSLB with consequential multiple tube ruptures, with the proposed administrative limits on reactor coolant system dose equivalent iodine, and the reduction in the CPC variable overpower setpoints, the resulting offsite doses are less than 10CFR100 limits.

Steam Generator 31

Row	Column	Location	Call	Resolution
102	25	08H+25" to 36"	NQI*	Previous indications with no change since 1991
105	30	BW1 + 20"	NQI*	Previous indications with no change since 1989
144	57	09H + 25"	NQI* PDP	Indication not evident in 1991 data. 100 Khz absolute drift in same area. Appears to also have PDP indication.
114	135	08H +38.62"	NQI* PAI PDP BOW	Previous indication evaluated as a pit and was plugged during U3R3.
95	138	BW1 + 13"	NQI*	Indication not evident in 1991 data. Does not have strong signal of defect.
102	139	08H + 25"	NQI*	Previous indication with no change since 1989
99	148	BW1 + 12"	PAI PDP BOW	Previous RPC evaluation at BW1 +12" found acceptable. PAI identified ~.34" long at BW1 + 3.73" during reevaluation

Steam Generator 32

Row	Column	Location	Call	Resolution
156	107	08H + 21"	NQI*	Indication not evident in 1991 data. Does not have strong signal of defect.

*Bobbin Coil

09/93, ARIZONA PUBLIC SERVICE CO., PALO VERDE, UNIT 3

STEAM GENERATOR: 31

DATE: 09/29/93

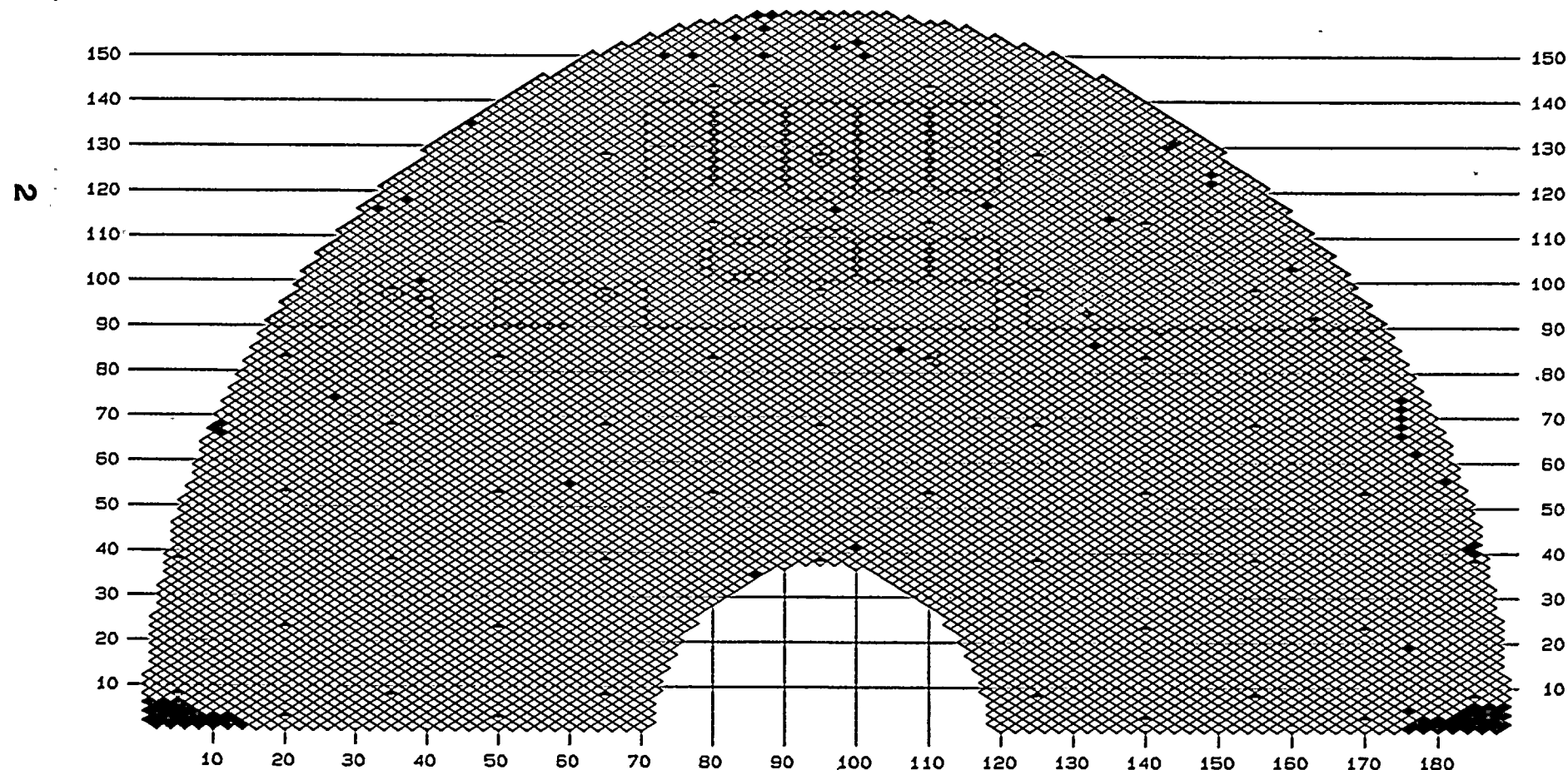
OUTAGE DATA SET : CURRENT

TIME: 17: 49: 43

SELECTION VARIABLES:

STAYS

PLUGGED 105 ♦ 610UL 3072 ♦



REVIEW OF 10/92 BOBBIN DATA ROW 90 & UP

CONAM NUCLEAR, INC. BW

CUMULATIVE REPORT
09/93, ARIZONA PUBLIC SERVICE CO., PALO VERDE, UNIT 3

STEAM GENERATOR : 31
METER DATA SET : CURRENT
SECTION VARIABLES: Percent

PAGE: 1 OF 2
DATE: 09/30/93
TIME: 14:15:41

ROW	LIN	LEG	PROGRAM	EXAM EXTENT ACTUAL	EXP	CAL	PROBE	LOCATION	VOLTS	CURRENT MIL	DEG	%	CH
102	25	C	TEC-TEH	TEC-TEH		00006	610UL	08H+ 25.36	0.90		37	NQI	P 1
		C	TEC-TEH	TEC-TEH		00006	610UL	08H+ 32.36	0.45		56	NQI	P 1
		C	TEC-TEH	TEC-TEH		00006	610UL	08H+ 34.64	0.58		46	NQI	P 1
107	26	C	TEC-TEH	TEC-TEH		00006	610UL	07H+ 5.92to+ 25.12	0.30		0	PDP	8
		C	TEC-TEH	TEC-TEH		00006	610UL	08H+ 4.50to+ 18.24	0.30		0	PDP	8
105	30	C	TEC-TEH	TEC-TEH		00006	610UL	BW1+ 20.39	0.65		141	NQI	P 1
109	30	C	TEC-TEH	TEC-TEH		00006	610UL	07H+ 33.54to+ 40.97	0.30		0	PDP	8
120	35	C	TEC-TEH	TEC-TEH		00006	610UL	07H+ 31.54to+ 40.40	0.37		0	PDP	8
121	40	C	TEC-TEH	TEC-TEH		00006	610UL	07H+ 22.17to+ 32.04	0.30		0	PDP	8
		C	TEC-TEH	TEC-TEH		00006	610UL	08H+ 4.44to+ 19.85	0.50		0	PDP	8
116	45	EXP 1	H	TEH-VS2	TEH-VS6	00004	610UL	08H+ 43.96to+ 46.48	0.00		0	PDP	8
114	49	C	TEC-TEH	TEC-TEH		00007	610UL	08H+ 17.89to+ 28.99	0.31		0	PDP	8
114	51	C	TEC-TEH	TEC-TEH		00007	610UL	08H+ 19.70to+ 31.82	0.18		0	PDP	8
140	51	C	TEC-TEH	TEC-TEH		00007	610UL	09H+ 9.95to+ 18.89	0.42		0	PDP	8
142	53	C	TEC-TEH	TEC-TEH		00007	610UL	07H+ 18.24to+ 34.48	0.43		0	PDP	8
143	54	C	TEC-TEH	TEC-TEH		00007	610UL	07H+ 19.53to+ 36.97	0.32		0	PDP	8
144	57	C	TEC-TEH	TEC-TEH		00007	610UL	09H+ 23.43to+ 27.19	0.50		0	PDP	8
		C	TEC-TEH	TEC-TEH		00007	610UL	09H+ 24.78	0.59		42	NQI	P 1
104	77	EXP 1	C	TEC-TEH	TEC-TEH	00031	610UL	07H+ 31.06to+ 37.24	0.40		0	PDP	8
159	86	H	BW1-BW1	BW1-BW1		00074	580RC	BW1- 2.74to- 4.00	0.70		0	PDP	4
98	99	C	TEC-TEH	TEC-TEH		00020	610UL	08H+ 2.68to+ 9.04	0.55		0	PDP	8
103	100	C	TEC-TEH	TEC-TEH		00020	610UL	08H+ 3.73to+ 8.04	0.47		0	PDP	8
109	100	C	TEC-TEH	TEC-TEH		00020	610UL	08H+ 20.47to+ 26.41	0.58		0	PDP	8
99	106	C	TEC-TEH	TEC-TEH		00019	610UL	08H+ 4.09to+ 11.01	0.36		0	PDP	8
93	114	C	TEC-TEH	TEC-TEH		00019	610UL	08H+ 1.94to+ 12.57	0.36		0	PDP	8
117	118	H	09H-BW1	09H-BW1		00074	580RC	09H- 4.47to- 1.99	1.65		0	PDP	4
		H	TEH-09H	TEH-09H		00074	580RC	09H- 4.32to+ 4.18				BOW	3
113	124	EXP 1	H	BW1-VS2	BW1-VS2	00074	580RC	BW1+ 13.49to+ 30.42	1.79		262	PDP	4
114	135	EXP 1	H	08H-BW1	08H-BW1	00074	580RC	08H+ 26.52to+ 47.04	5.18		352	BOW	3
		H	08H-BW1	08H-BW1		00074	580RC	08H+ 37.74to+ 42.56	1.46		0	PDP	4
		H	08H-BW1	08H-BW1		00074	580RC	08H+ 39.95	2.01		12	PAI	P 1
95	138	C	TEC-TEH	TEC-TEH		00067	610UL	BW1+ 13.46	0.68		101	NQI	P 1
102	139	EXP 2	C	TEC-TEH	TEC-TEH	00069	610UL	08H+ 24.94	1.01		28	NQI	1
99	148	EXP 2	H	BW1-VS2	BW1-VS2	00074	580RC	BW1- 1.05to+ 3.86	3.51		0	BOW	3
		H	BW1-VS2	BW1-VS2		00074	580RC	BW1+ 3.20to+ 4.09	1.25		0	PDP	4
		H	BW1-VS2	BW1-VS2		00074	580RC	BW1+ 3.83	0.64		248	PAI	P 1
		H	BW1-VS2	BW1-VS2		00074	580RC	BW1+ 19.38to+ 23.51	0.98		0	PDP	4
102	153	EXP 2	C	TEC-TEH	TEC-TEH	00070	610UL	08H+ 9.97to+ 17.85	2.34		0	PDP	8
104	153	EXP 2	C	TEC-TEH	TEC-TEH	00070	610UL	08H+ 15.52to+ 25.02	0.51		0	PDP	8
106	153	EXP 2	C	TEC-TEH	TEC-TEH	00070	610UL	08H+ 20.90to+ 28.29	0.58		0	PDP	8

REVIEW OF 10/92 BOBBIN DATA ROW 90 & UP

CUMULATIVE REPORT
09/93, ARIZONA PUBLIC SERVICE CO., PALO VERDE, UNIT 3

STEAM GENERATOR : 31
OUTAGE DATA SET : CURRENT
SECTION VARIABLES: Percent

PAGE: 2 OF 2
DATE: 09/30/93
TIME: 14:15:41

NUMBER OF TUBES SELECTED FROM CURRENT OUTAGE: 29
NUMBER OF DATA RECORDS SELECTED FROM CURRENT OUTAGE: 40

NO TREND ANALYSIS REQUESTED

DATA SELECTION CRITERIA:
Percent: NQI, PDP, BOW, PAI

REPORT OPTIONS:
Only examination results matching criteria are included

REVIEW OF 10/92 BOBBIN DATA ROW 90 & UP

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Analysis System Graphics

Tube Comment:

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VS2-						ZOOMED 30 10
		MxRVmx GAn180	MxRVmx GAn180	MxRVmx GAn180	MxRVmx GAn180	X2-/2 Liz Chan
		0.67v 57d 92%	0.20v 62d 95%	0.35v 59d 52%	0.69v 51d 94%	Next-Last Channel
BW1-		08H + 25.36				
		2: 550 ABSL	4: 990 ABSL	6: 100 ABSL	P2: 2-6 ABSL	8-LISS
		0.07v/d sp 1 r 75	0.07v/d sp 1 r 28	0.07v/d sp 1 r 32	0.15v/d sp 1 r 55	Data-Dir/ File-Func
08H-						Process Channels
		MxRVmx GAn180	MxRVmx GAn180	MxRVmx GAn180	MxRVmx GAn180	Print Screen
		0.41v 232d	0.05v 243d	0.28v 231d	0.87v 216d 20%	

Analysis System Graphics

Tube Comment:





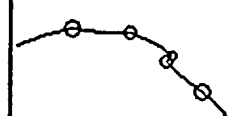
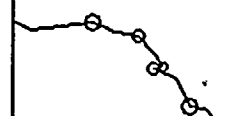
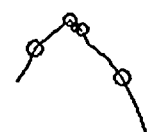
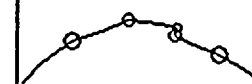
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08H-						ZOOMED 30 10
		Vpp 1.13 Vmx GAn180	Vpp 1.13 Vmx GAn180	Vpp 1.13 Vmx GAn180	Vpp 1.13 Vmx GAn180	X2-/2 Liz Chan
		0.76v 51d 93%	0.24v 49d 96%	0.35v 55d 61%	0.00v 0d	Next-Last Channel
		08H + 24.99				
BW1-		2: 550 ABSL	4: 990 ABSL	6: 100 ABSL	8: 20 ABSL	8-LISS
		0.16v/d sp 4 r 63	0.07v/d sp 1 r 28	0.11v/d sp 3 r 31	0.14v/d sp 3 r 19	Data-Dir/ File-Func
						Process Channels
		Vpp 1.13 Vmx GAn180	Vpp 1.13 Vmx GAn180	Vpp 1.13 Vmx GAn180	Vpp 1.13 Vmx GAn180	Print Screen
		0.30v 202d	0.15v 248d	0.15v 164d	0.04v 326d	

Analysis System Graphics

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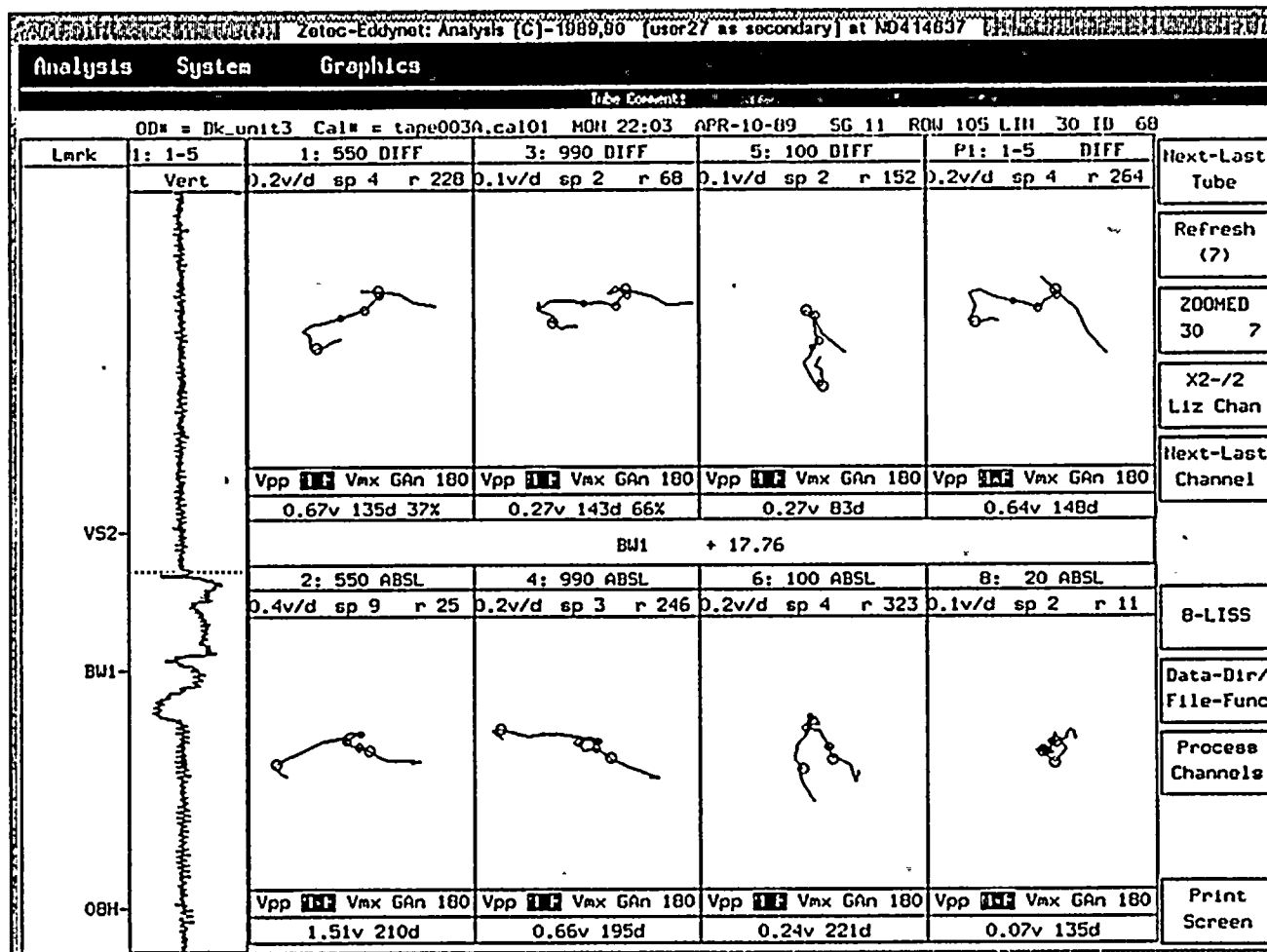
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						ZOOMED 30 10
		Vpp 1.02 Vmx GAn180	Vpp 1.12 Vmx GAn180	Vpp 1.12 Vmx GAn180	Vpp 1.12 Vmx GAn180	X2-/2 Liz Chan
		0.70v 154d 11%	0.34v 175d 50%	0.25v 116d	0.65v 150d 9%	Next-Last Channel
		BW1 + 19.07				
		2: 550 ABSL	4: 990 ABSL	6: 100 ABSL	P2: 2-6 ABSL	8-LISS
		.2v/dsp 5 r 75	.1v/dsp 1 r 281	.1v/dsp 1 r 321	.4v/dsp 5 r 55	Data-Dir/ File-Func
						Process Channels
		Vpp 1.02 Vmx GAn180	Vpp 1.12 Vmx GAn180	Vpp 1.12 Vmx GAn180	Vpp 1.12 Vmx GAn180	Print Screen
		0.86v 221d	0.27v 246d	0.20v 213d	1.79v 198d 32%	

VS2-

BW1-

OBH-



2

3

4

5

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11

Analysis System Graphics

Tube Comment:

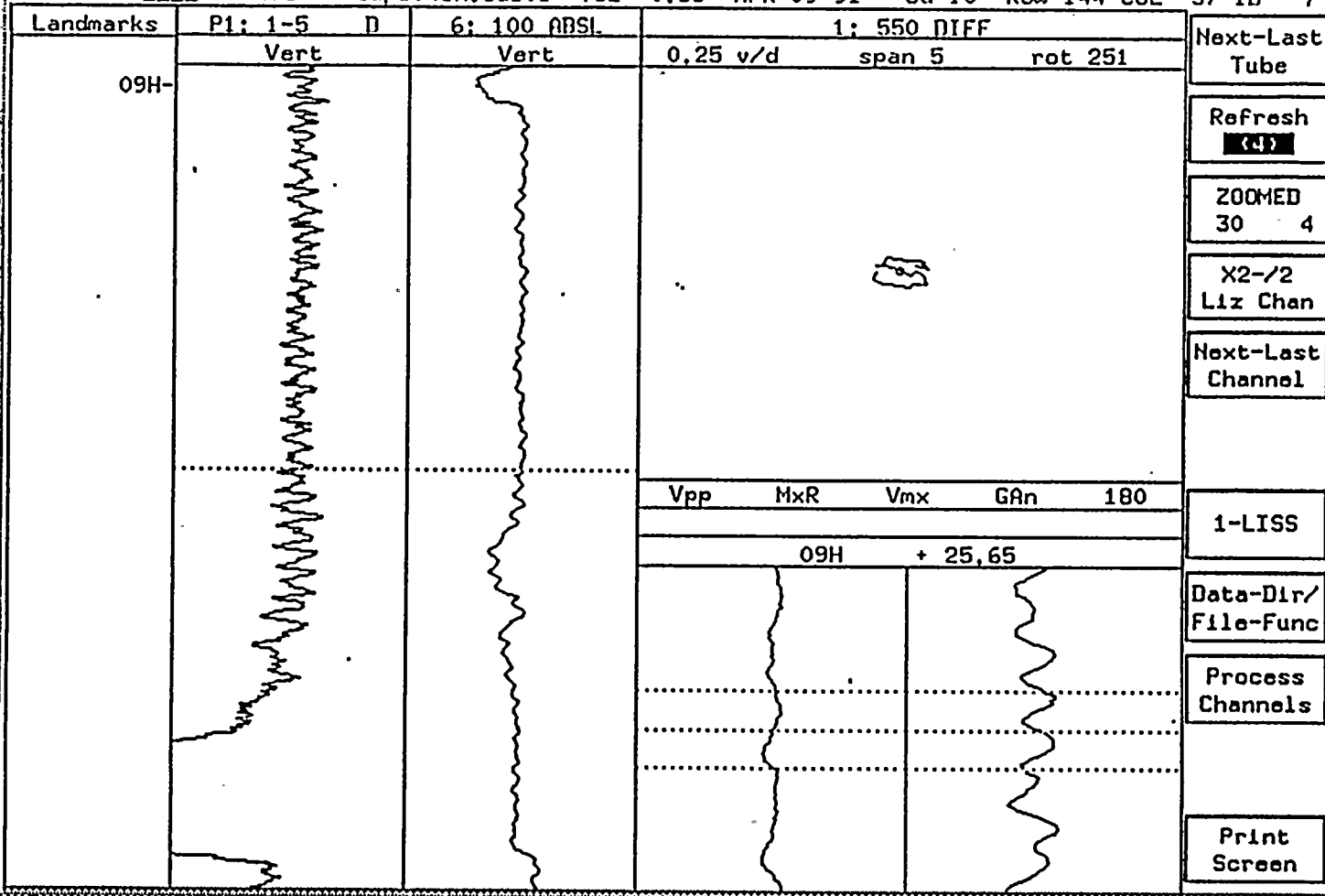
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						ZOOMED 30 4
		Vpp 1.13 Vmx GAn180 0.49v 50d 96%	Vpp 1.13 Vmx GAn180 0.12v 75d 92%	Vpp 1.13 Vmx GAn180 0.19v 63d 30%	Vpp 1.13 Vmx GAn180 0.60v 43d 94%	X2-/2 Liz Chan
		09H + 25.52				Next-Last Channel
		2: 550 ABSL .3v/dsp 8 r 75	4: 990 ABSL .1v/dsp 3 r 281	6: 100 ABSL .1v/dsp 2 r 321	P1: 1-5 DIFF .1v/dsp 3 r 265	8-LISS
						Data-Dir/ File-Func
09H-		Vpp 1.13 Vmx GAn180 0.78v 240d	Vpp 1.13 Vmx GAn180 0.22v 243d	Vpp 1.13 Vmx GAn180 0.25v 246d	Vpp 1.13 Vmx GAn180 0.60v 43d 94%	Process Channels
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Analysis System Graphics

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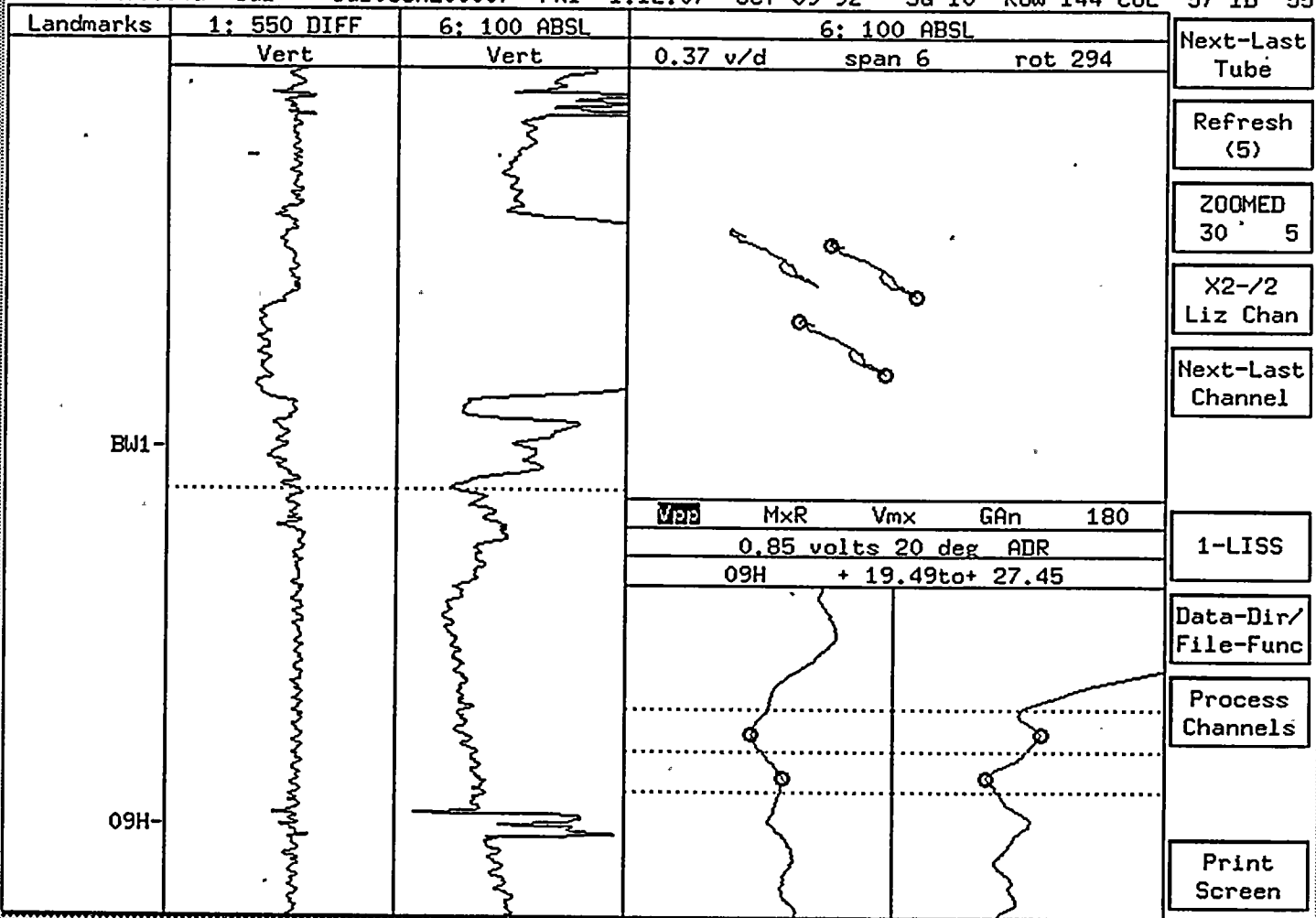


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Analysis System Graphics

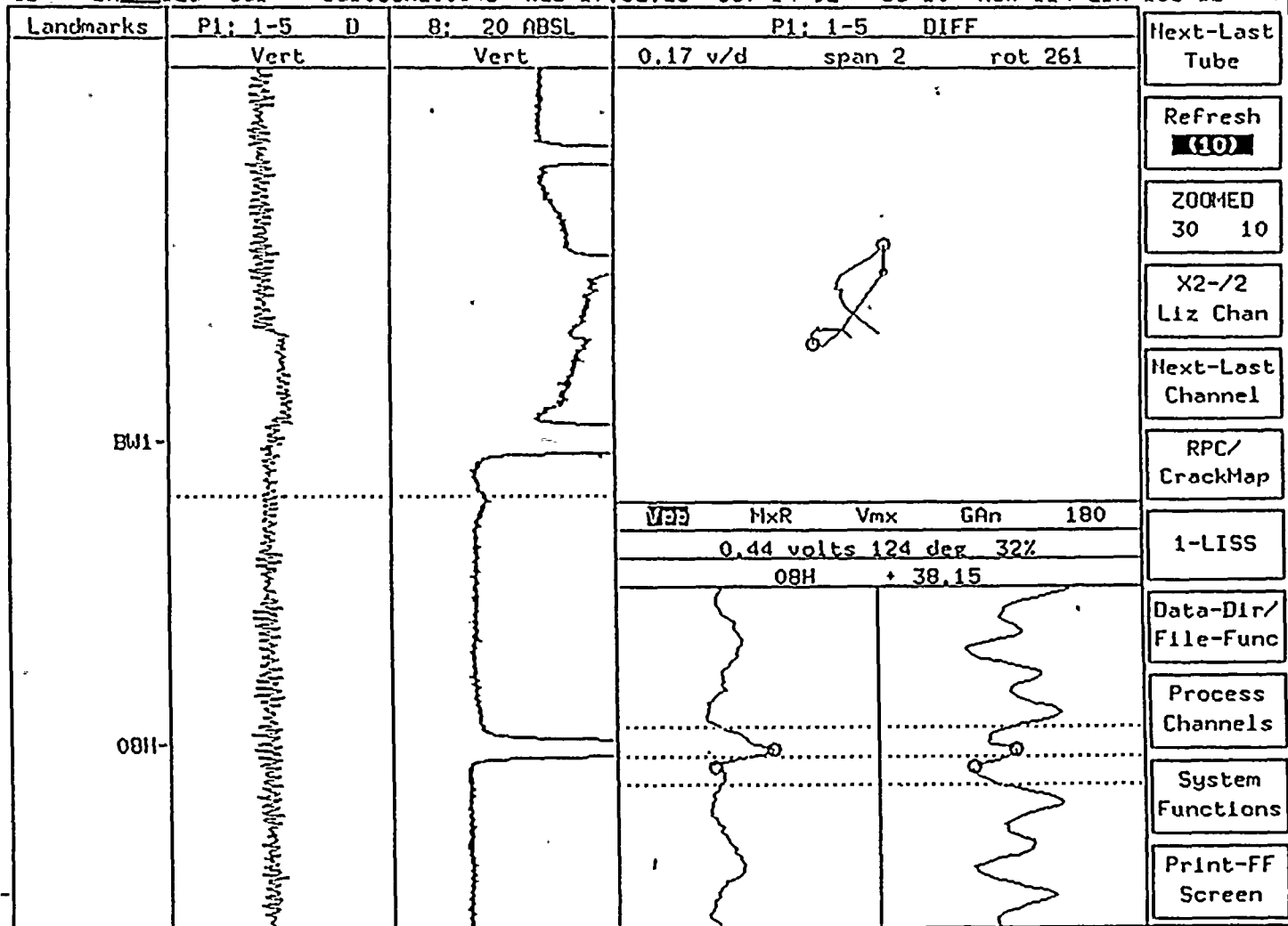
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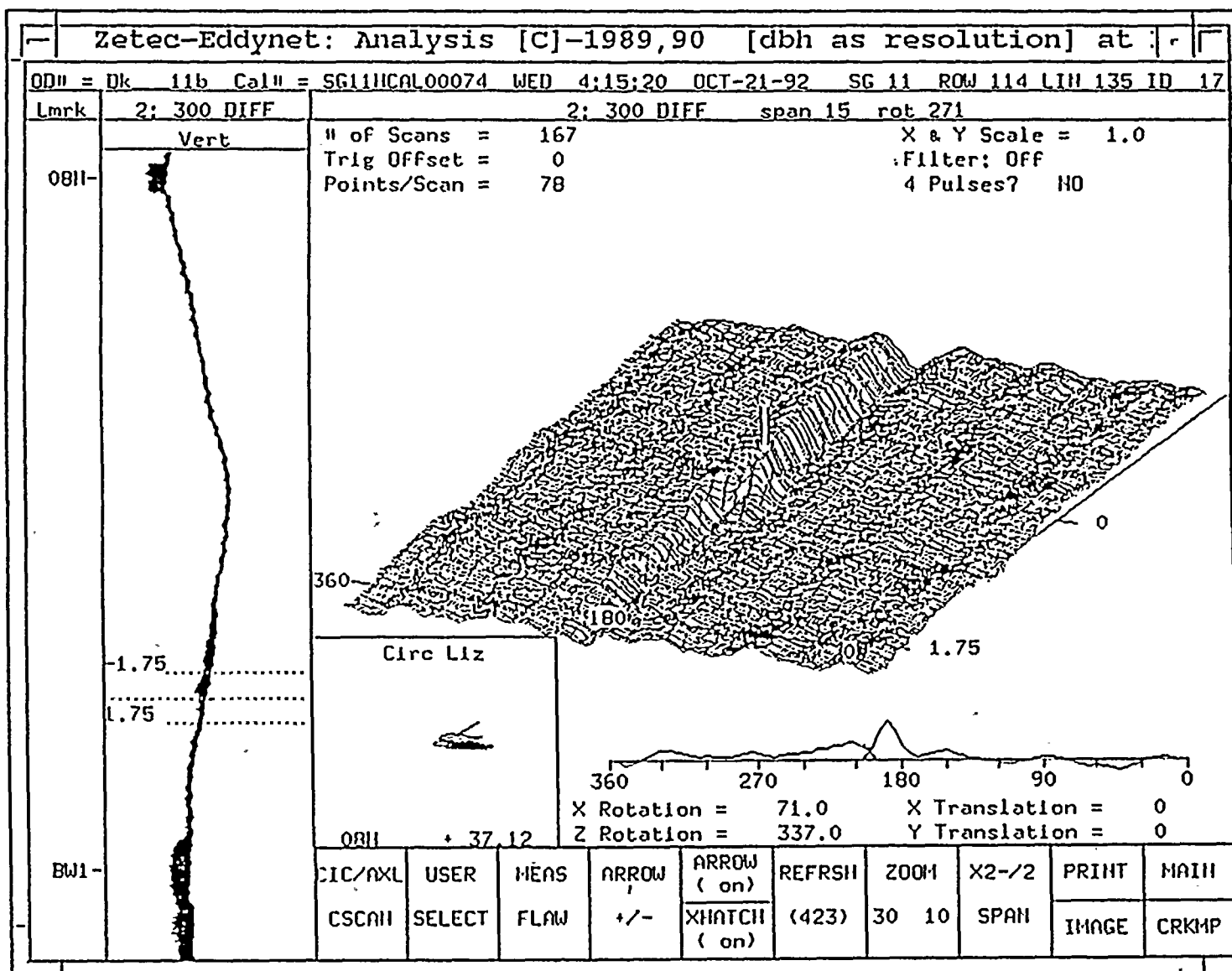
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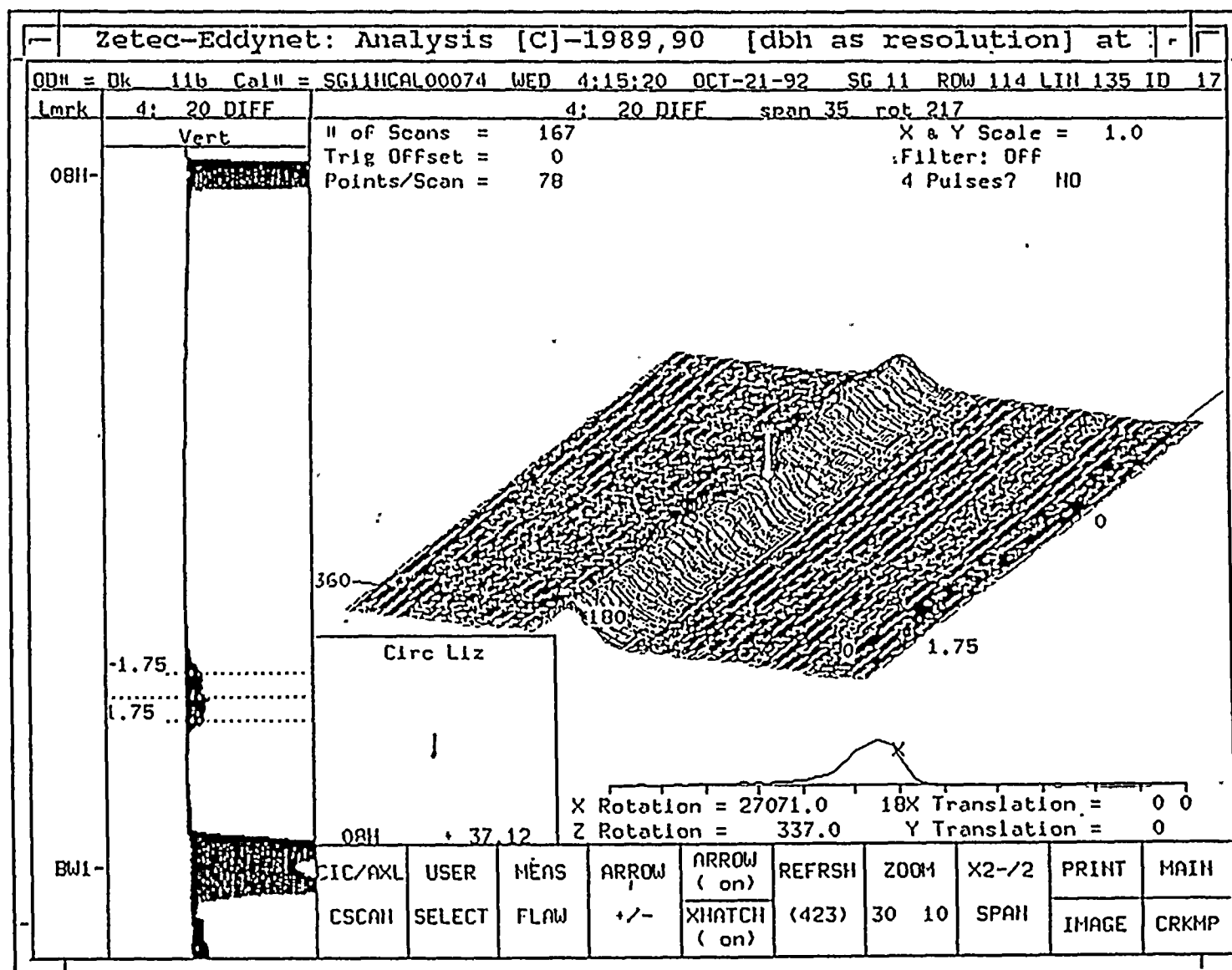


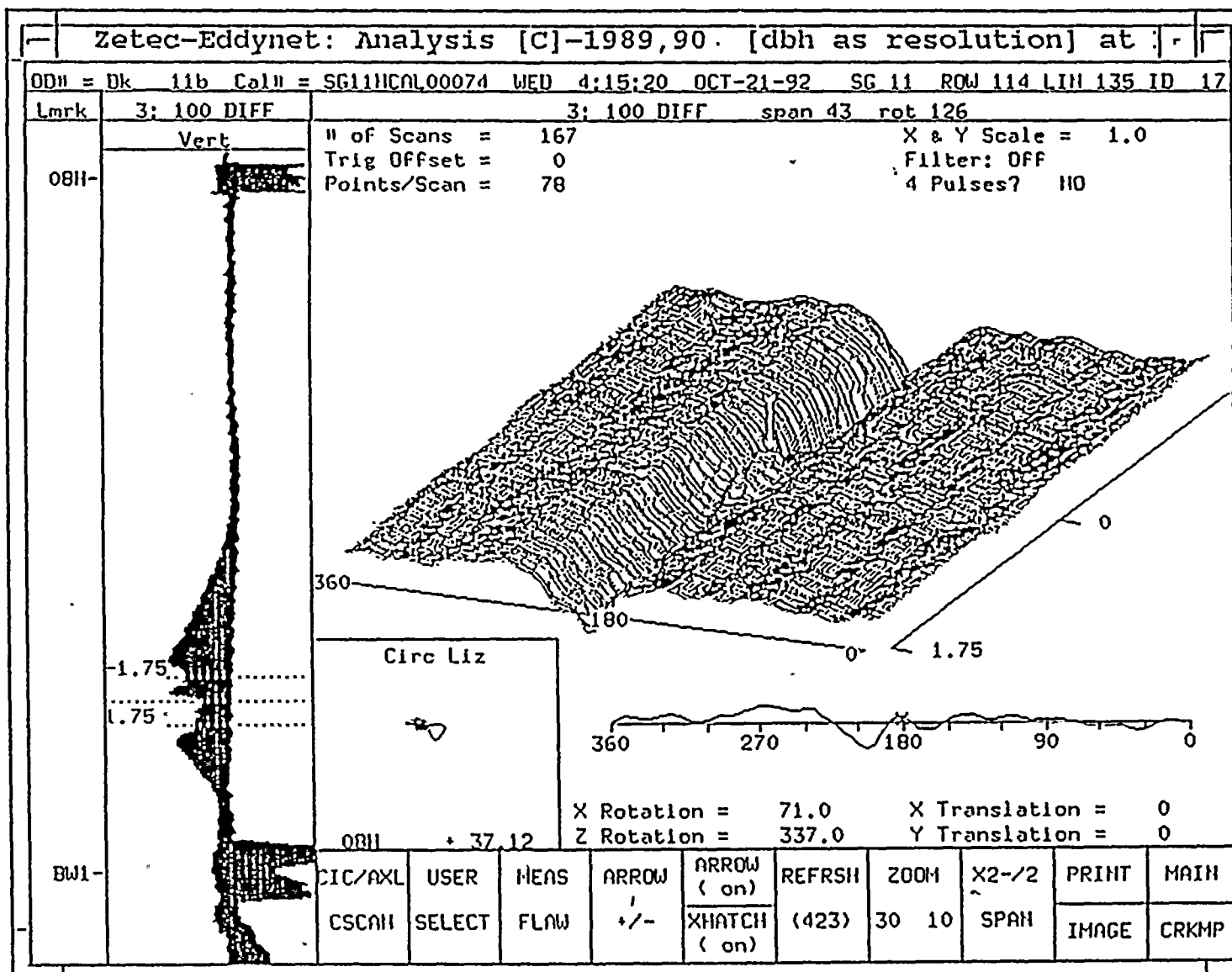
Zetec-Eddynet: Analysis [C]-1989,90 [dbh as resolution] at

OD# = Dk 12a Cal# = SG10CCAL00043 WED 17:52:25 OCT-14-92 SG 10 ROW 114 LIH 135 ID 4







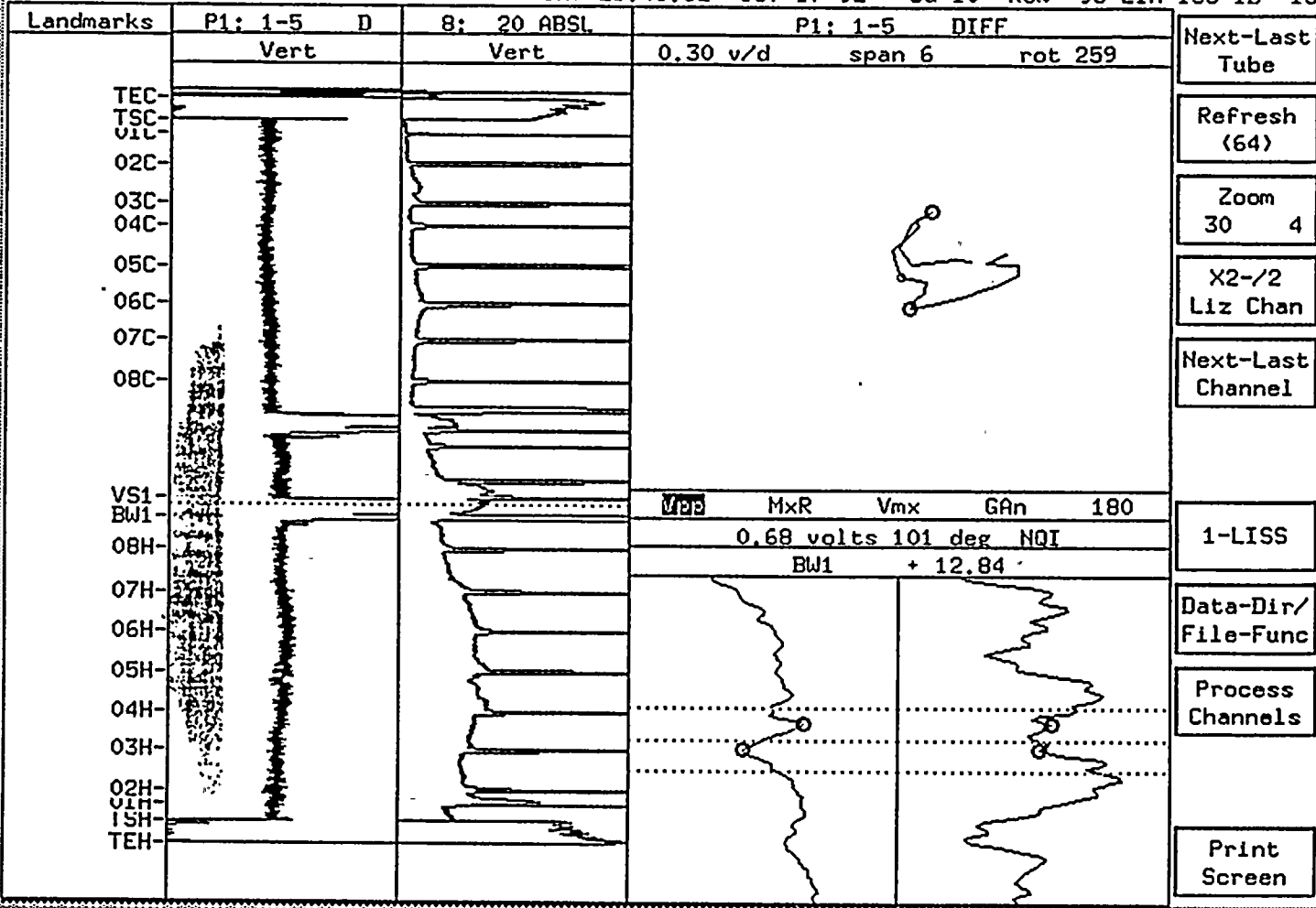


Zetec-Eddynet: Analysis [C]-1989,90 [user11 as resolution] at ND27264D

Analysis System Graphics

Tube Comment:

OD# = DK__17a Cal# = SG10CCAL00067 SAT 21:46:52 OCT-17-92 SG 10 ROW 95 LIN 138 ID 13



Next-Last
Tube

Refresh
(64)

Zoom
30 4

X2-/2
Liz Chan

Next-Last
Channel

1-LISS

Data-Dir/
File-Func

Process
Channels

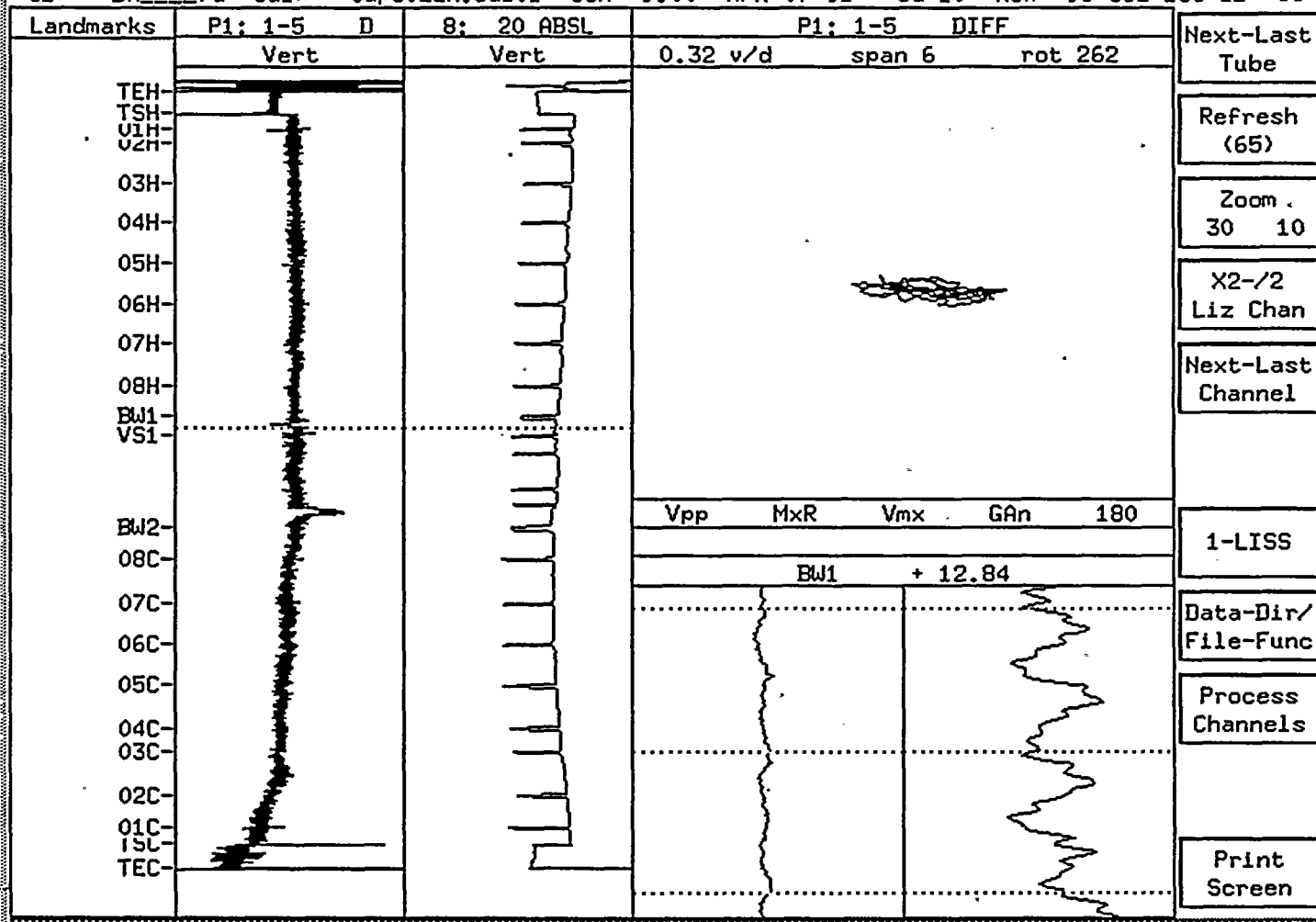
Print
Screen

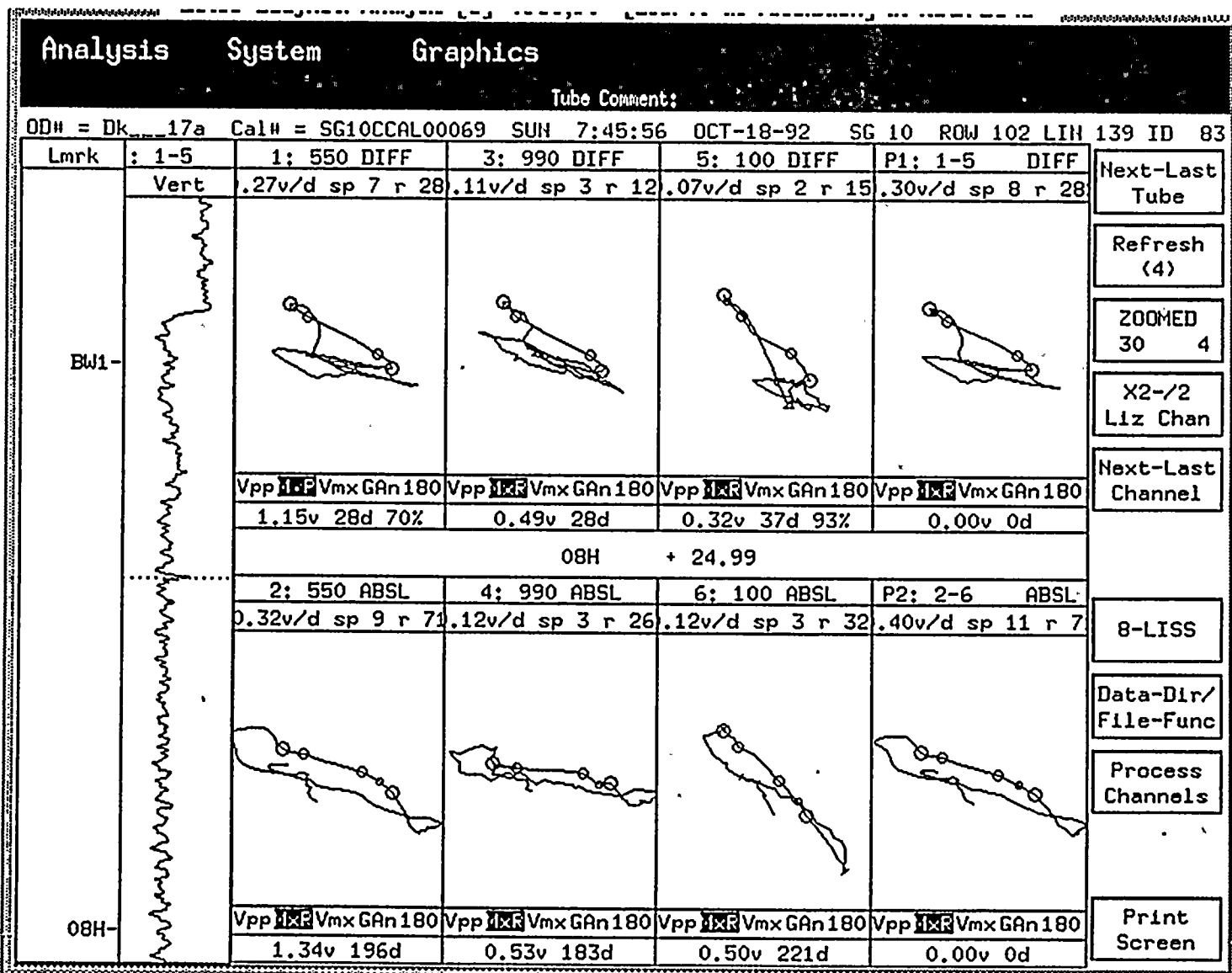
ND 91
084

Analysis System Graphics

Tube Comment:

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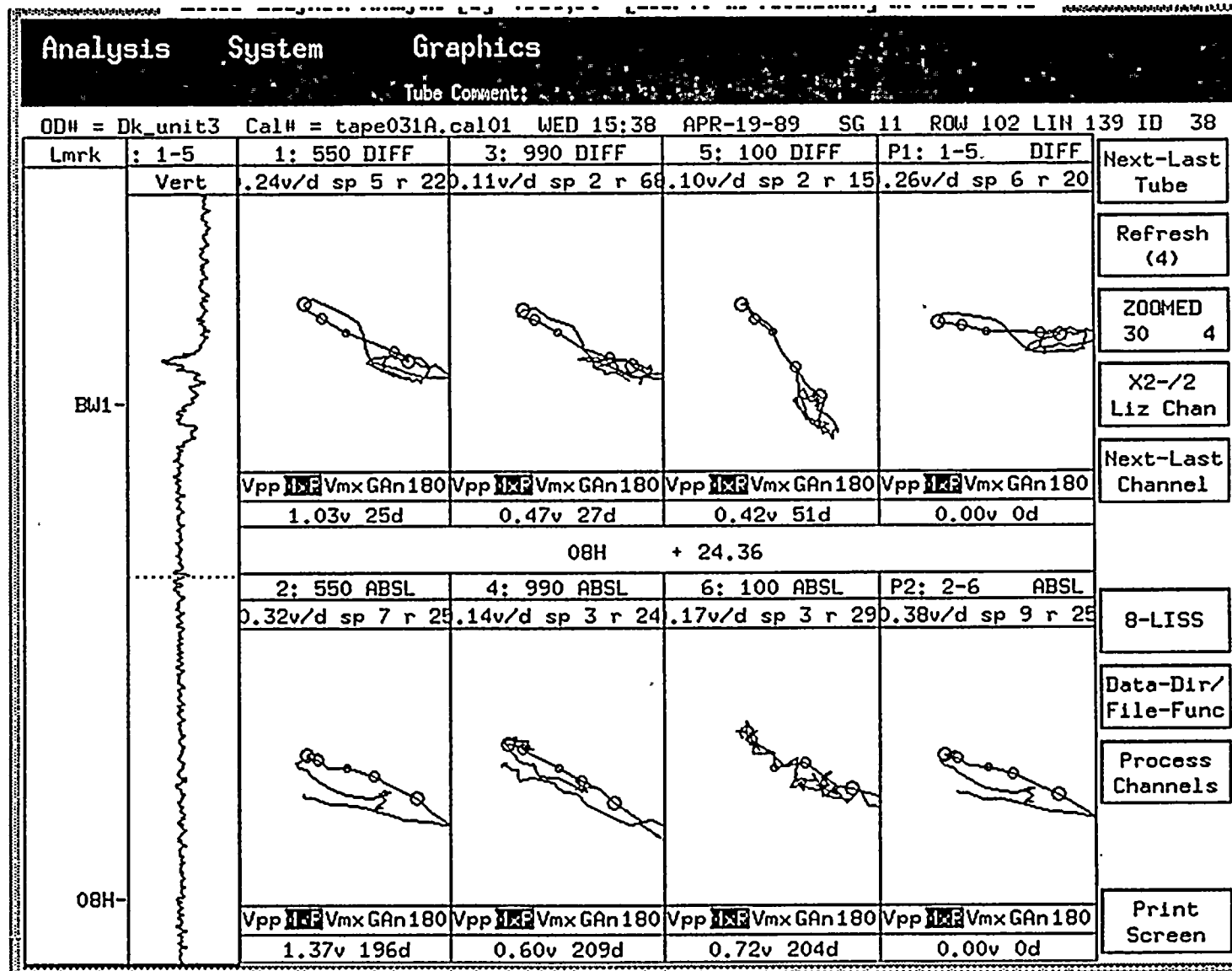
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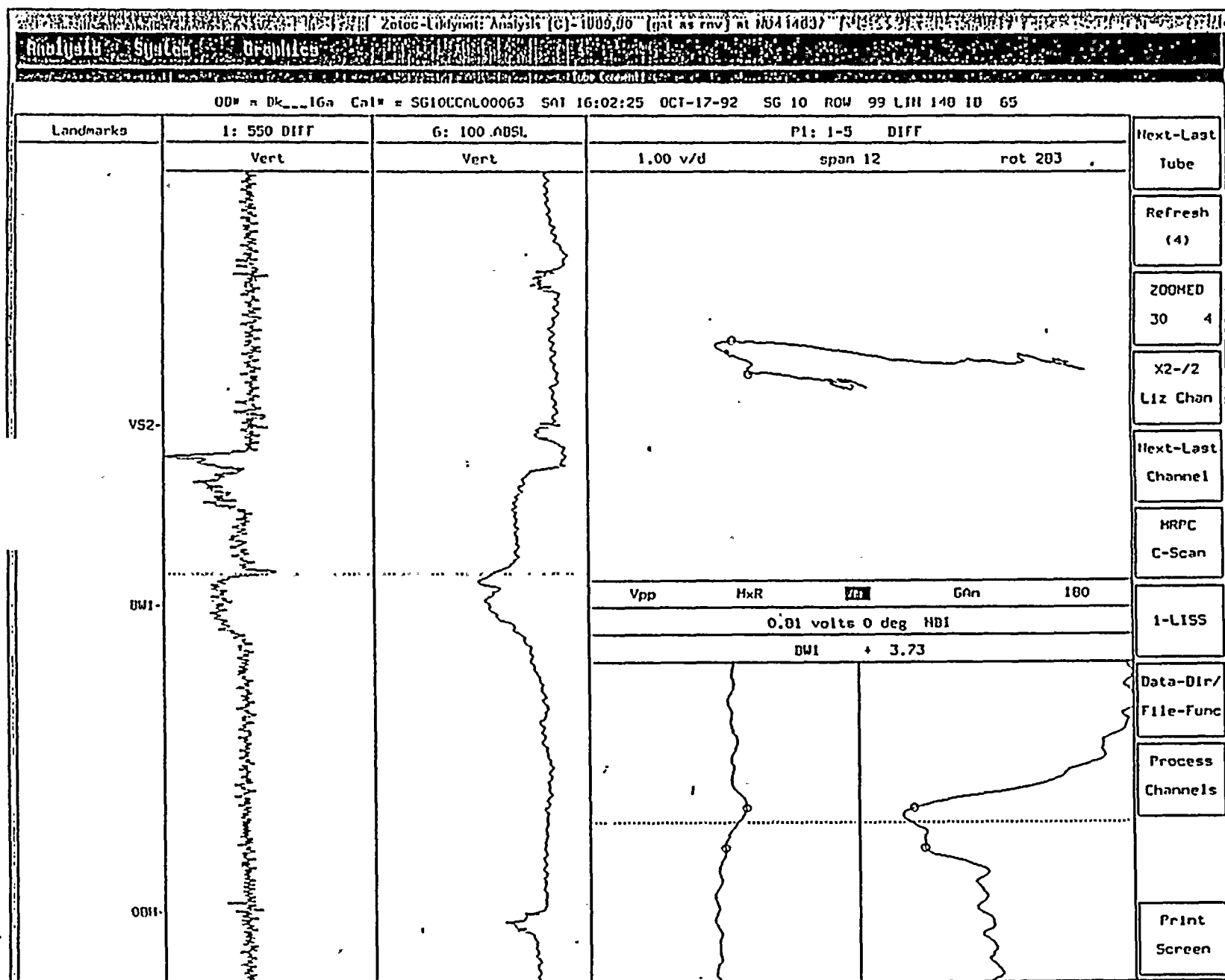
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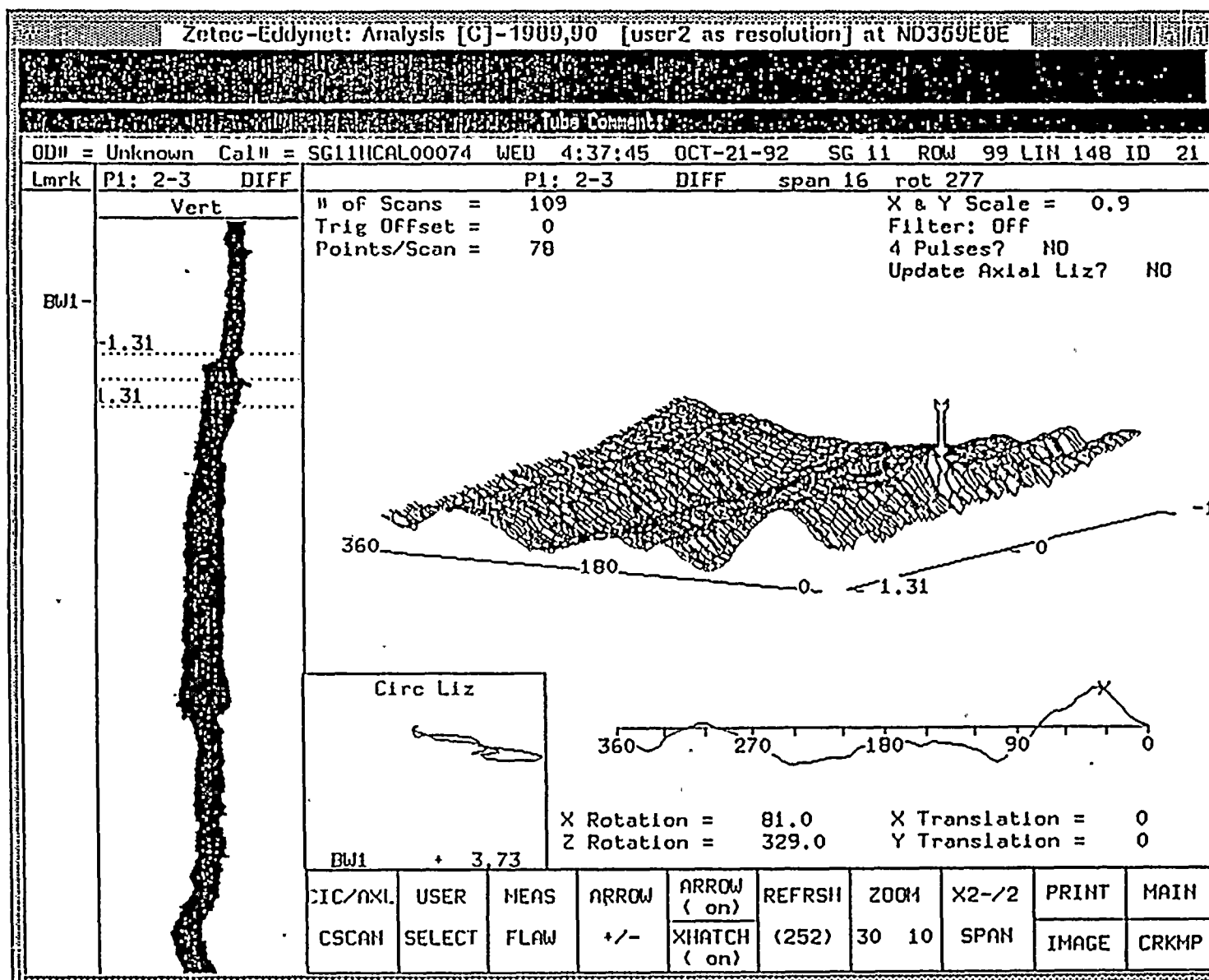
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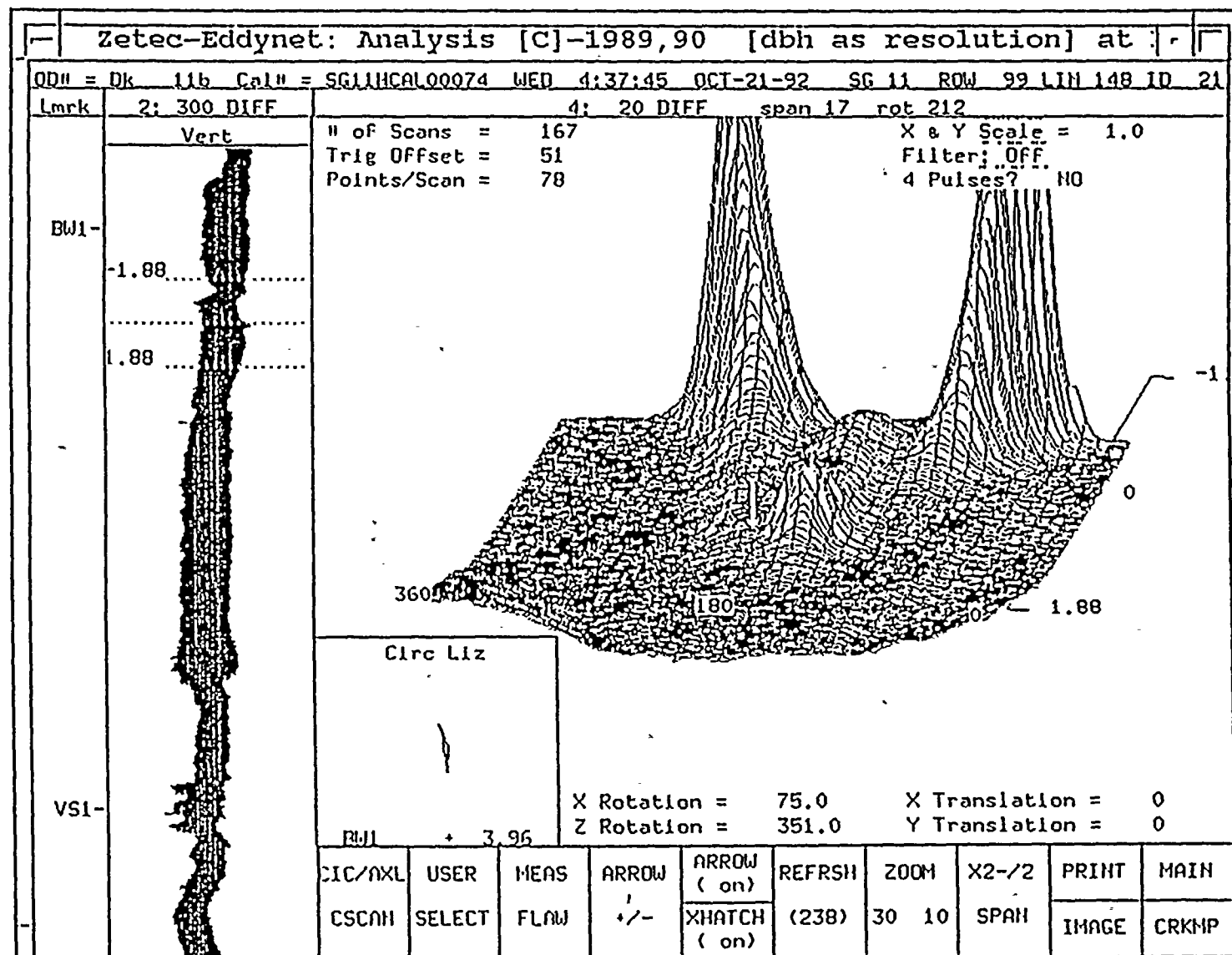
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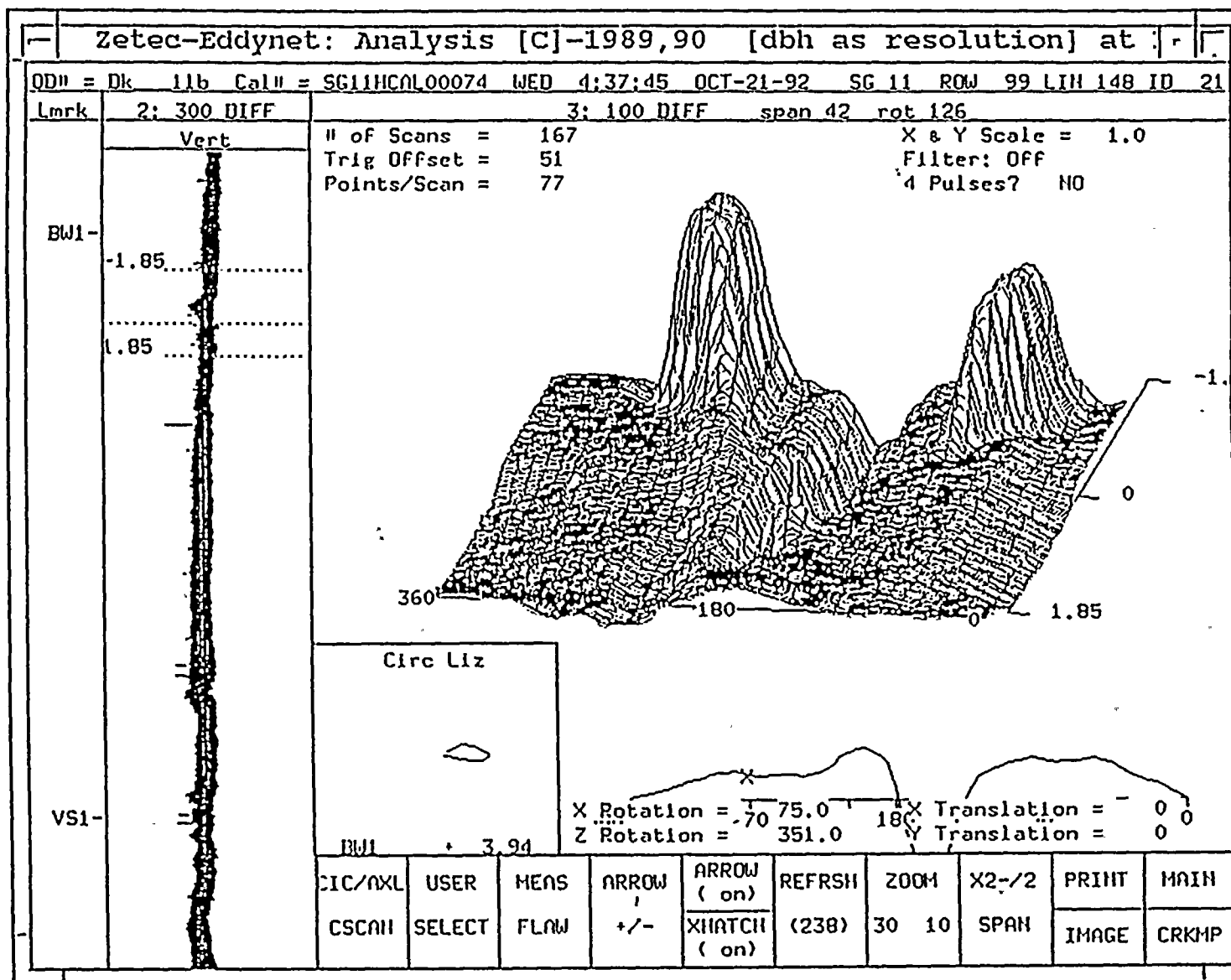
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100









09/93, ARIZONA PUBLIC SERVICE CO., PALO VERDE, UNIT 3

STEAM GENERATOR: 32

OUTAGE DATA SET : CURRENT

SELECTION VARIABLES:

DATE: 09/29/93

TIME: 17:57:16

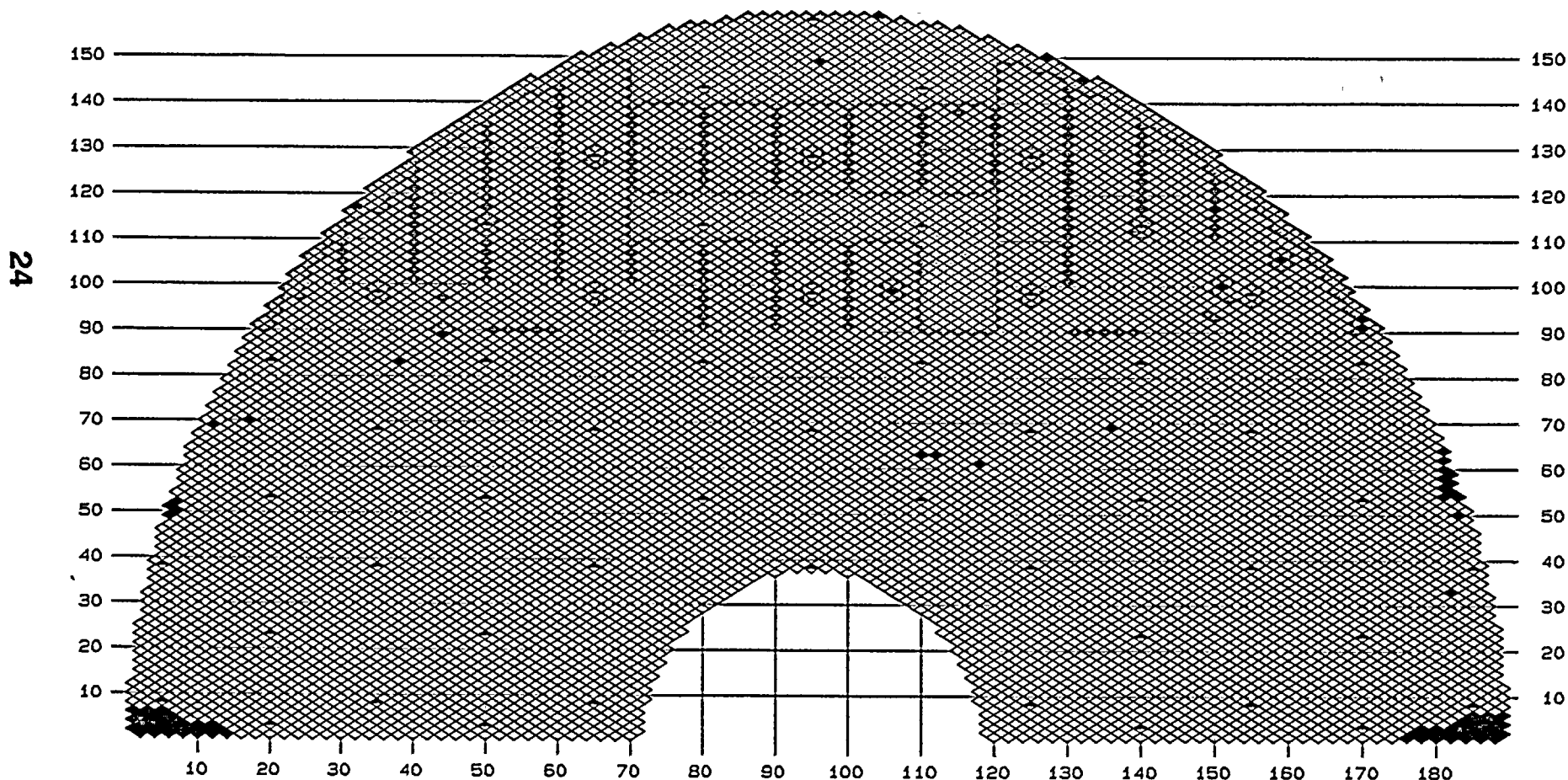
STAYS

PLUGGED

94 ♦

610UL

1358 ♦



REVIEW OF 10/92 BOBBIN DATA ROW 90 & UP

CONAM NUCLEAR, INC. BW

CUMULATIVE REPORT
09/93, ARIZONA PUBLIC SERVICE CO., PALO VERDE, UNIT 3

STEAM GENERATOR : 32
OUTAGE DATA SET : CURRENT
SELECTION VARIABLES: Percent

PAGE: 1 OF 1
DATE: 09/30/93
TIME: 14:25:40

ROW	LIN	LEG	EXAM EXTENT		EXP	CAL	PROBE	LOCATION	VOLTS	CURRENT				CH
			PROGRAM	ACTUAL						MIL	DEG	%		
156	107	H	TEH-VS1	TEH-VS1		00021	610UL	08H+ 20.96	0.60		136	NQI	P 1	

NUMBER OF TUBES SELECTED FROM CURRENT OUTAGE: 1
NUMBER OF DATA RECORDS SELECTED FROM CURRENT OUTAGE: 1

NO TREND ANALYSIS REQUESTED

DATA SELECTION CRITERIA:
Percent: NQI, BOW, PDP, PAI

REPORT OPTIONS:
Only examination results matching criteria are included

REVIEW OF 10/92 BOBBIN DATA ROW 90 & UP

