VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

December 20, 2002

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

Serial No. 02-491B
NL&OS/GDM R0
Docket Nos. 50-338/339
License Nos. NPF-4/7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2
NRC BULLETIN 2002-02 – REACTOR PRESSURE VESSEL HEAD AND VESSEL HEAD PENETRATION NOZZLE INSPECTION PROGRAMS
REQUEST FOR ADDITIONAL INFORMATION

In a letter dated September 12, 2002 (Serial No. 02-491), Virginia Electric and Power Company (Dominion) responded to NRC Bulletin 2002-02, "Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs," for North Anna and Surry Power Stations. Item 2 of the bulletin requires licensees to provide a supplemental response, within 30 days after plant startup, following the next inspection of the reactor vessel head (RVH) and reactor vessel head penetration (RVHP) nozzles to identify the presence of any degradation. This information was provided for North Anna Unit 2 in a letter dated October 18, 2002 (Serial No. 02-491A). This letter also included Dominion's response to an NRC request for additional information associated with the integrity of the North Anna Unit 1 reactor coolant pressure boundary and its conformance with regulatory requirements.

During their review of the information provided in Dominion's October 18, 2002 letter, the NRC determined that additional information was required regarding the RVHP inspections previously performed for North Anna Units 1 and 2. As a result, a conference call was held on November 18, 2002, to discuss the NRC's questions. At the conclusion of the conference call, Dominion stated that it would provide a docketed response to the NRC questions discussed during the call. The NRC questions and our responses are provided in the attachment.

If you have any further questions or require additional information, please contact us.

Very truly yours,

Leslie N. Hartz
Vice President – Nuclear Engineering

A096

Enclosure

Commitments made in this letter: None

cc: U.S. Nuclear Regulatory Commission
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SN: 02-491B
Docket Nos.: 50-338/339
Subject: RAI – NRC Bulletin 2002-02

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Leslie N. Hartz, who is Vice President - Nuclear Engineering, of Virginia Electric and Power Company. She has affirmed before me that she is duly authorized to execute and file the foregoing document in behalf of that Company, and that the statements in the document are true to the best of her knowledge and belief.

Acknowledged before me this 20th day of December, 2002.

My Commission Expires: 3/31/04.

Notary Public

(SEAL)

Enclosure

Response to Request for Additional Information
NRC Bulletin 2002-02

North Anna Power Station Units 1 and 2

Virginia Electric and Power Company
(Dominion)

Response to Request for Additional Information
NRC Bulletin 2002-02

North Anna Power Station Units 1 and 2

1. *How many penetrations (RVHPs) were ultrasonically inspected on the North Anna Unit 1 reactor vessel head during the previous outage?*

   Six penetrations (3, 11, 31, 33, 52 and 60) were ultrasonically examined from the inner diameter (ID) surface of the penetrations to the extent required to size eddy current indications that were detected on the inside diameter of the penetrations with the gap scanner. In addition, penetration 50 was ultrasonically examined from the ID surface of the penetration to look for potential circumferential indications above the J-groove weld on the outer diameter (OD) of the penetration at the root of the weld.

2. *Please identify which RVHPs were identified as masked during the recent visual inspection performed on the North Anna Unit 2 reactor vessel head and also characterize the extent of the masking for each penetration? What steps were taken to clear debris, boric acid, etc. from the masked RVHPs?*

   A list of the masked penetrations and the extent of the masking (i.e., by quadrant) is provided in the attached Table 1, "Masked Penetrations, North Anna Power Station Unit 2."

   The engineering inspection procedure used to perform the RVH and RVHP inspections states that ..."IF masking is evident, THEN pressurized air (maximum 60 psig) directed through an air hose may be utilized to remove loose debris that interferes with the performance of a qualified visual examination." A remotely operated camera mounted on a moveable cart was used to perform the majority of the RVH and RVHP inspections. The camera cart had an air hose attached that was used to remove loose or lightly fixed boric acid and/or debris to facilitate the inspections. Consistent with the inspection procedure, an air pressure of approximately 60 psi was used. A small number of boroscope inspections were also performed in areas that the cart could not easily access (e.g., the areas of the RVH and RVHPs located near the periphery of the RVH). The air hose had to be used separately in these areas, which proved difficult to accomplish effectively. The decision to use air pressure to remove boric acid and/or debris was based on the examiner's judgement. When it was obvious that the air pressure would be of no benefit (e.g., large, hardened boric acid flows from the conoseal surrounding an affected penetration), air pressure was not used.

   Less boric acid accumulation was observed on the Unit 2 RVH during the Fall 2002 outage than was previously observed on the Unit 1 RVH during the Unit 1 Fall 2001

inspection. This is likely due to the Unit 1 conoseal leak potentially depositing boric acid on the Unit 1 RVH for a longer period (i.e. up to a full cycle); whereas, the Unit 2 RVH had been cleaned during the previous mid cycle inspection.

3. *Please provide the length and location of the RVHP tube inner diameter axial indications. (The axial locations of the indications should be provided relative to the J-Groove weld.)*

   Ultrasonic testing (UT) data and Eddy Current testing (ET) data are provided in Attachments 1 and 2, respectively, for the axial indications identified in the North Anna Unit 2 RVHPs. It is not possible to extract precise UT dimensional data relative to the root of the J-Groove weld without reanalyzing the raw UT data. This is because the dimension to the J-Groove root is a nominal dimension, and the data points that were recorded are in relation to the start of the scan, not the J-Groove weld. However, sketches are included in Attachment 1 that were made using the raw UT data at the time of the examinations that show the locations of the indications relative to the measured distance to the J-Groove weld. Dimensional data relative to the root of the J-Groove weld was also not recorded for the ID ET examinations; however, graphics are included in Attachment 2 that show the locations of the recorded indications. In many cases, the outline of the J-Groove weld is visible in the ET data.

4. *Please provide the axial location of each outer diameter circumferential indication identified relative to the root of the J-Groove weld, as well as the length of the indication.*

   See the attached Table 2, "Location of OD Flaws Detected by UT in NAPS Unit 2 CRDM Penetrations." The axial location provided in the table represents the closest approach of the indication to the root of the J-Groove weld. Tables 3 and 4 provide additional information for RVHPs #54 and 65, which include the two indications that most closely approach the J-Groove weld root. These two indications are at 119 to 198 degrees on penetration #54, and at 160 to 190 degrees on penetration #65. These indications were plotted at 5-degree increments along the length of the indication to better characterize the flaw location relative to the J-Groove weld root.

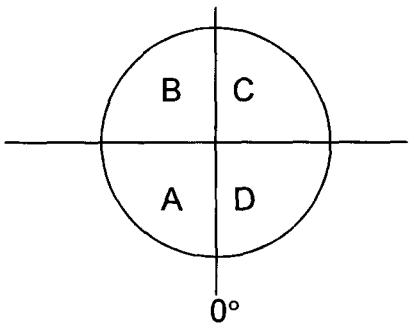
Table 1

Masked Penetrations
North Anna Power Station Unit 2

Penetration #	Extent of Masking*
2	Quadrant C masked by debris (paint chips)
7	Quadrants C and D masked by debris (paint chips)
24	Quadrants A, B, C and D masked. A and B had boric acid potentially from conoseal leak, Quadrant D had debris
27	Quadrants A, B, C and D masked by paint chips and boric acid potentially from conoseal leak
32	Quadrant C masked by debris (paint chips and loose boric acid)
33	Quadrants A, B, C and D masked, A, B and C had boric acid potentially from conoseal leak
41	Quadrants A, B, C and D masked by boric acid potentially from conoseal leak
42	Quadrants B and C masked by boric acid potentially from conoseal leak
46	Quadrant C masked by debris
47	Quadrants A, B, C and D masked by boric acid potentially from conoseal leak
50	Quadrant C masked by paint chips and loose boric acid
52	Quadrants C and D masked by boric acid potentially from conoseal leak
53	Quadrants A, B, C and D masked by boric acid potentially from conoseal leak
59	Quadrant C masked by boric acid potentially from conoseal leak
60	Quadrants A, B, C and D masked by boric acid potentially from conoseal leak

62	Quadrant A masked from previous leakage (repaired but not cleaned last outage)
63	Quadrant A, B, C and D masked from previous leakage (repaired but not cleaned last outage)
64	Quadrants C and D masked by boric acid potentially from conoseal leak
65	Quadrants A, B, C and D masked by boric acid potentially from conoseal leak
66	Quadrant C masked by boric acid potentially from conoseal leak
Head Vent	Quadrant C masked with boric acid potentially from conoseal leak

* - Each penetration is divided into four 90-degree quadrants. The quadrants were designated as indicated in the diagram below with the 0-degree point corresponding to the centerline of the reactor vessel head #1 stud location:



RVHP Inspection Quadrants

Table 2

Location of OD Flaws Detected by UT in NAPS Unit 2 CRDM Penetrations

Penetration #	Characteristics	* Axial Location Relative to Root of J-Groove Weld	Length	Depth
#15	OD Circumferential	-1.12"	7.5 deg. to 12 deg.	0.226"
#21	Potential Leak Path	NA	220 deg.	N/A
#35	OD Axial	-1.12"	0.80"	0.223"
#41	OD Circumferential	-0.52"	357 deg. to 43 deg.	0.097"
#51	Potential Leak Path	NA	210 deg. to 260 deg.	N/A
#54	OD Circumferential	-.040	119 deg. to 198 deg.	0.226"
"	OD Circumferential	-0.276	344 deg. to 16 deg.	0.156"
#59	OD Circumferential	-0.312"	347 deg. to 63 deg.	0.149"
"	OD Circumferential	-0.320	156 deg. to 206 deg.	0.149"
#63	Potential Leak Path	NA	320 deg. to 0 deg.	N/A
#65	OD Circumferential	-0.320	330 deg. to 42 deg.	0.152"
"	OD Circumferential	-0.200	160 deg. to190 deg.	0.078"
#67	OD Circumferential	-0.800	343 deg. to 27 deg.	0.094"

* negative dimension indicates axial distance below root at closest approach

Table 3

Indication in Penetration # 54 at 119 to 198 Degrees
Plotted at 5 Degree Increments Along the Length

Degree	Indication Axial Location	Top of J-Groove Location
119	6.80	6.96
124	6.88	7.16
129	7.04	7.24
134	6.92	7.28
139	7.32	7.36
149	6.88	7.48
154	7.16	7.52
159	7.28	7.56
164	7.40	7.56
169	7.28	7.56
174	7.40	7.60
179	7.56	7.64
184	7.40	7.60
189	7.44	7.56
194	7.36	7.52
197	7.24	7.48

Table 4

Indication in Penetration # 65 at 160 to 190 Degrees Plotted at 5 Degree Increments Along the Length

Degree	Indication Axial Location	Top of J-Groove Location
160	8.28	8.48
165	8.24	8.52
170	8.16	8.56
175	8.16	8.60
180	8.32	8.60
185	8.36	8.56
190	8.24	8.52

Attachment 1

CRDM Open Penetration Ultrasonic Examination
All Recorded Data

North Anna Unit 2
Virginia Electric and Power Company
(Dominion)

NAPS U2 RV Head Examination
Summary of UT Results Reported

Penetration	Ind #	Location / Orientation	Circ Extent Degrees	Axial Extent Inches	Depth Inches	Above/Below J-Groove Root	Evaluated as Flaw
10	1	OD/NA	7 – 37	3.44 – 3.92	NA	BELOW	NO/WWI
10	2	OD/NA	5 – 13 -	4.36 – 4.84	NA	BELOW	NO/LOF
12	1	ID/AXIAL	138 – 138	2.62 – 3.58	TSM	BELOW	YES
12	2	ID/AXIAL	348 – 348	5.18 – 5.78	TSM	ABOVE	YES
15	1	OD/NA	7.5 – 12	2.20 – 2.24	0.226	BELOW	YES
19	1	OD/AXIAL	355 – 355	2.76 – 3.72	NA	BELOW	NO/IPA
19	2	ID/AXIAL	303 – 303	5.56 – 5.92	TSM	ABOVE	YES
21							PLP
31	2	OD/NA	302 – 304	6.56 – 6.84	NA	ABOVE	NO/IPA
35	1	OD/AXIAL	48 – 58	2.72 – 3.52	0.218	BELOW	YES
35	2	OD/NA	172 – 176	4.08 –4.72	NA	BELOW	NO/WWI
35	3	ID/AXIAL	148 – 194	3.70 – 5.20	TSM	BELOW	YES
35	4	OD/AXIAL	44 – 60	2.76 – 3.48	0.223	BELOW	SAME IND. AS 1
38	1	OD/NA	188 – 222	4.82 – 5.46	NA	BELOW	NO/WWI
40	1	OD/NA	149 – 161	6.68 – 6.72	NA	BELOW	NO/WWI
41	1	ID/AXIAL	172 – 172	3.50 – 3.66	TSM	BELOW	YES
41	2	ID/AXIAL	306 – 306	5.54 – 5.86	TSM	ABOVE	YES
41	3	OD/CIRC	357 – 43	3.82 – 4.02	0.097"	BELOW	YES
41	4	OD/NA	342 – 351	3.86 – 4.22	NA	BELOW	NO/LOF
44	1	NA	69 – 161	0 – 2.14	NA	BELOW	NO/LOC
44	2	OD/NA	119 – 125	6.38 – 6.22	NA	BELOW	NO/IPA
44	3	OD/NA	139 – 220	5.58 – 5.58	NA	BELOW	NO/WWI
44	4	OD/NA	177 – 189	6.90 – 7.18	NA	BELOW	NO/LOF
44	5	OD/NA	347 – 17	4.30 – 4.82	NA	BELOW	NO/LOF
46	1	OD/NA	4 – 22	2.56 – 3.24	NA	BELOW	NO/WWI
47	1	OD/NA	10 – 24	3.48 – 3.48	NA	BELOW	NO/WWI
47	2	OD/NA	154 – 235	5.72 - 6.24	NA	BELOW	NO/WWI
47	3	OD/NA	201 – 220	7.64 – 7.52	NA	BELOW	NO/WWI
47	4	OD/NA	Several spots	Several Spots	NA	BELOW	NO/LOF
48	1	OD/NA	208 – 272	0.00 – 1.38	NA	BELOW	NO/LOC
48	2	OD/NA	355 - 22	3.18 – 3.30	NA	BELOW	NO/WWI
48	3	OD/NA	67 – 82	5.18 – 5.22	NA	BELOW	NO/WWI
48	4	OD/NA	205 – 208	9.50 – 9.58	NA	ABOVE	NO/IPA
48	5	OD/NA	303 – 316	5.54 – 8.74	NA	ABOVE	NO/IPA
48	6	OD/NA	Several spots	Several Spots	NA	BELOW	NO/LOF
50	1	OD/NA	319 – 324	10.12 – 10.48	NA	ABOVE	NO/IPA
50	2	OD/NA	301 – 305	8.50 – 8.92	NA	ABOVE	NO/IPA
50	3	OD/NA	20 – 27	2.40 – 2.72	NA	BELOW	NO/IPA
50	4	NA	@ 299	4.48 – 5.60	NA	NA	NO/NOISE
50	5	NA	@ 279	3.02 – 4.20	NA	NA	NO/NOISE
50	6	ID/AXIAL	169 – 169	4.76 – 5.12	TSM	BELOW	YES
51	1	ID/AXIAL	153 – 174	3.07 – 4.43	TSM	BELOW	YES
51	2	ID/AXIAL	337 – 337	3.59 – 3.95	TSM	ABOVE	YES
51	3	ID/AXIAL	13.5 – 13.5	4.63 – 5.19	TSM	ABOVE	YES
51	4	OD/NA	237 – 243	5.51 – 5.51	NA	BELOW	NO/WWI
51	NA						PLP

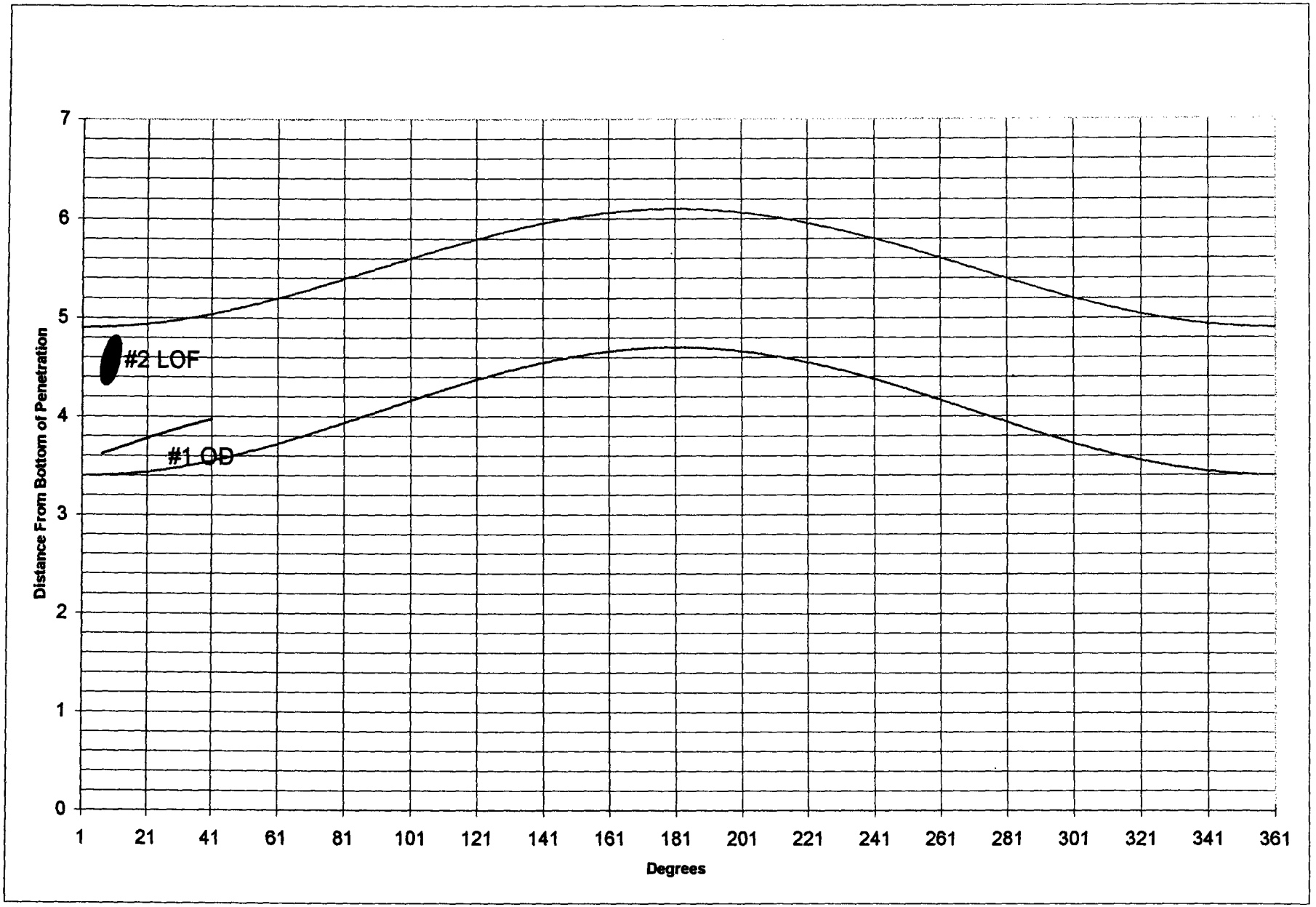
Penetration	Ind #	Location / Orientation	Circ Extent Degrees	Axial Extent Inches	Depth Inches	Above/Below J-Groove Root	Evaluated as Flaw
52	1	OD/NA	144 – 154	7.48 – 7.44	NA	BELOW	NO/IPA
52	2	ID/AXIAL	144 – 144	3.76 – 3.92	TSM	BELOW	YES
52	3	ID/AXIAL	182 – 182	4.72 – 4.92	TSM	BELOW	YES
52	4	ID/AXIAL	322 – 322	2.08 – 2.60	TSM	BELOW	YES
53	1	ID/AXIAL	151.5 – 151.5	5.48 – 5.80	TSM	BELOW	YES
53	2	ID/AXILA	147 – 147	4.72 – 4.92	TSM	BELOW	YES
53	3	ID/AXIAL	207 – 207	4.72 – 4.92	TSM	BELOW	YES
53	4	OD/NA	4.48 – 4.60	19.5 – 21.0	NA	BELOW	NO/LOF
54	1	OD/CIRC	119 – 198	6.68 – 7.40	0.226	BELOW	YES
54	2	OD/CIRC	344 – 16	3.28 – 4.04	0.156	BELOW	YES
55	1	ID/AXIAL	208.5 – 208.5	4.20 – 4.56	TSM	BELOW	YES
55	2	ID/AXIAL	171 – 171	3.80 – 4.08	TSM	BELOW	YES
55	3	OD/NA	82.5 – 67.5	4.80 – 5.28	NA	BELOW	NO/WWI
56	1	OD/NA	43 – 56	3.80 – 4.24	NA	BELOW	NO/WWI
58	1	OD/NA	347 – 359	2.52 - 3.00	NA	BELOW	NO/IPA
59	1	OD/CIRC	347 – 63	4.04 – 4.80	0.149	BELOW	YES
59	2	OD/CIRC	156 – 206	7.66 – 8.08	0.149	BELOW	YES
59	3	ID/AXIAL	159 – 159	8.04 – 8.48	TSM	ABOVE	YES
60	1	OD/NA	140 –294	4.56 – 6.68	NA	BELOW	NO/WWI
60	2	OD/NA	298 – 298	4.48 – 5.20	NA	BELOW	NO/WWI
61	1	OD/NA	119 – 260	5.52 – 5.80	NA	BELOW	NO/WWI
61	2	ID/AXIAL	157 – 166	3.84 – 4.64	TSM	BELOW	YES
61	3	ID/AXIAL	141 – 141	4.72 – 5.16	TSM	BELOW	YES
61	4	ID/AXIAL	178 - 190	4.04 – 5.56	TSM	BELOW	YES
62	1	OD/NA	168 – 175	7.08 – 7.48	NA	BELOW	NO/WWI
62	2	OD/NA	186 – 206	7.00 – 7.44	NA	BELOW	NO/WWI
62	3	OD/NA	224 – 224	6.56 – 6.80	NA	BELOW	NO/IPA
62	4	NA	302 – 286	3.64 – 11.08	NA	ABOVE	NO/LOC
62	5	OD/NA	164 – 162	6.92 – 7.44	OD/NA	BELOW	NO/WWI
62	6	ID/AXIAL	318 – 88	4.88 – 6.68	TSM	ABOVE	YES
62	7	ID/AXIAL	118 - 226	2.68 – 5.64	TSM	BELOW	YES
63	1						PLP
63	2	ID/AXIAL	172 – 172	4.02 – 4.82	TSM	BELOW	YES
63	3	ID/AXIAL	358 – 358	4.70 – 5.22	TSM	ABOVE	YES
64	1	OD/NA	346 – 335	4.00 – 4.00	NA	BELOW	NO/WWI
64	2	ID/AXIAL	316 – 68	4.44 – 6.96	TSM	ABOVE	YES
64	3	ID/AXIAL	110 - 222	4.32 – 6.36	TSM	BELOW	YES
65	1	OD/CIRC	330 – 42	3.20 –5.08	0.152	BELOW	YES
65	2	OD/CIRC	160 – 190	7.84 – 8.36	0.078	BELOW	YES
65	3	ID/AXIAL	142 -198	4.68 – 6.48	TSM	BELOW	YES
66	1	ID/AXIAL	152 – 154	3.88 – 5.24	TSM	BELOW	YES
66	2	ID/AXIAL	200 – 197	4.16 – 5.64	TSM	BELOW	YES
66	3	ID/AXIAL	320 –328	5.60 – 6.76	TSM	ABOVE	YES
66	4	OD/NA	315 – 319	6.76 – 6.76	NA	ABOVE	NO/IPA
66	5	OD/NA	96 – 106	1.84 – 2.28	NA	BELOW	NO/IPA
66	6	ID/AXIAL	84 – 84	7.20 – 7.60	TSM	ABOVE	YES
66	7	OD/NA	80 – 104	5.00 – 5.88	NA	BELOW	NO/IPA
66	8	ID/AXIAL	306 – 348	5.60 – 6.72	TSM	ABOVE	YES
66	9	ID/AXIAL	118 - 216	3.60 – 6.36	TSM	BELOW	YES
67	1	ID/AXIAL	355 – 47	4.04 – 6.67	TSM	ABOVE	YES

Penetration	Ind #	Location / Orientation	Circ Extent Degrees	Axial Extent Inches	Depth Inches	Above/Below J-Groove Root	Evaluated as Flaw
67	2	OD/NA	230 – 234	8.20 – 8.48	NA	ABOVE	NO/IPA
67	3	OD/NA	182 – 187	7.76 – 8.16	NA	BELOW	NO/WWI
67	4	OD/NA	192 – 198	7.37 – 8.00	NA	BELOW	NO/WWI
67	5	OD/CIRC	343 - 27	3.16 – 4.00	0.094	BELOW	YES
67	6	OD/NA	156 – 245	5.40- 6.16	NA	BELOW	NO/WWI
67	7	OD/NA	187 – 193	7.72 – 8.00	NA	BELOW	NO/LOF
67	8	OD/NA	9 – 19	4.16 - 4.48	NA	BELOW	NO/LOF
68	1	OD/NA	344 – 0	5.00 – 5.40	NA	BELOW	NO/WVI - LOF

*** LEGEND**

WWI – Indication evaluated as weld interface signal
PLP – Possible Leak Path
LOF – Indication evaluated as lack of fusion in weld
IPA – Indication evaluated as anomaly such as material or weld artifact
LOC – Loss of coupling with test surface in area
NOISE – Noise in data either electrical or material related
TSM – Shallow flaw that is too shallow to measure with existing probe spacing
WVI – Volumetric indication in weld

North Anna Unit 2 RVHP Weld Profiles Penetration #10



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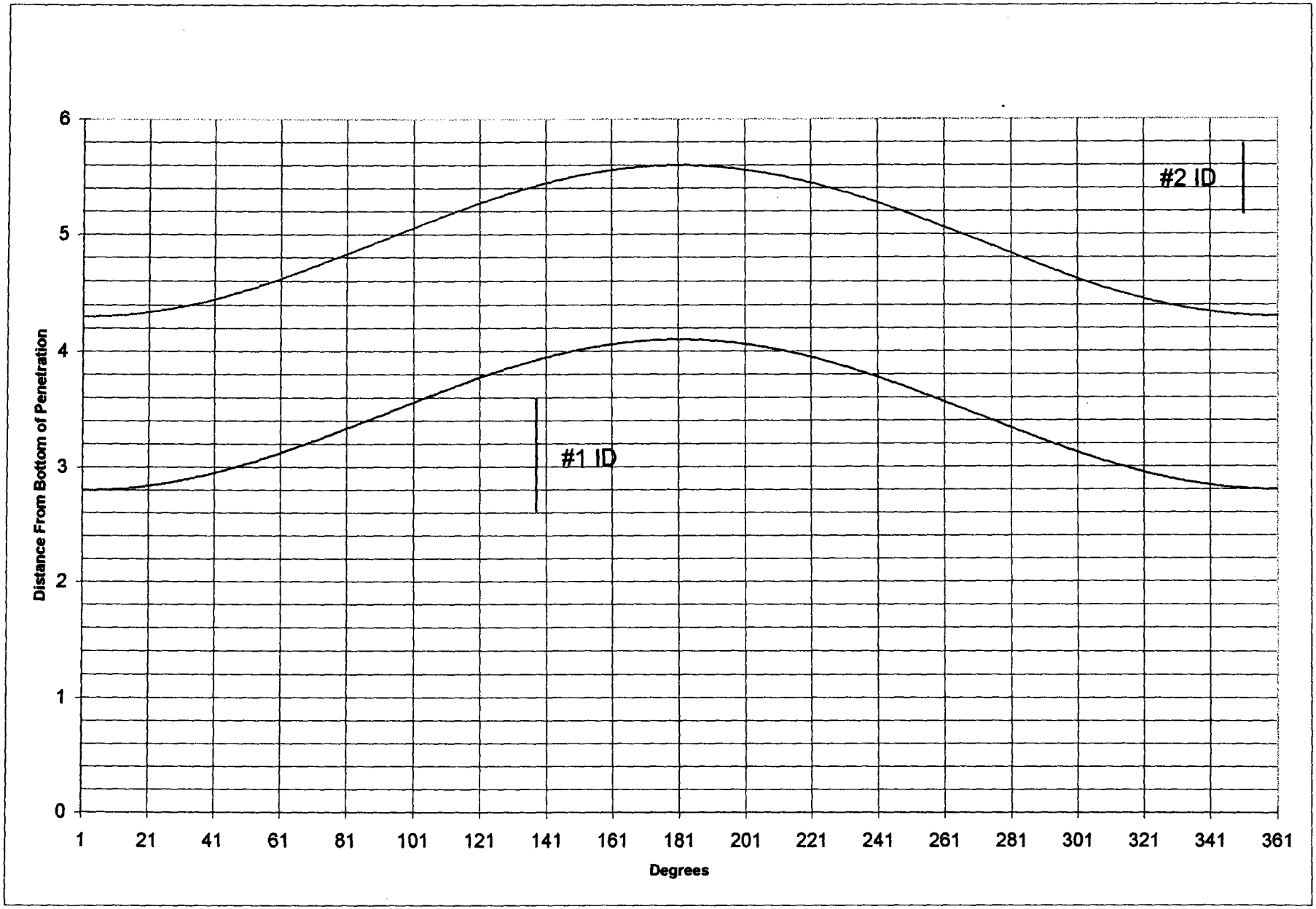

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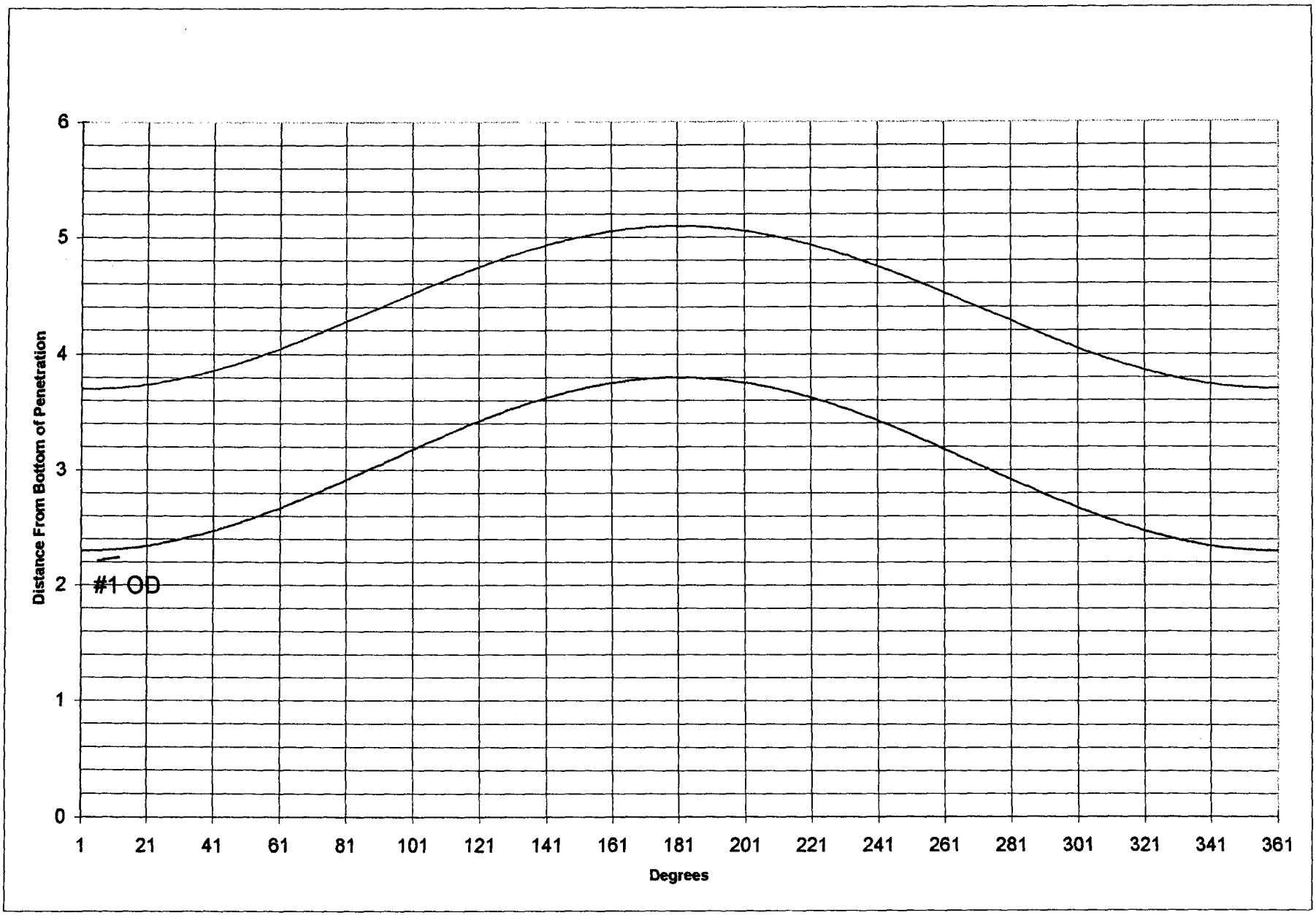
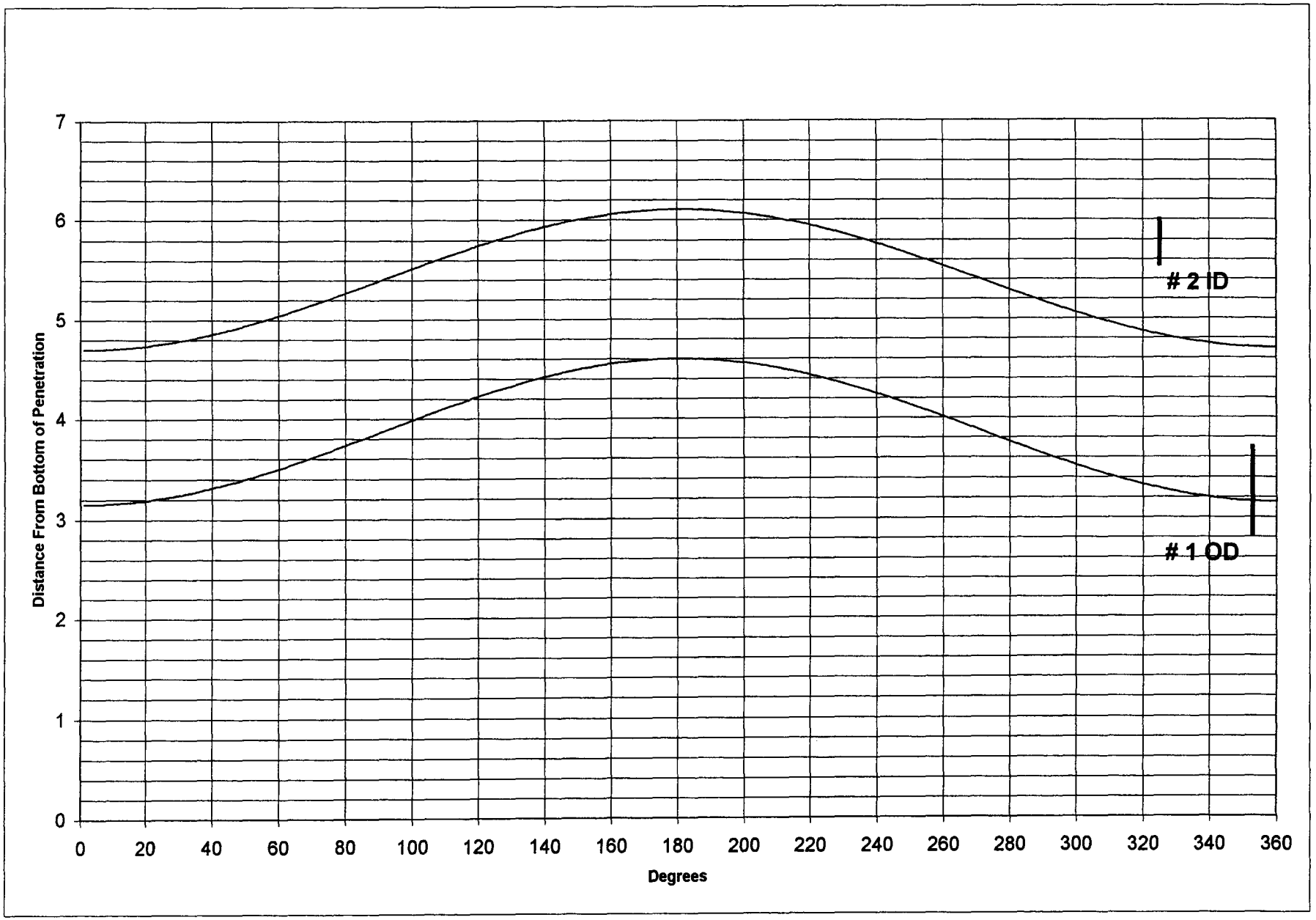


North Anna Unit 2 RVHP Weld Profile Penetration 19



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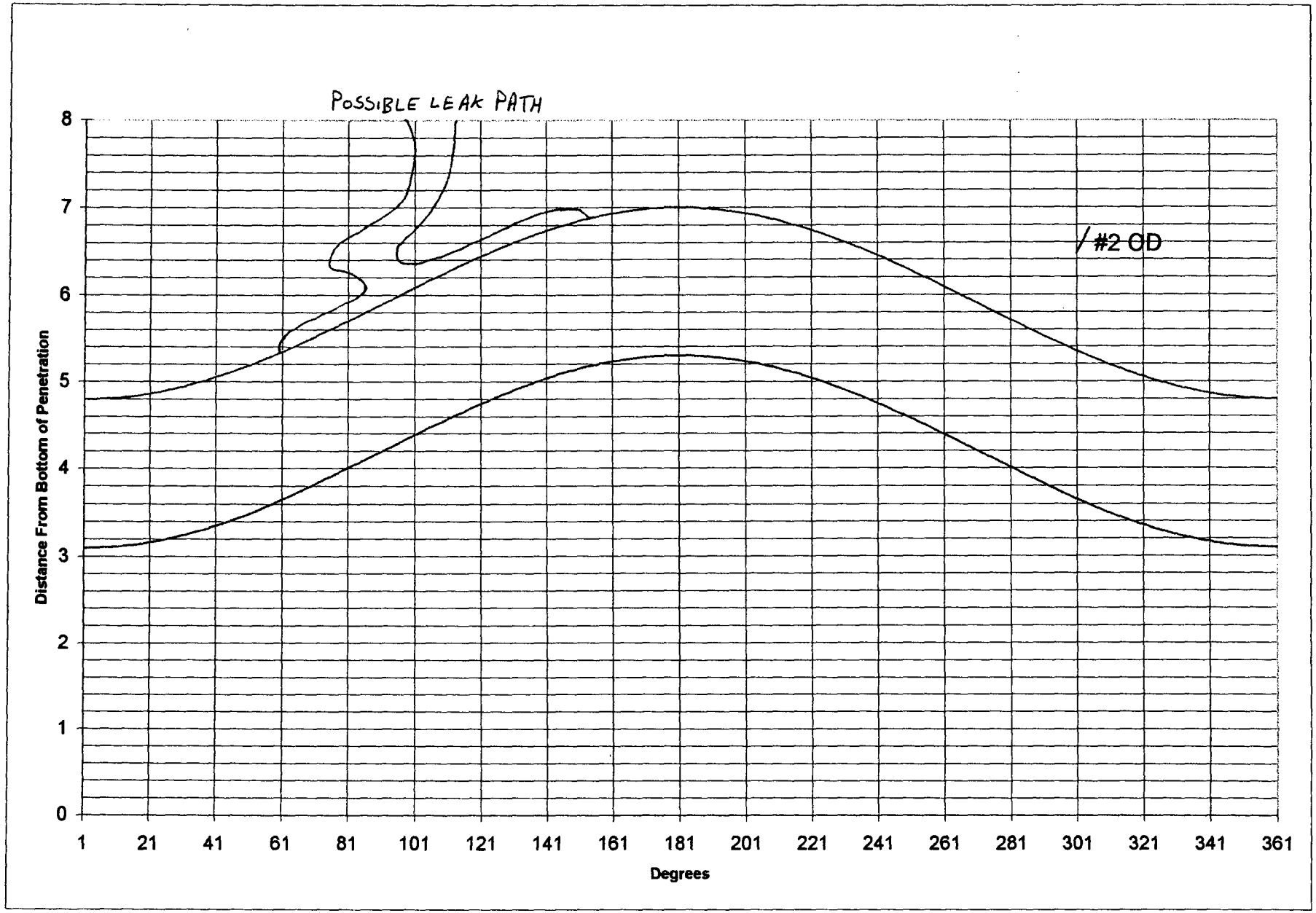

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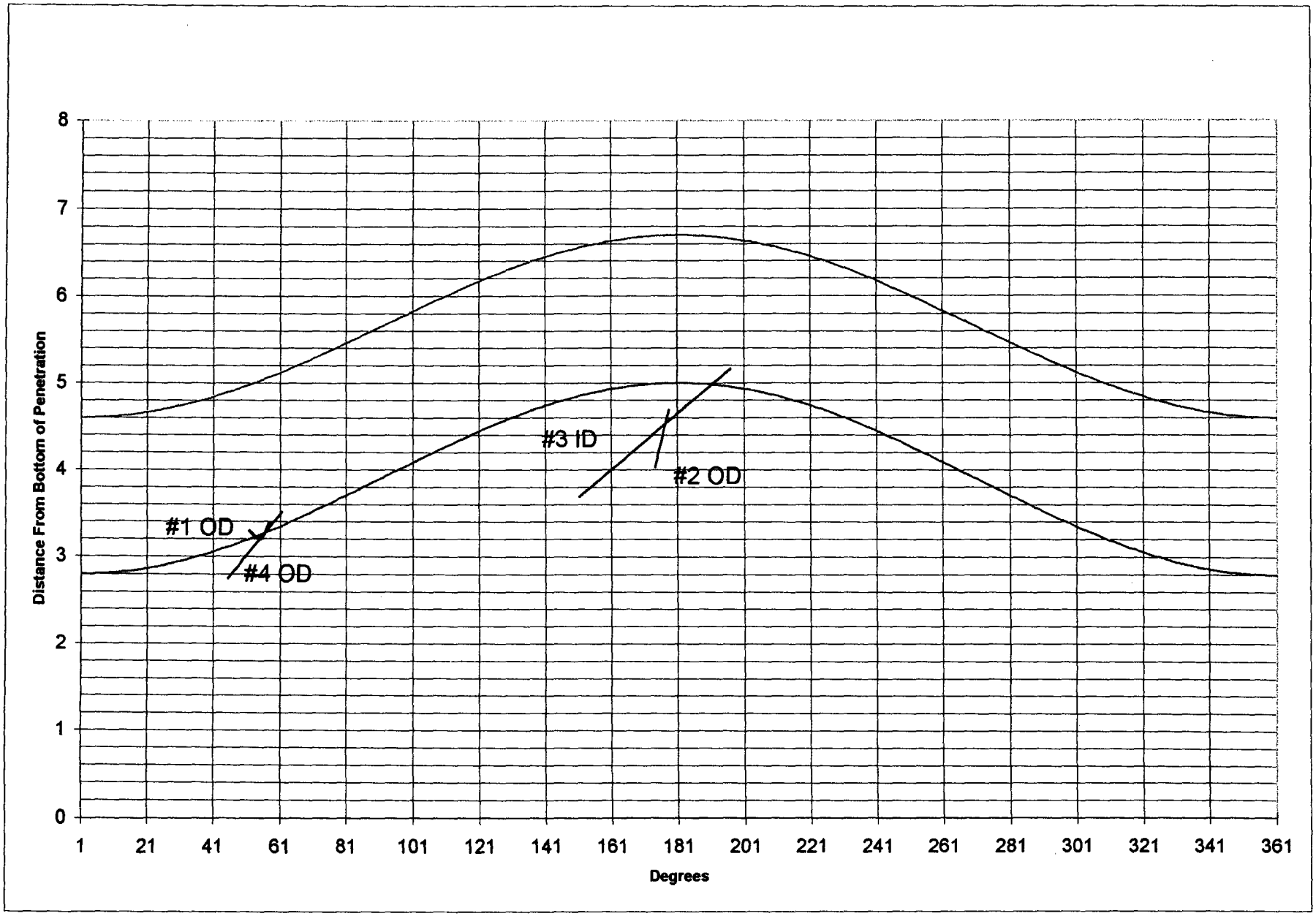

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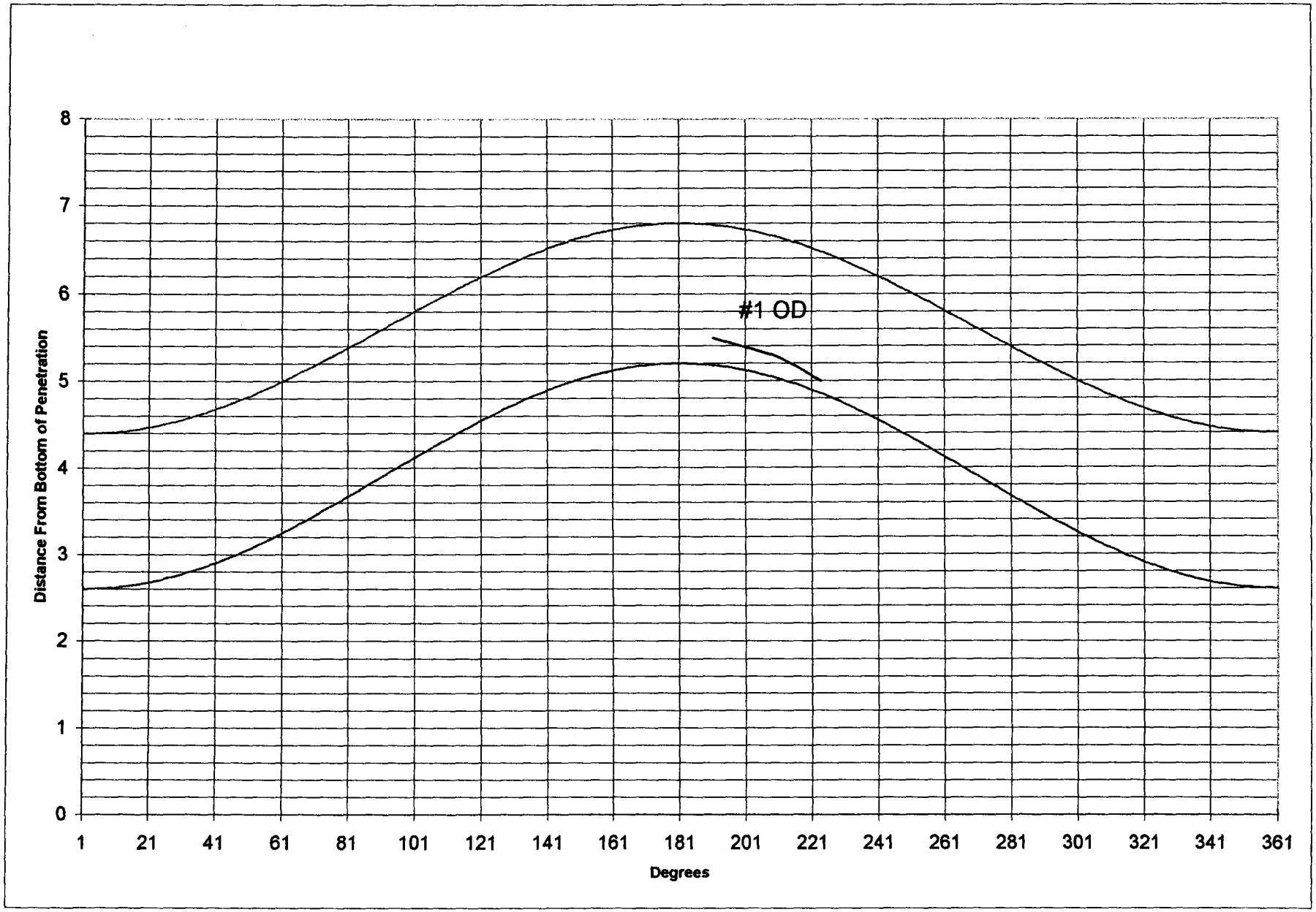

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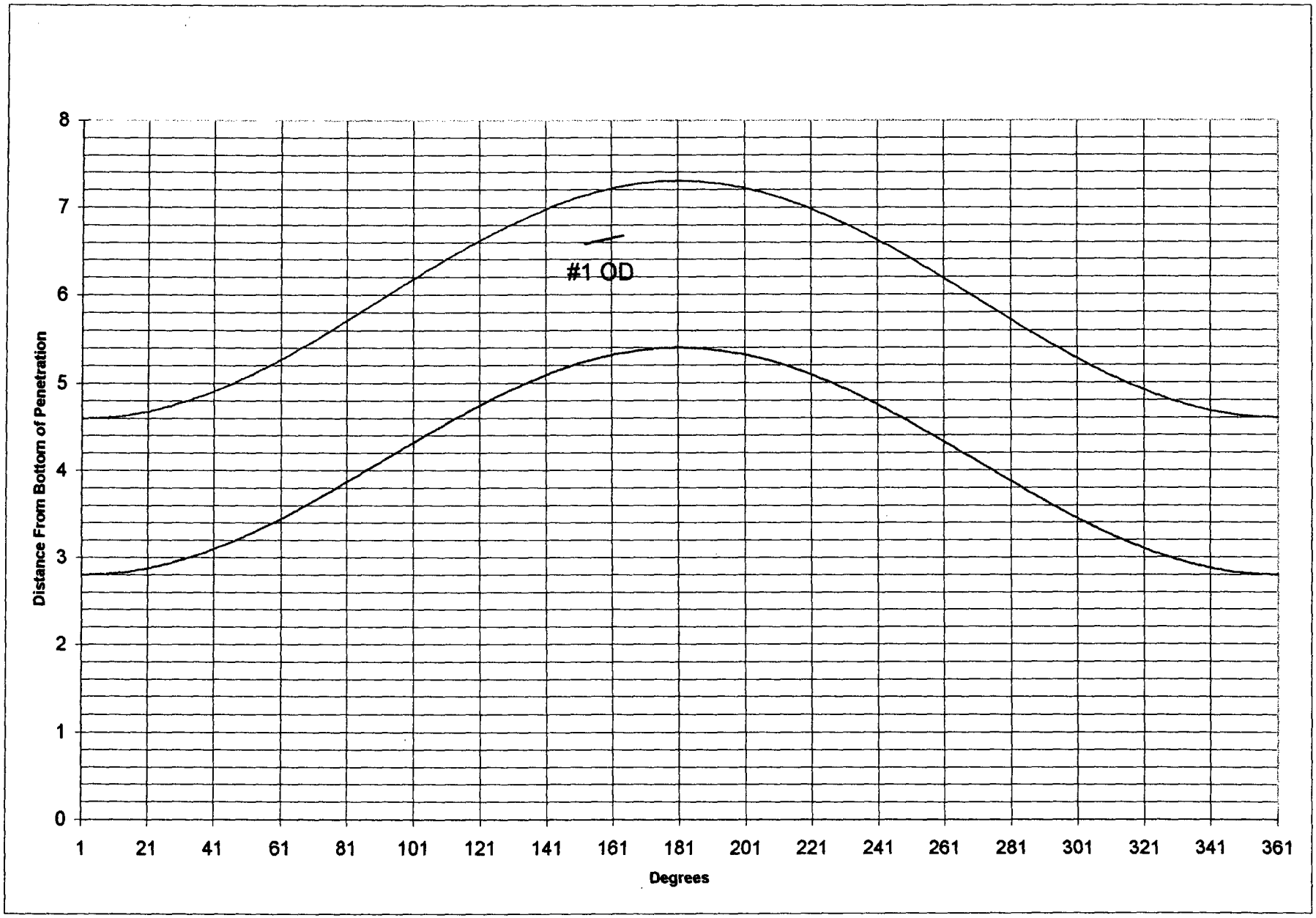
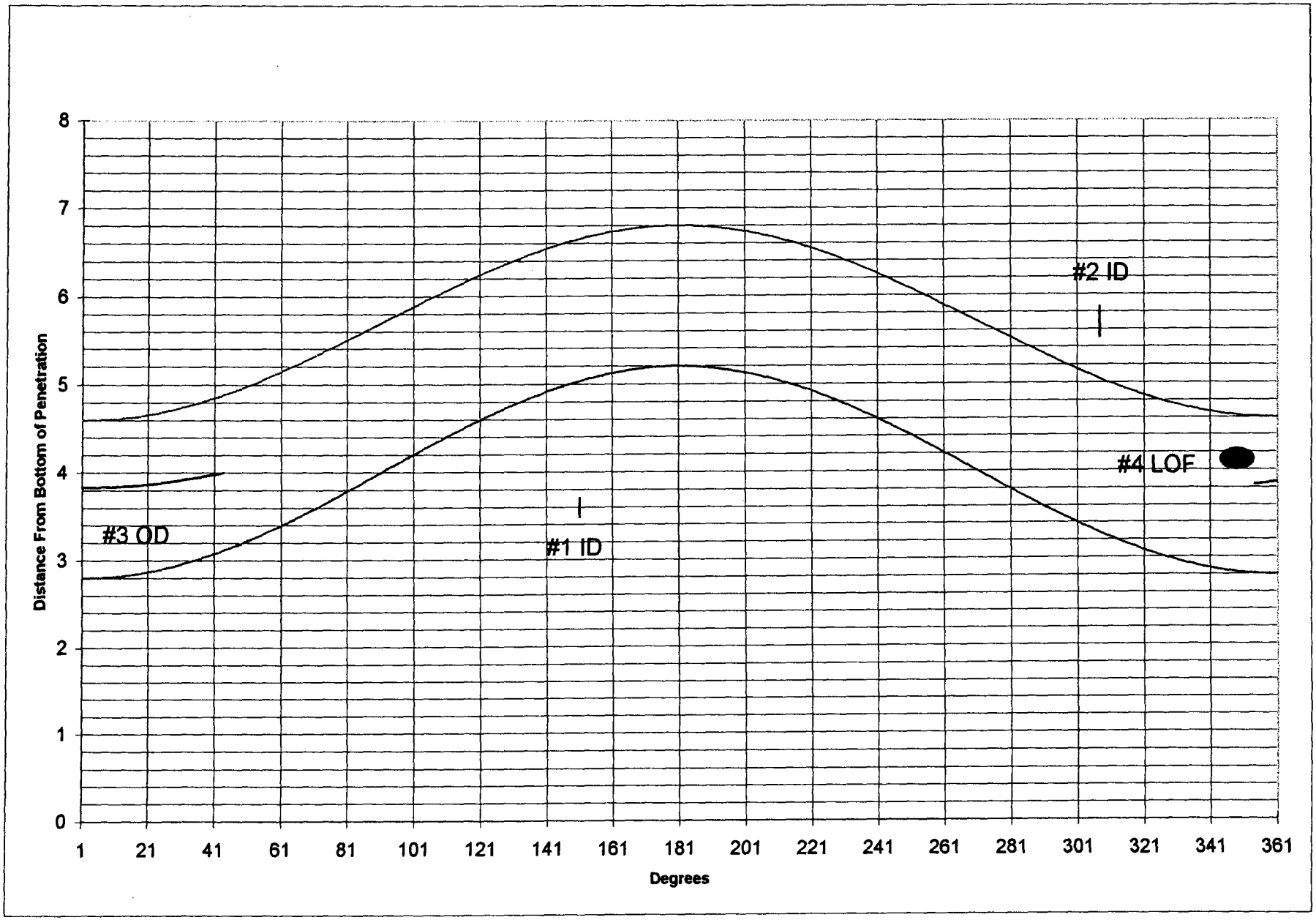
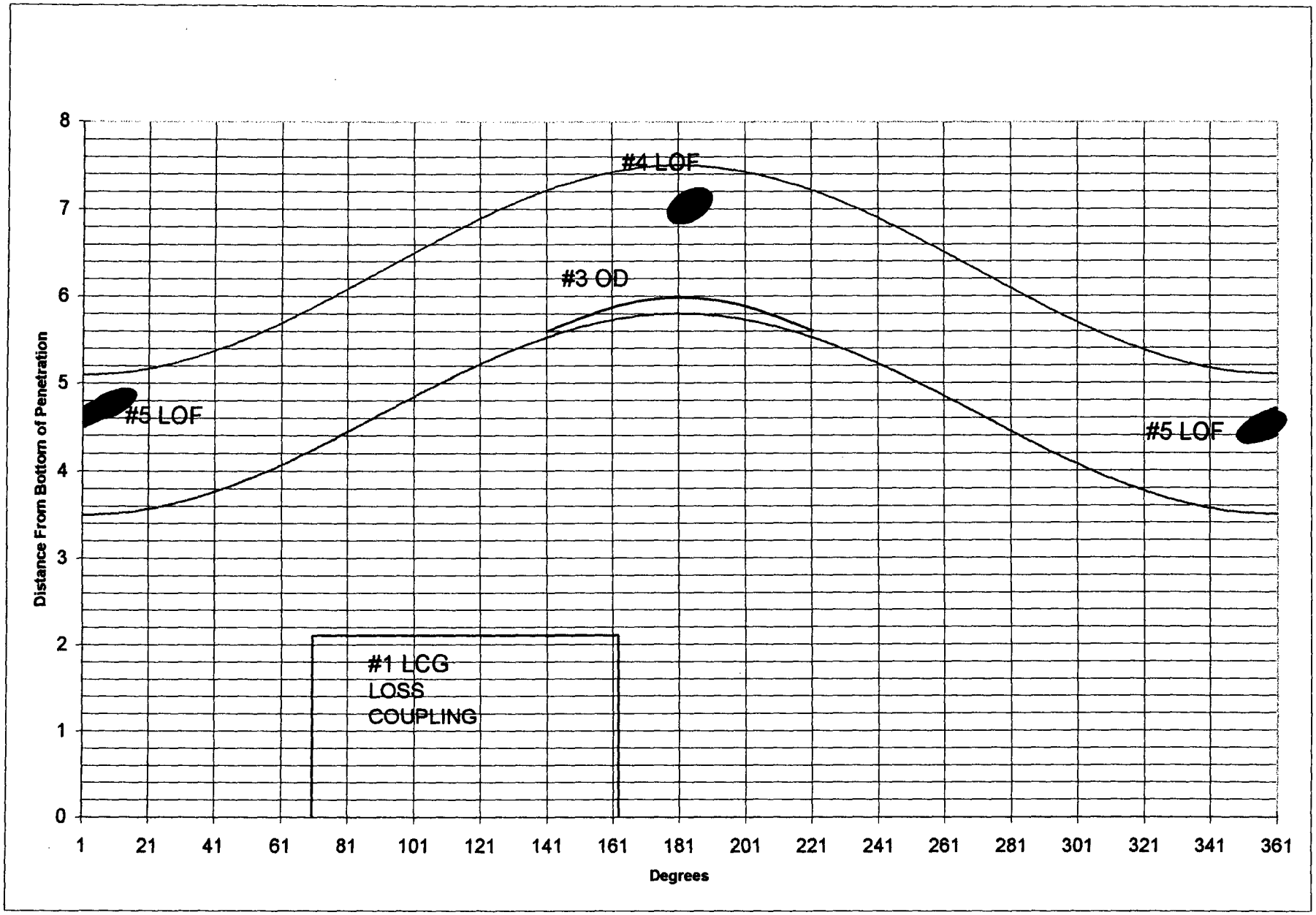


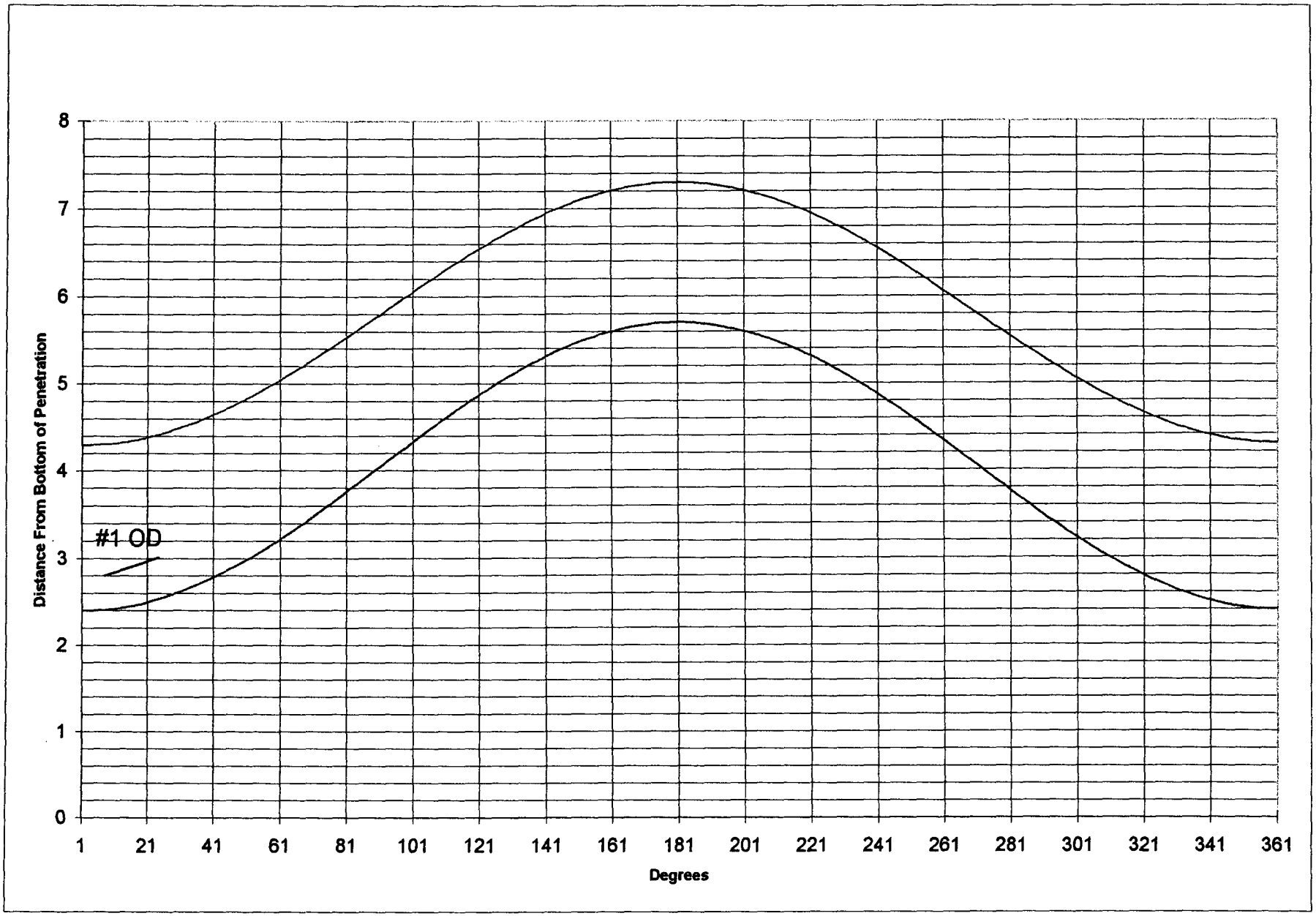
North Anna Unit 2 RVHP Weld Profiles Penetration #41



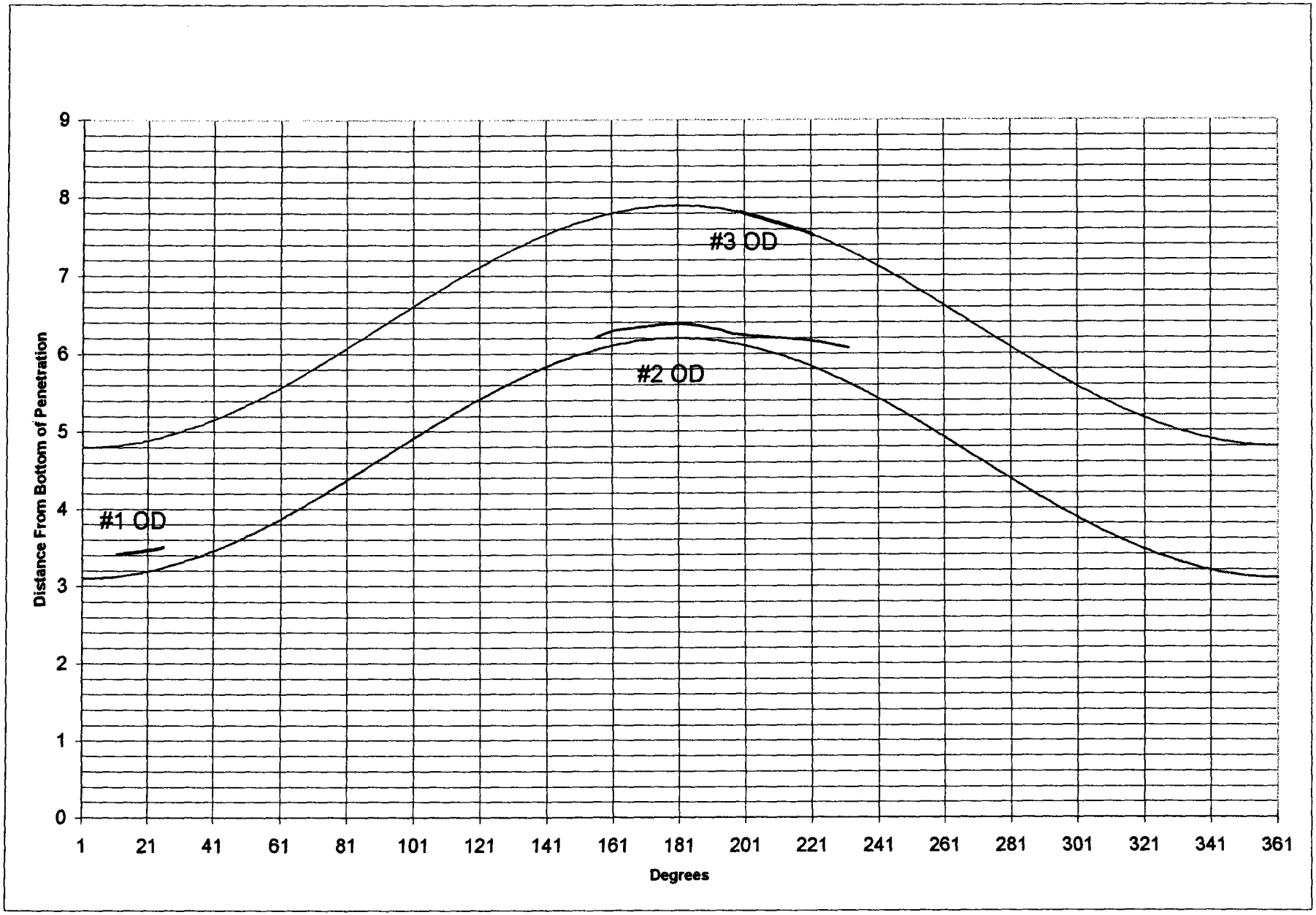
North Anna Unit 2 RVHP Weld Profiles Penetration #44



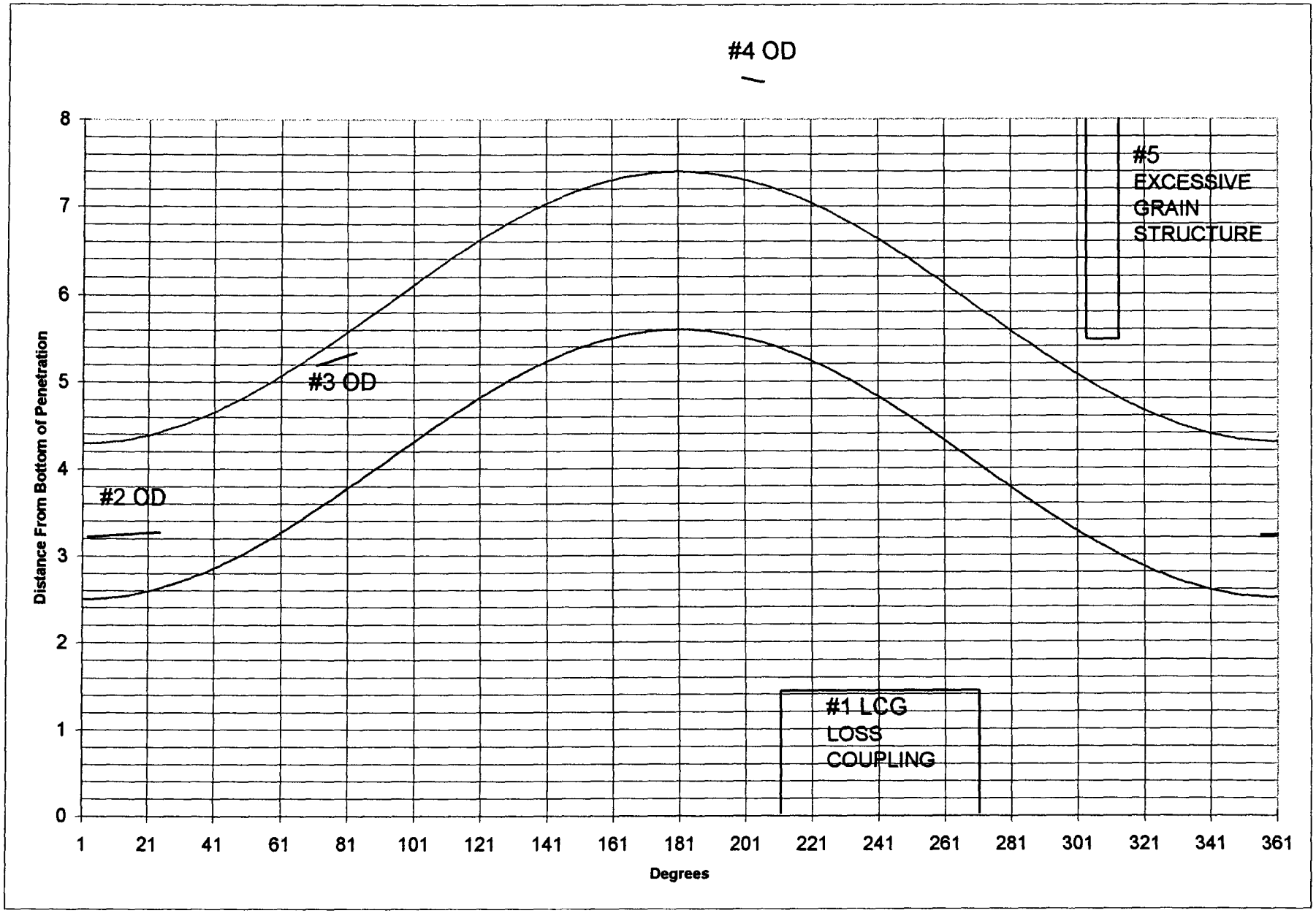
North Anna Unit 2 RVHP Weld Profiles Penetration #46



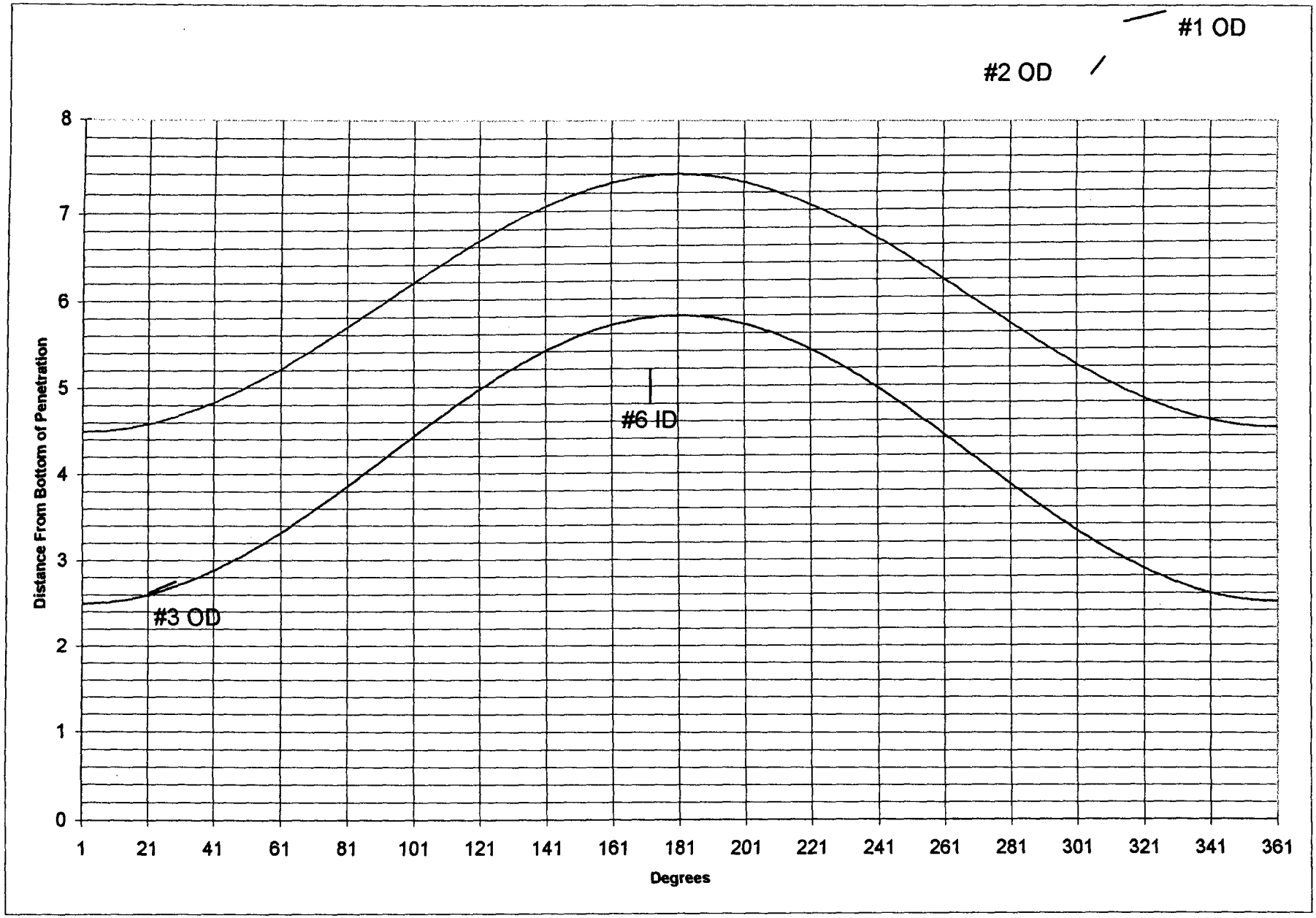
North Anna Unit 2 RVHP Weld Profiles Penetration #47



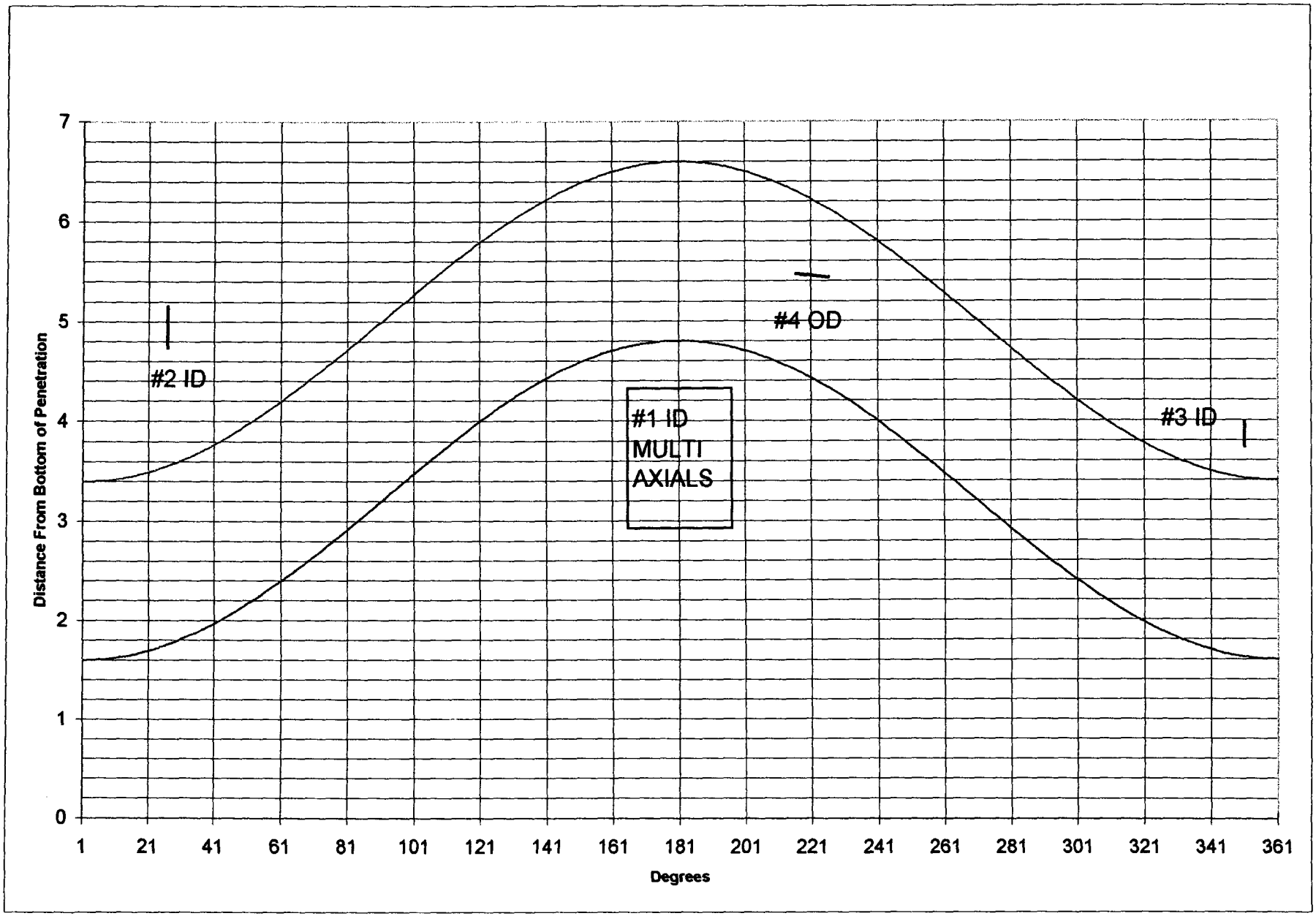
North Anna Unit 2 RVHP Weld Profiles Penetration #48



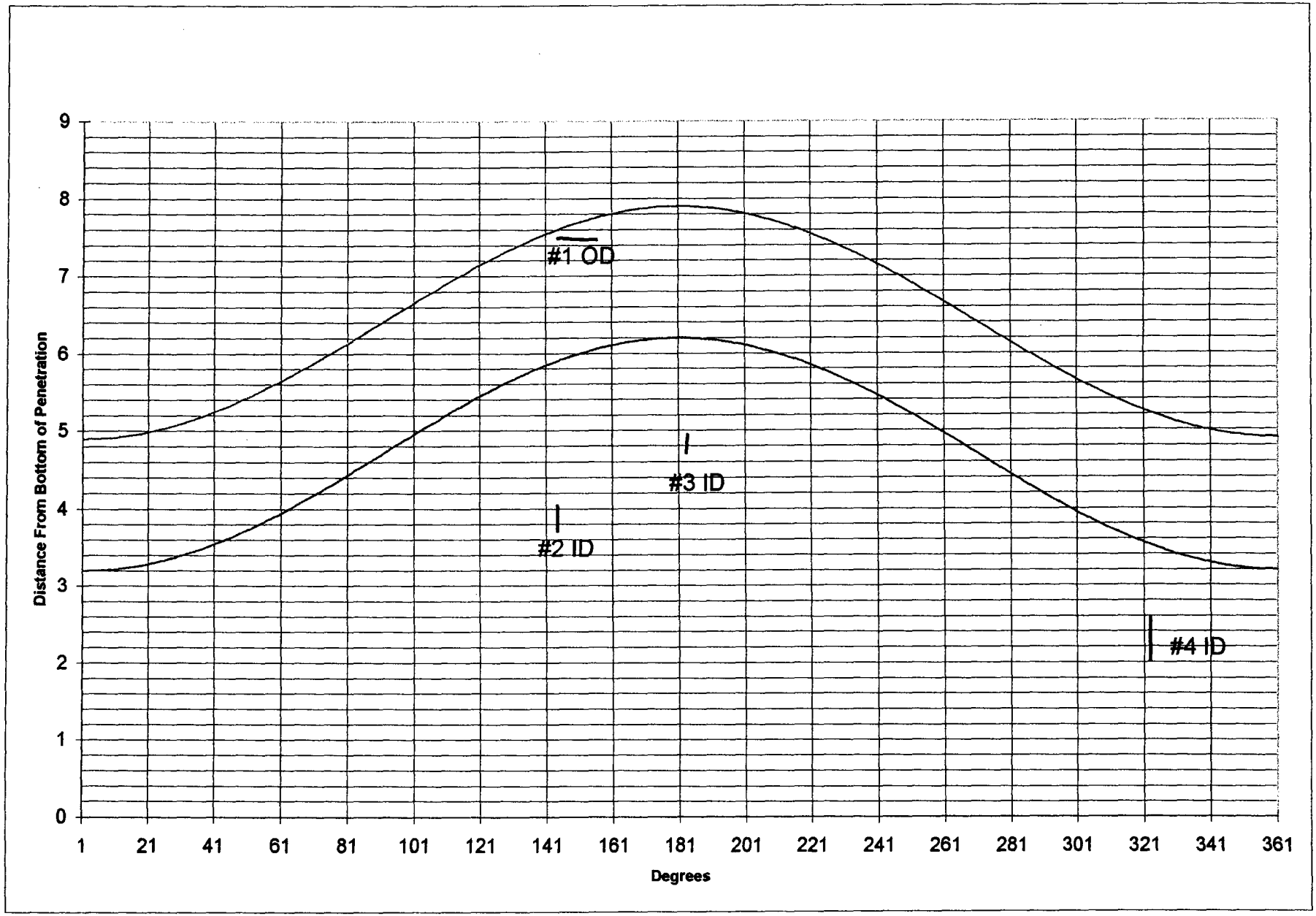
North Anna Unit 2 RVHP Weld Profiles Penetration #50



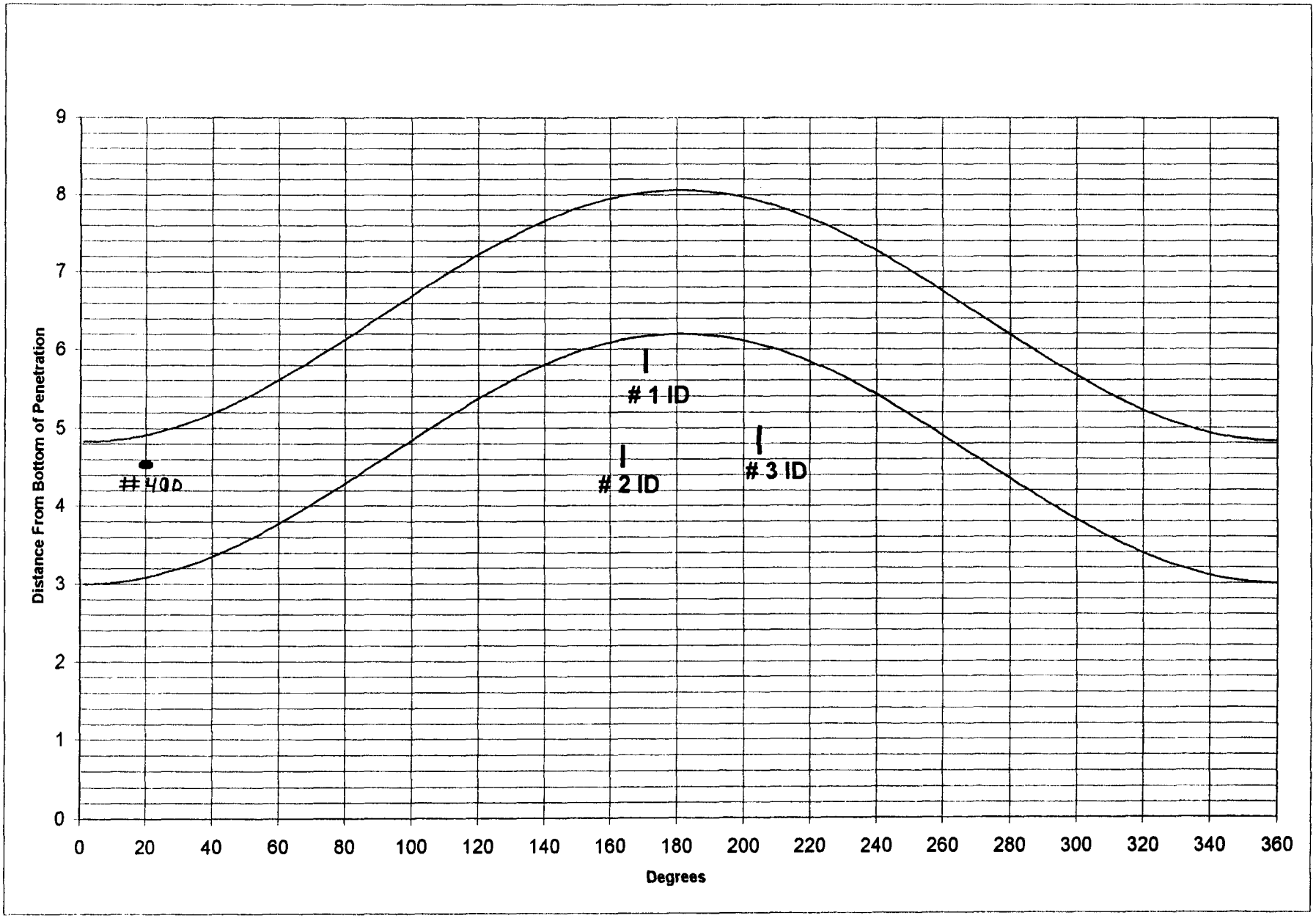
North Anna Unit 2 RVHP Weld Profiles Penetration #51



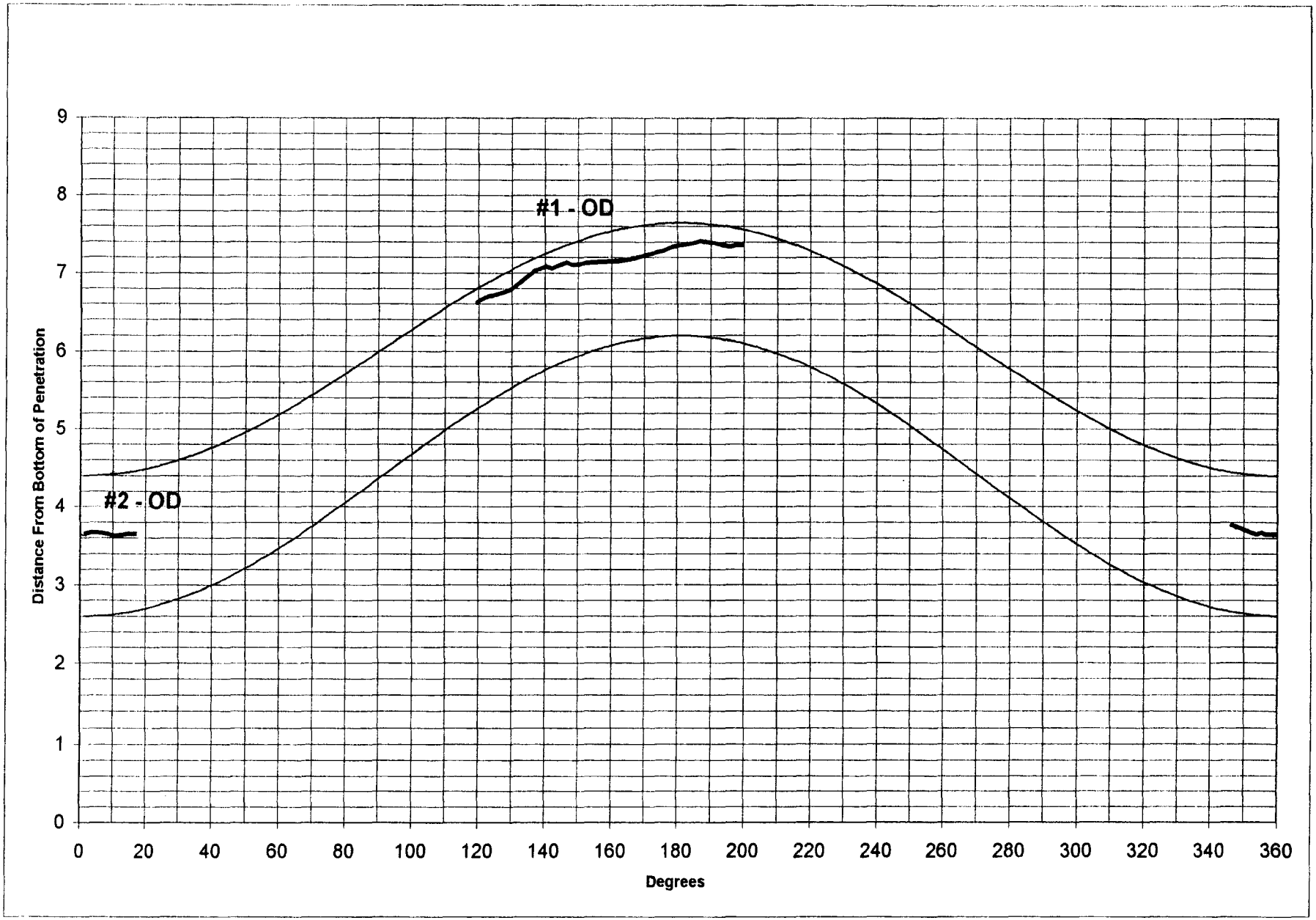
North Anna Unit 2 RVHP Weld Profiles Penetration #52



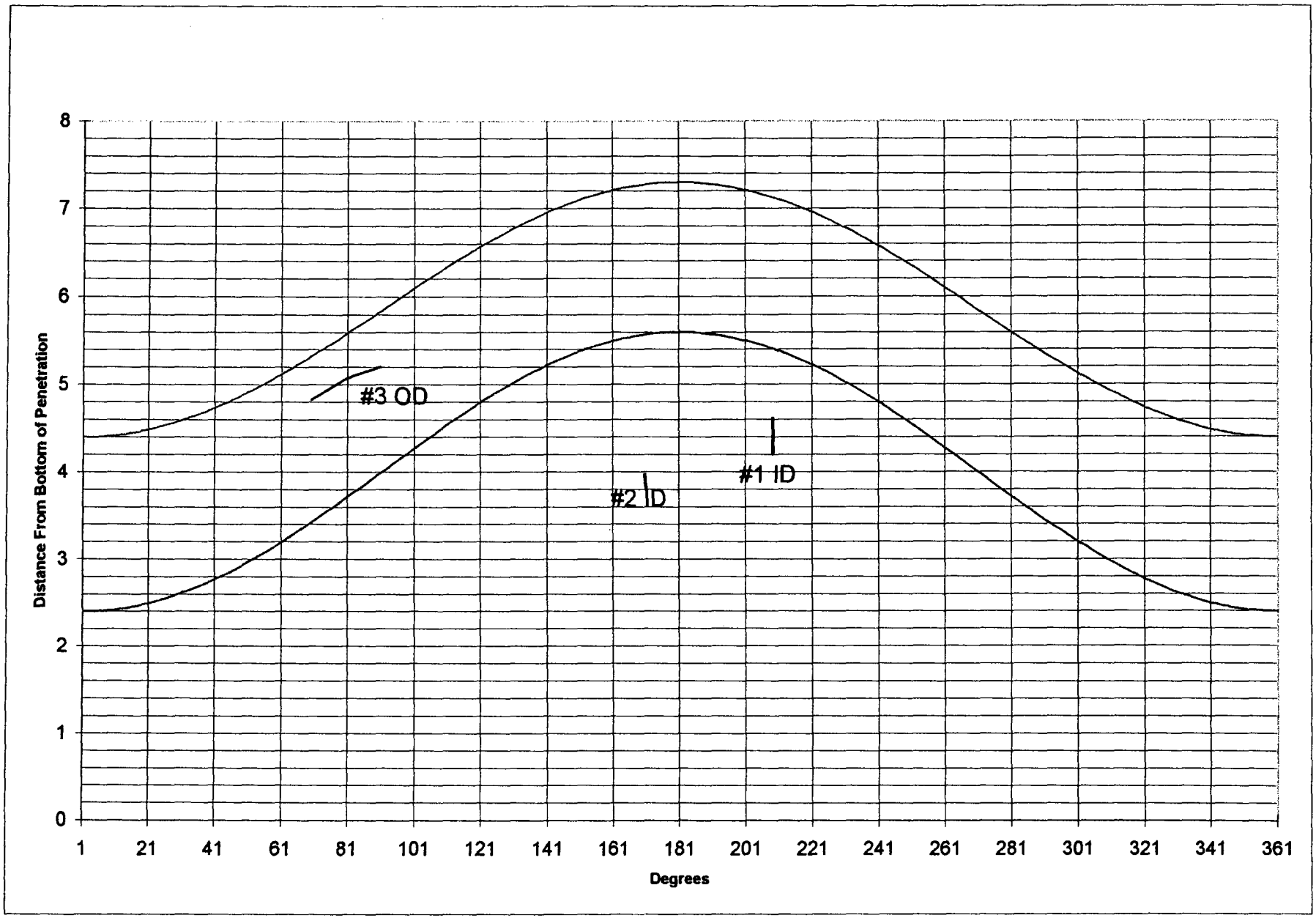
North Anna Unit 2 We[illegible] Penetration 53



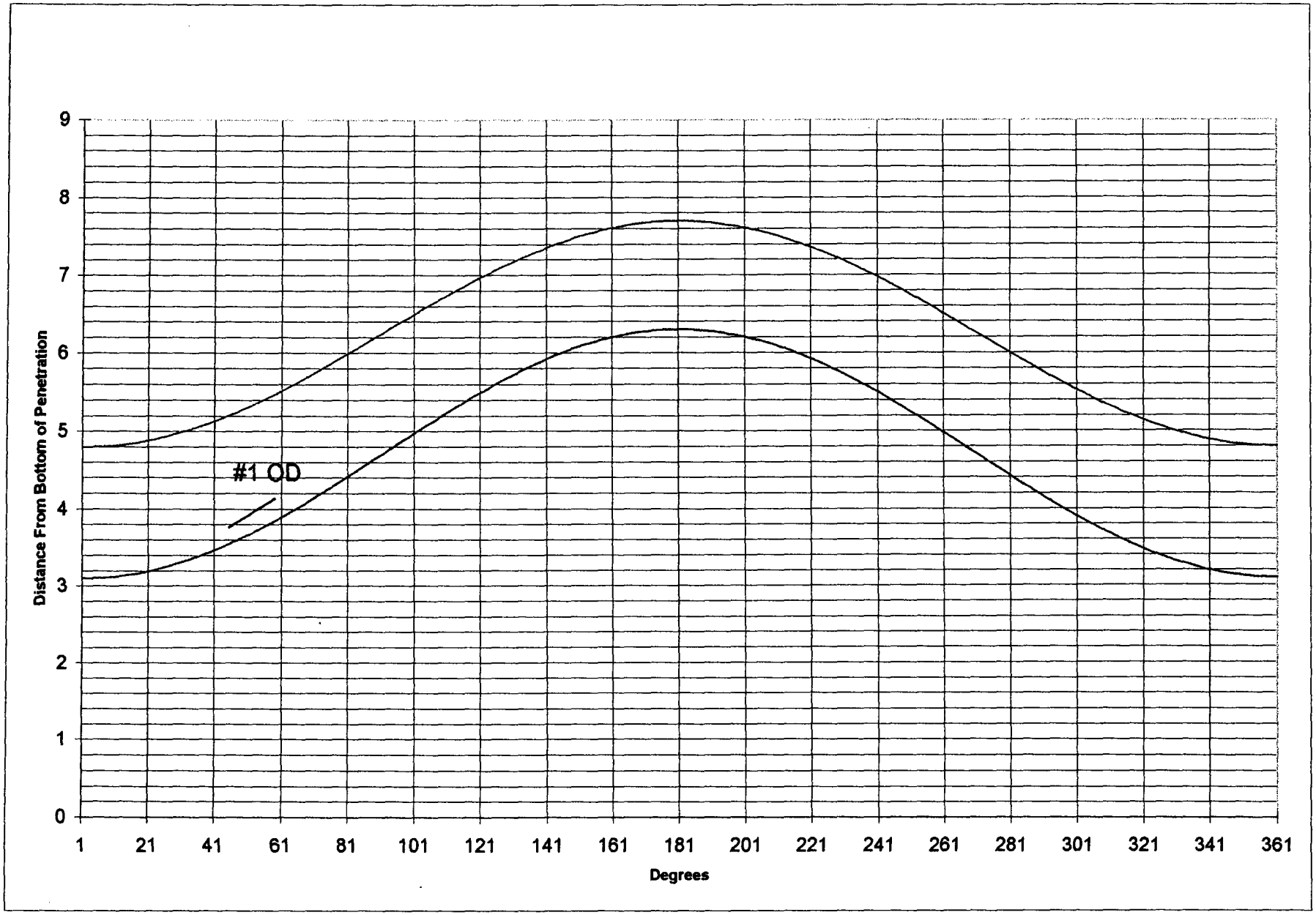
North Anna Unit 2 Weld [redacted] Penetration #54



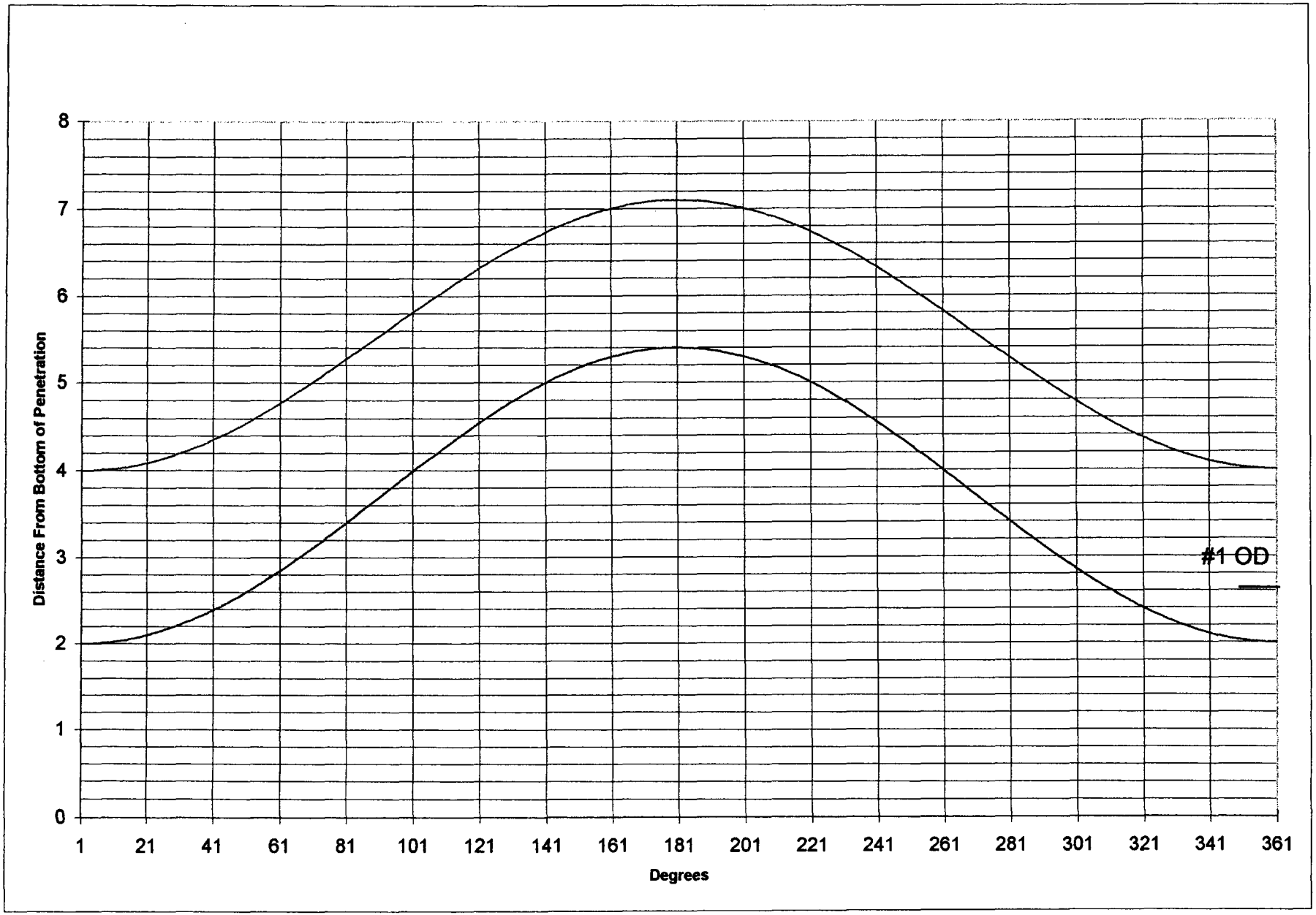
North Anna Unit 2 RVHP Weld Profiles Penetration #55



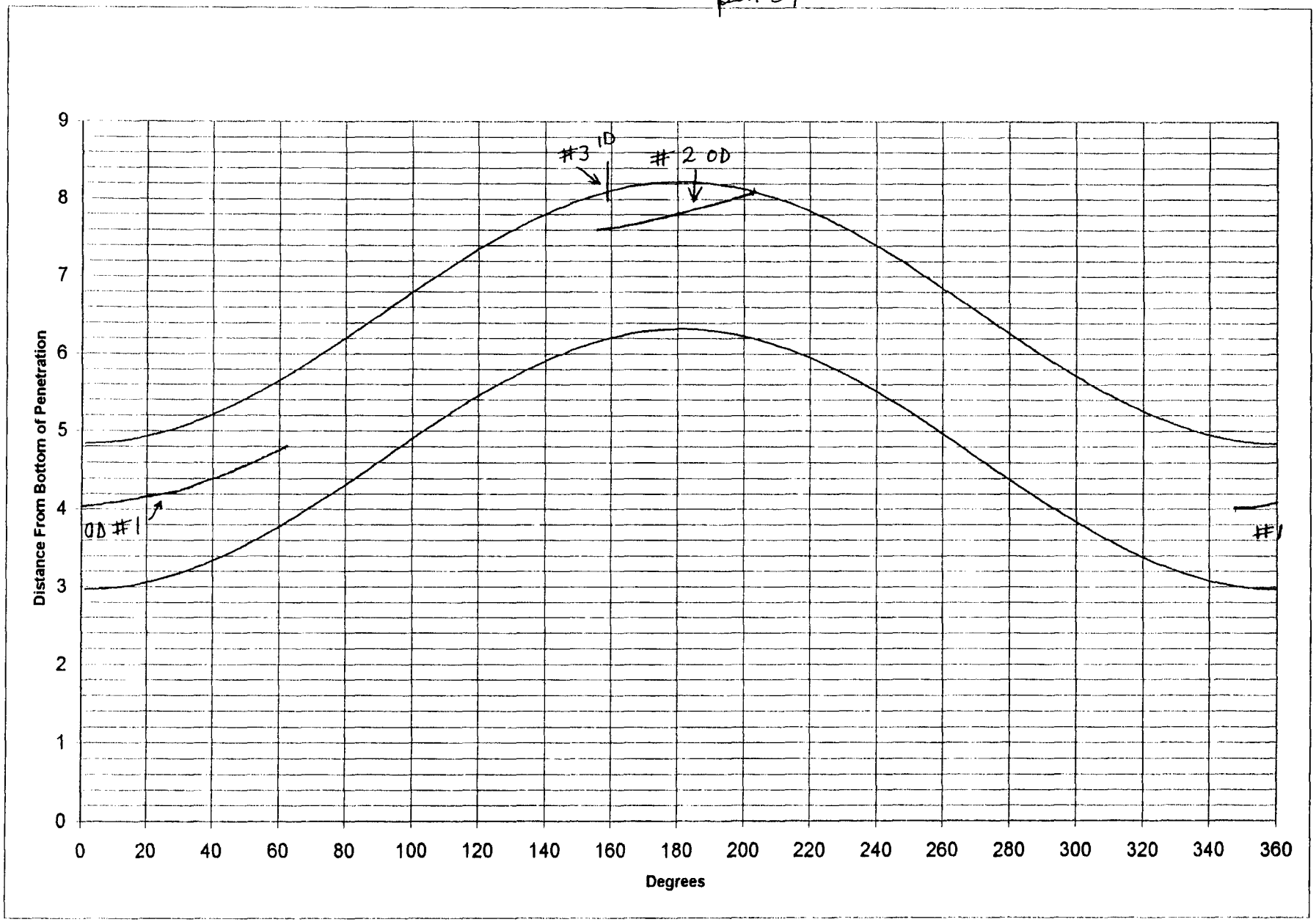
North Anna Unit 2 RVHP Weld Profiles Penetration #56



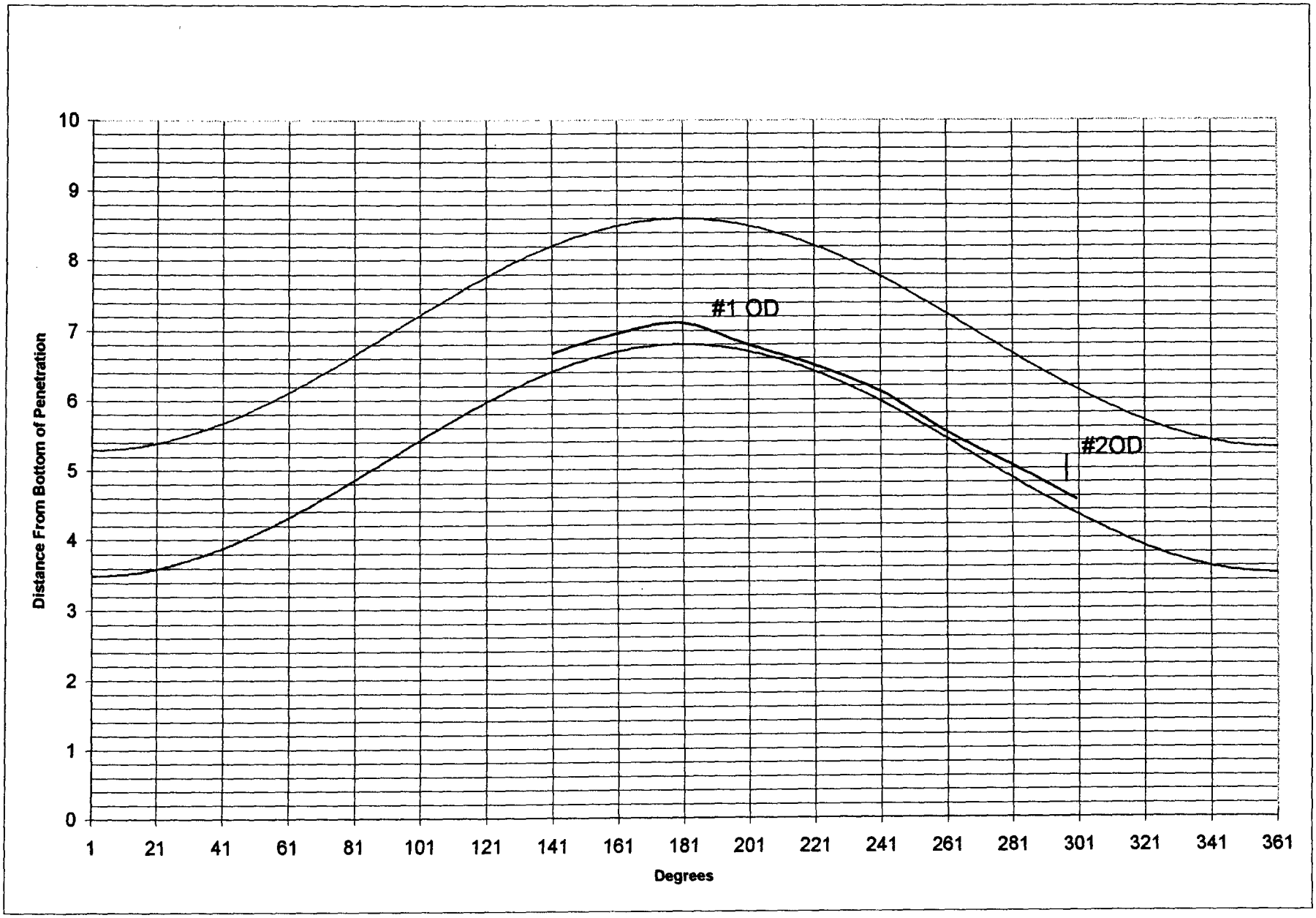
North Anna Unit 2 RVHP Weld Profiles Penetration #58



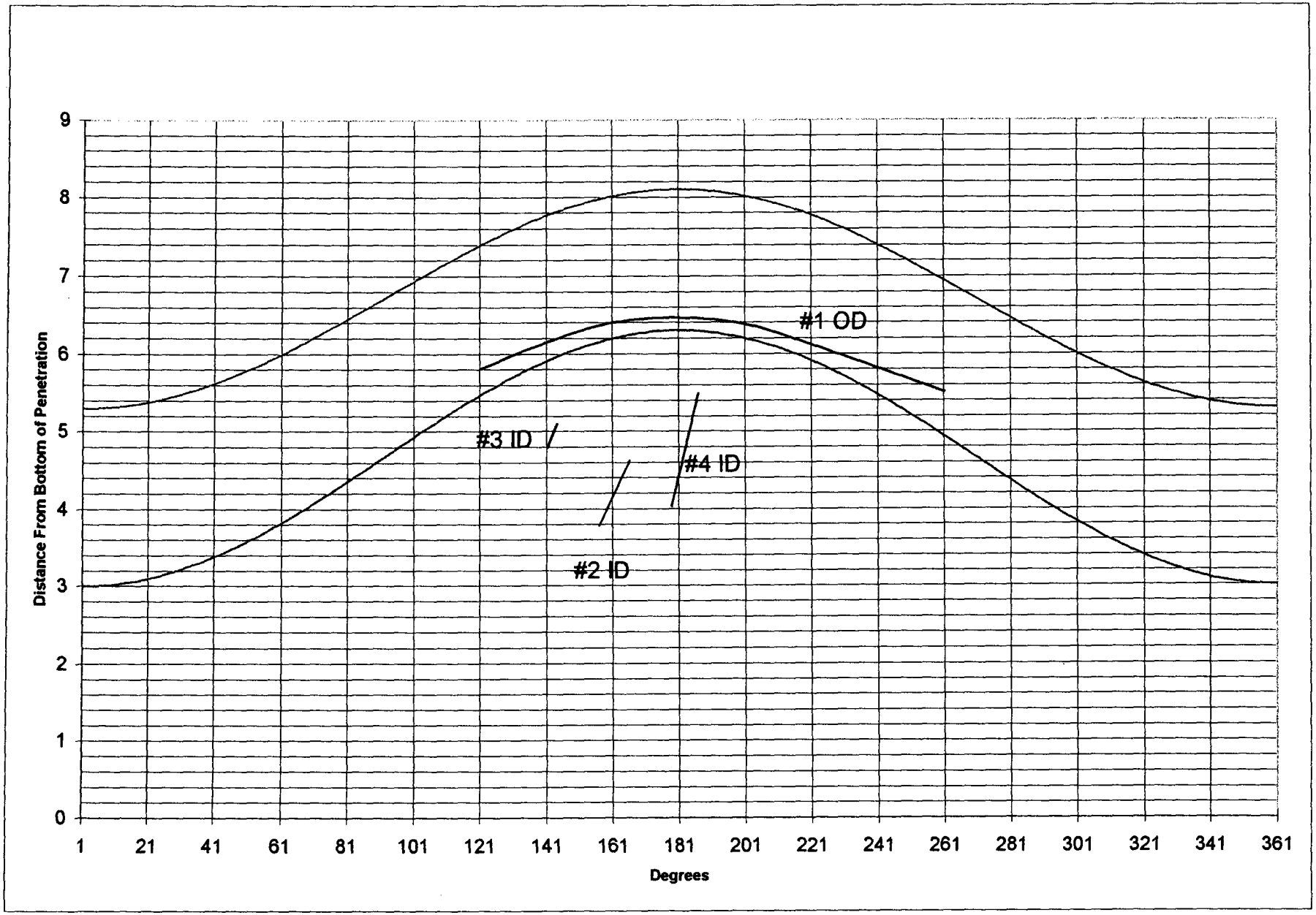
Pen 59


#3 ID
#2 OD
OD #1
#1
Distance From Bottom of Penetration
Degrees
0
1
2
3
4
5
6
7
8
9
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360

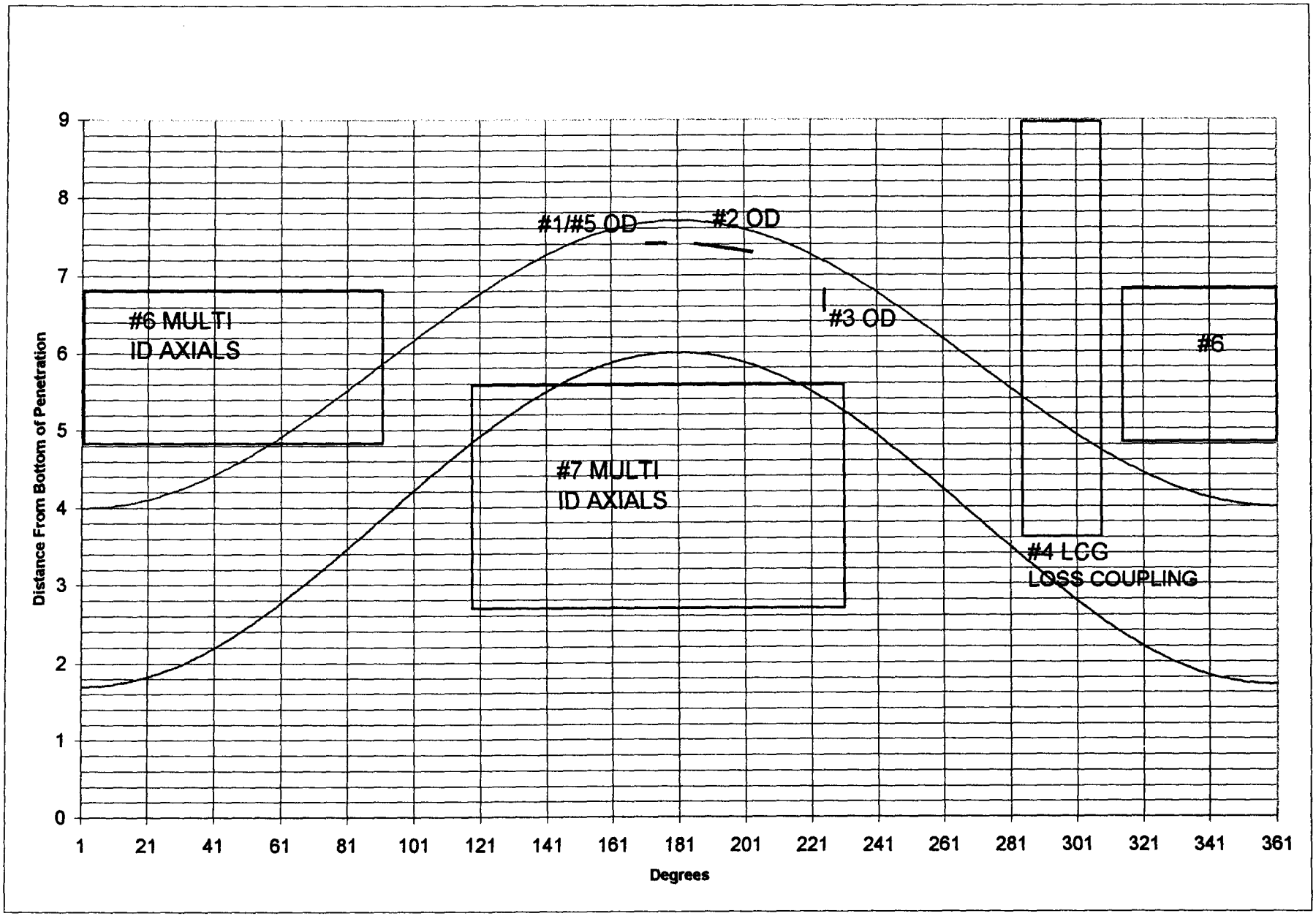
North Anna Unit 2 RVHP Weld Profiles Penetration #60



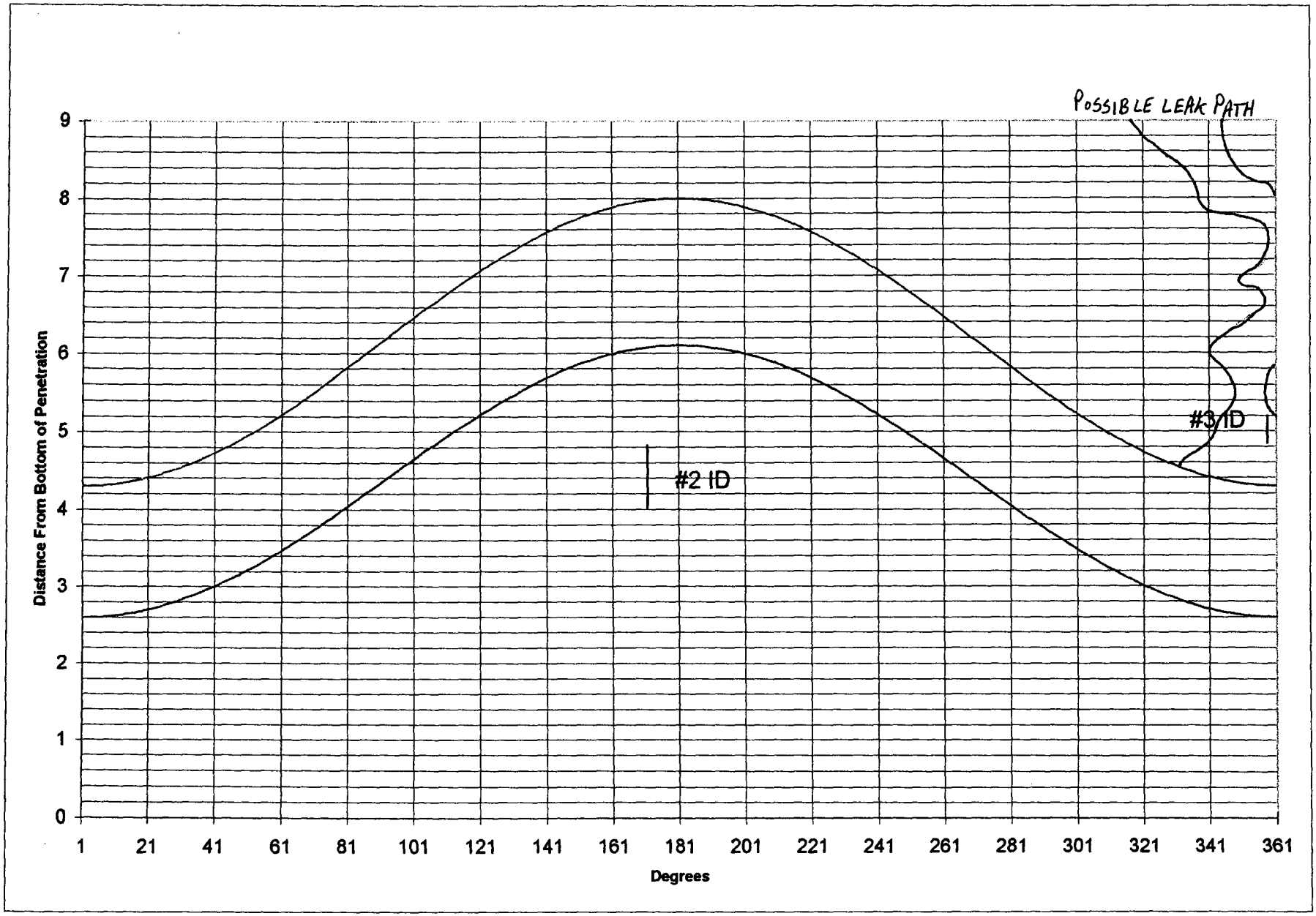
North Anna Unit 2 RVHP Weld Profiles Penetration #61



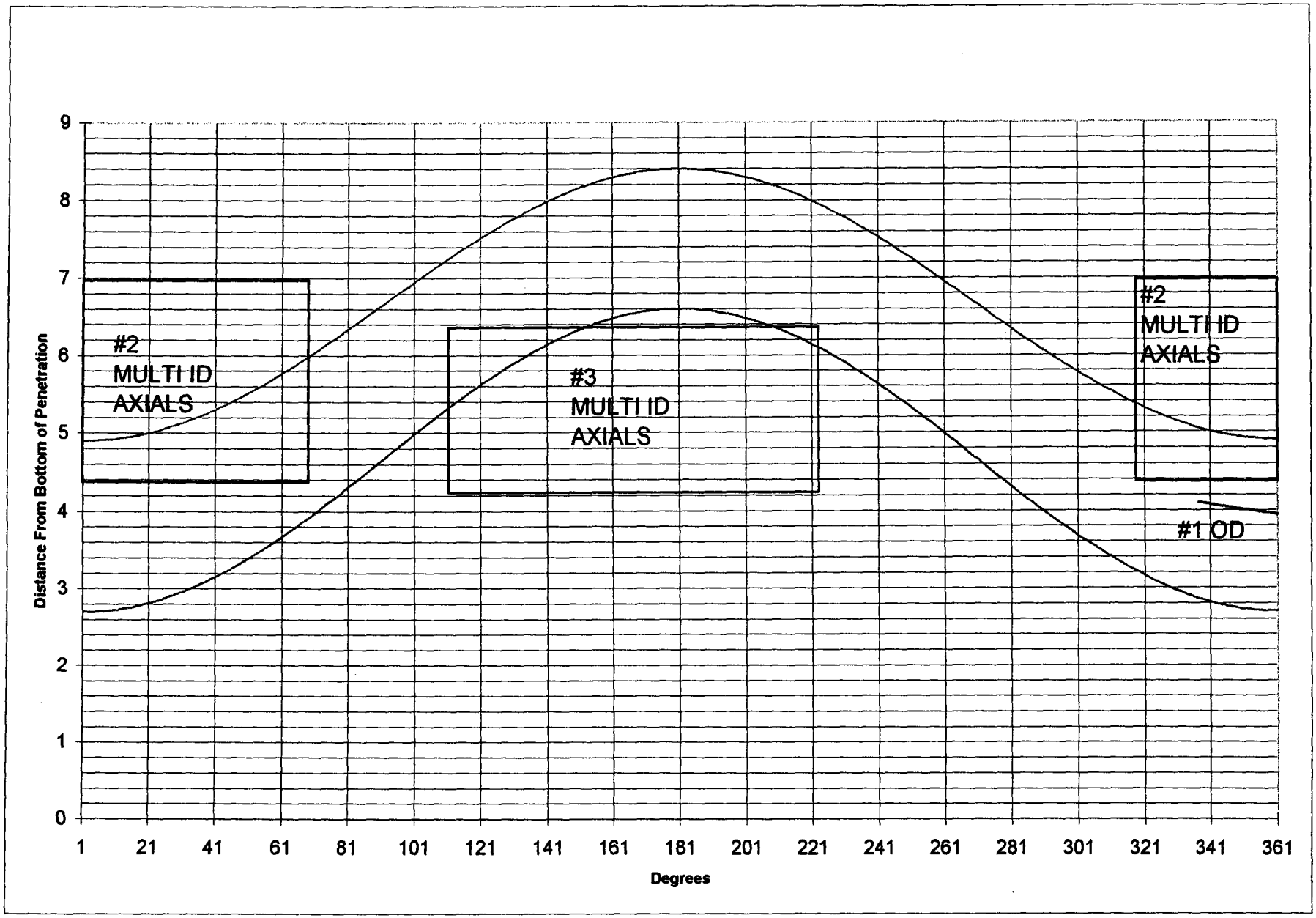
North Anna Unit 2 RVHP Weld Profiles Penetration #62



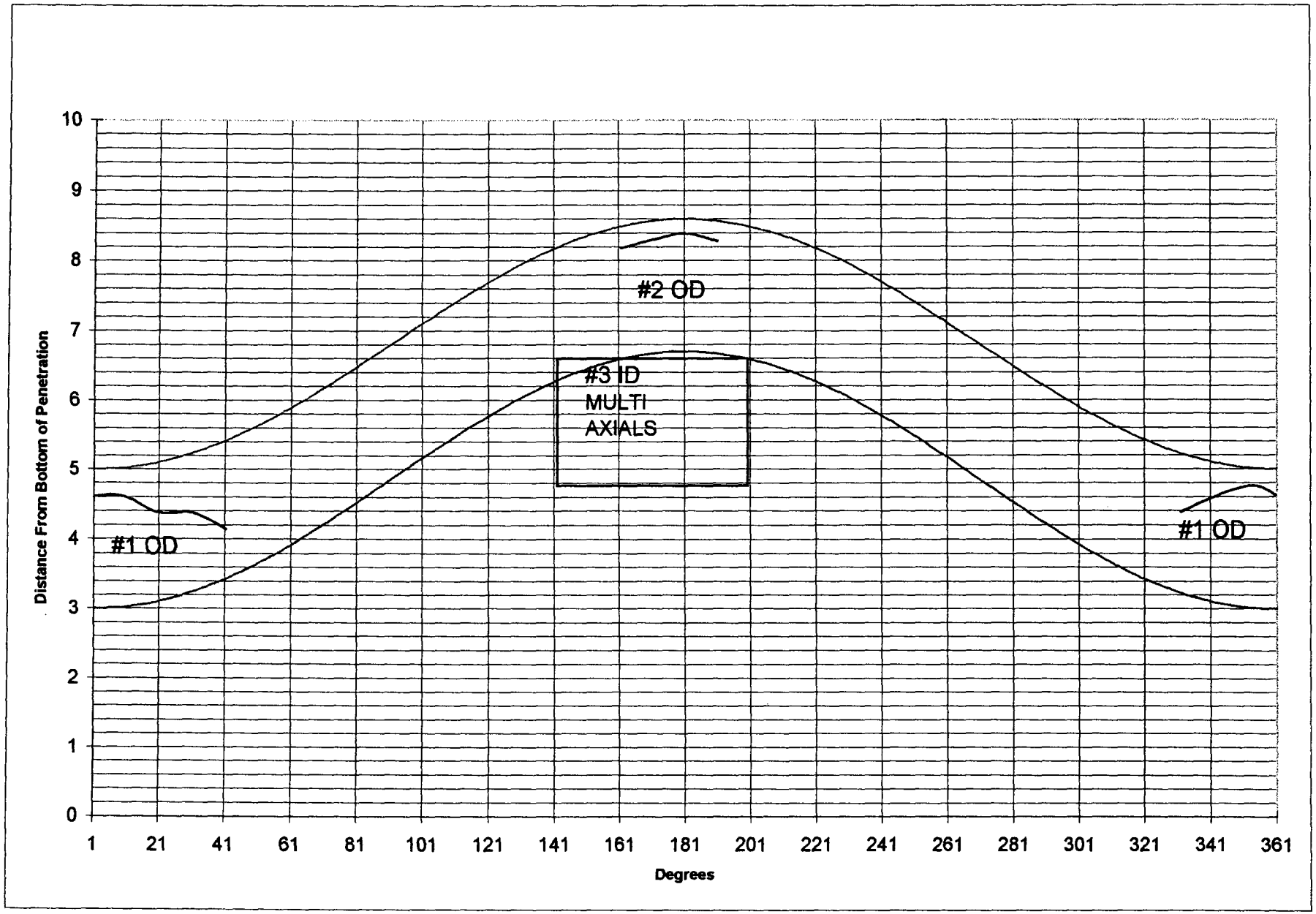
North Anna Unit 2 RVHP Weld Profiles Penetration #63



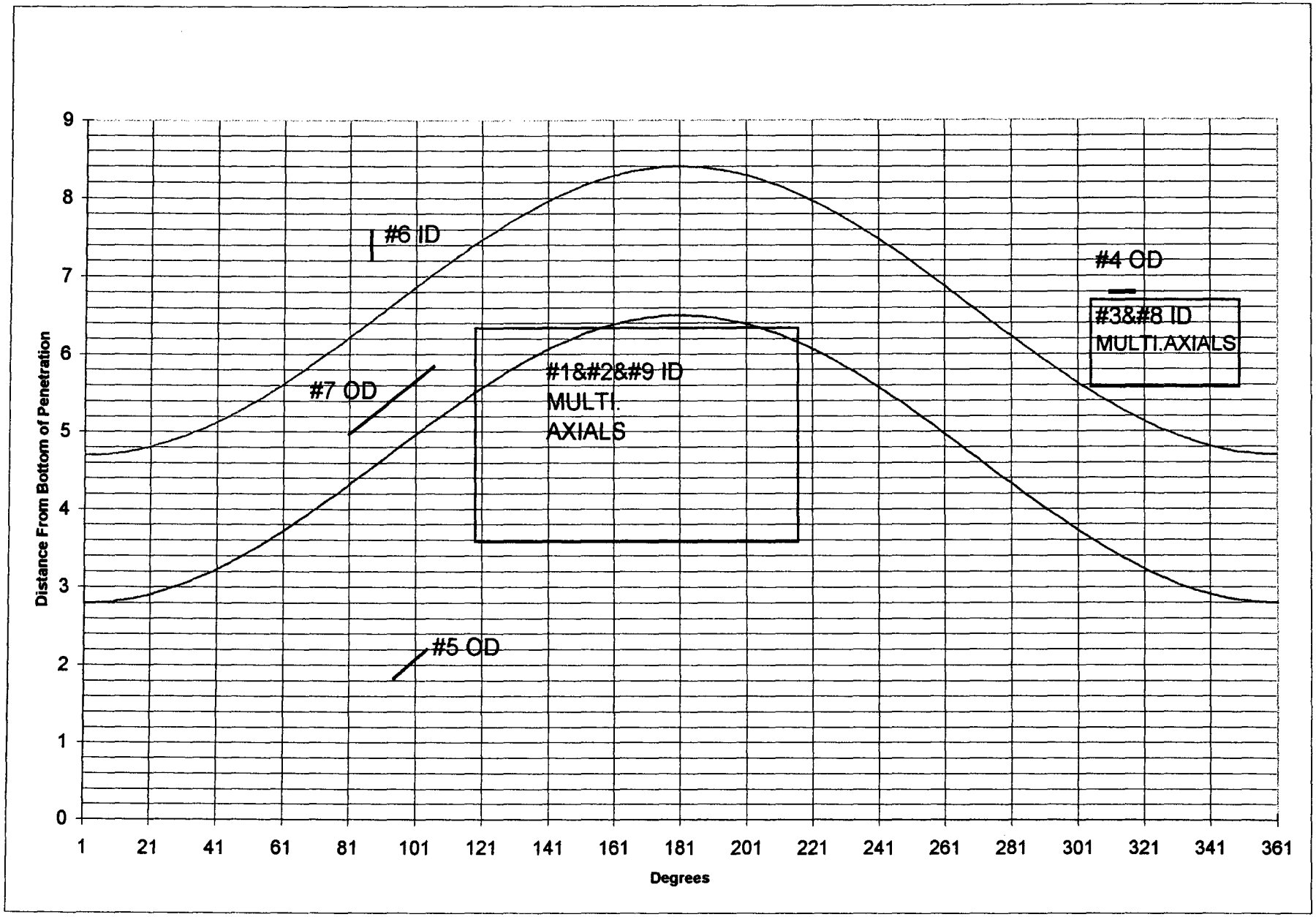
North Anna Unit 2 RVHP Weld Profiles Penetration #64



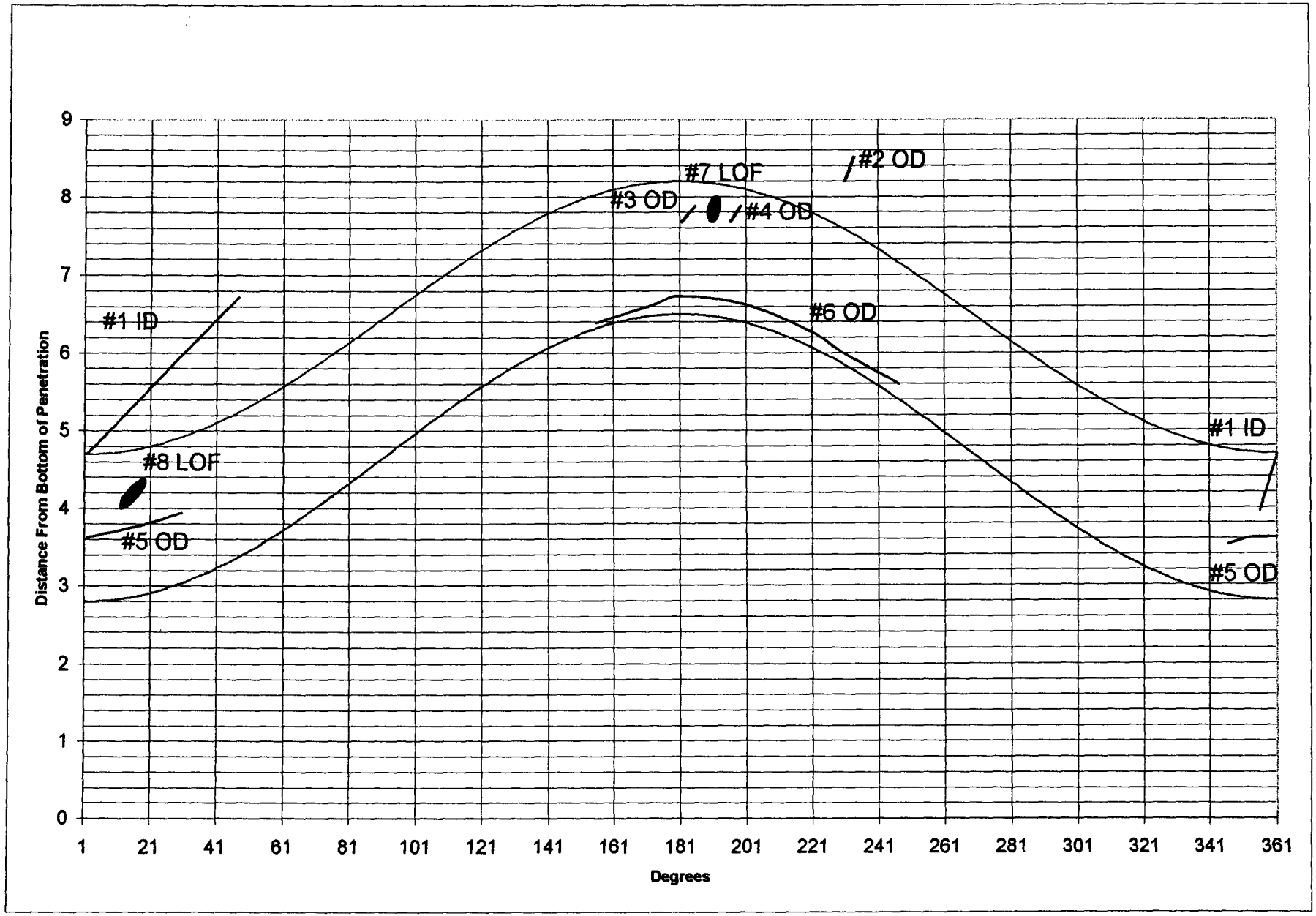
North Anna Unit 2 RVHP Weld Profiles Penetration #65



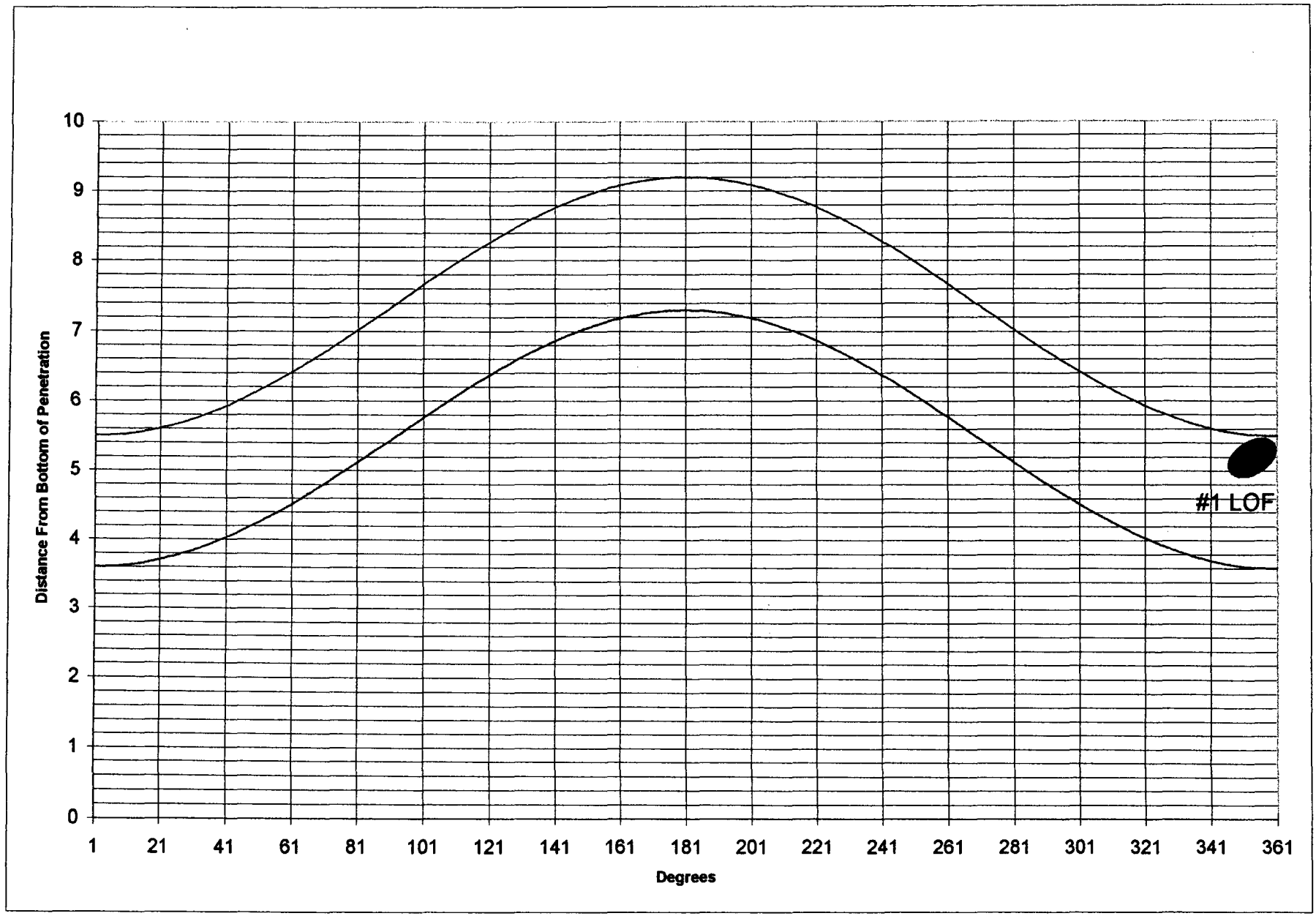
North Anna Unit 2 RVHP Weld Profiles Penetration #66



North Anna Unit 2 RVHP Weld Profiles Penetration #67



North Anna Unit 2 RVHP Weld Profiles Penetration #68



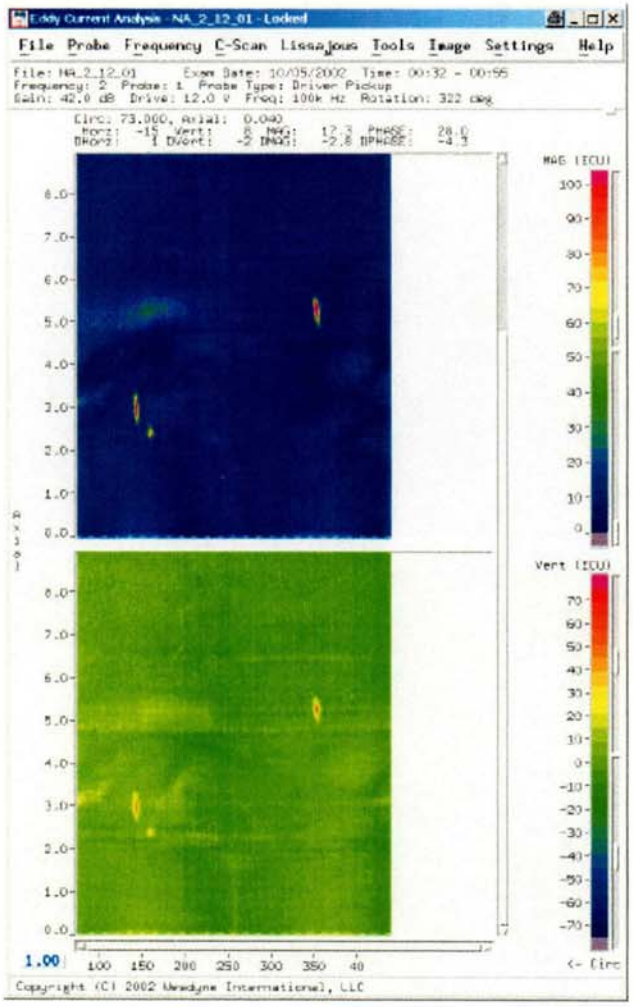
Attachment 2

CRDM Open Penetration Eddy Current Inspection
All Recorded Data

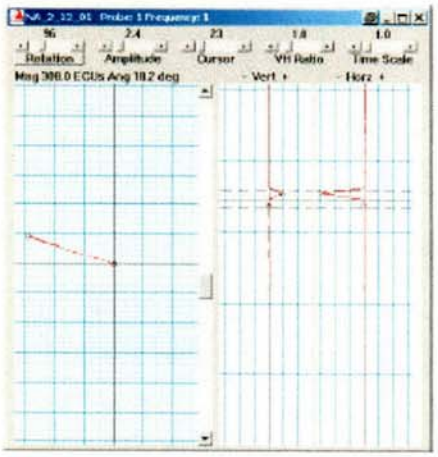
North Anna Unit 2
Virginia Electric and Power Company
(Dominion)

CRDM Open Penetration Inspection – Indications in CRDM No. 12

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	232	15	2.68	3.44	143	143	0.76	N/A	Axial
2	159	17	2.28	2.56	160	160	0.28	N/A	Axial
3	308	18	5.04	5.56	353	353	0.52	N/A	Axial



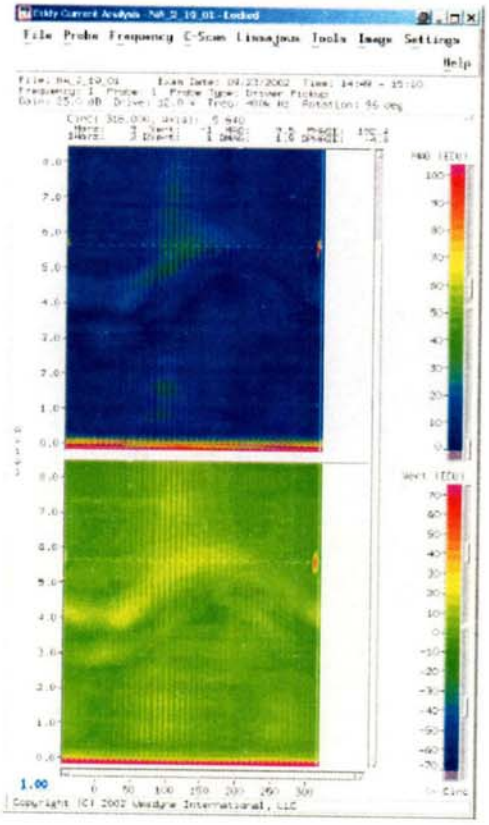
C-Scan



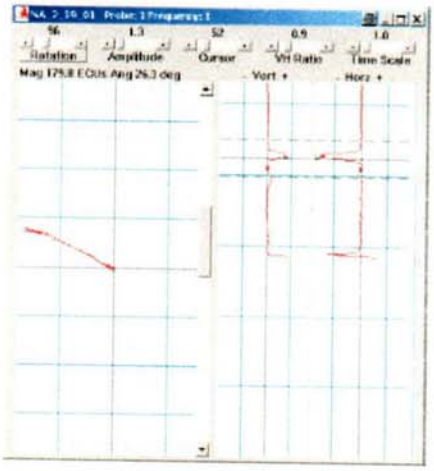
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 19

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	180	26	5.40	6.20	26	26	0.80	N/A	Axial



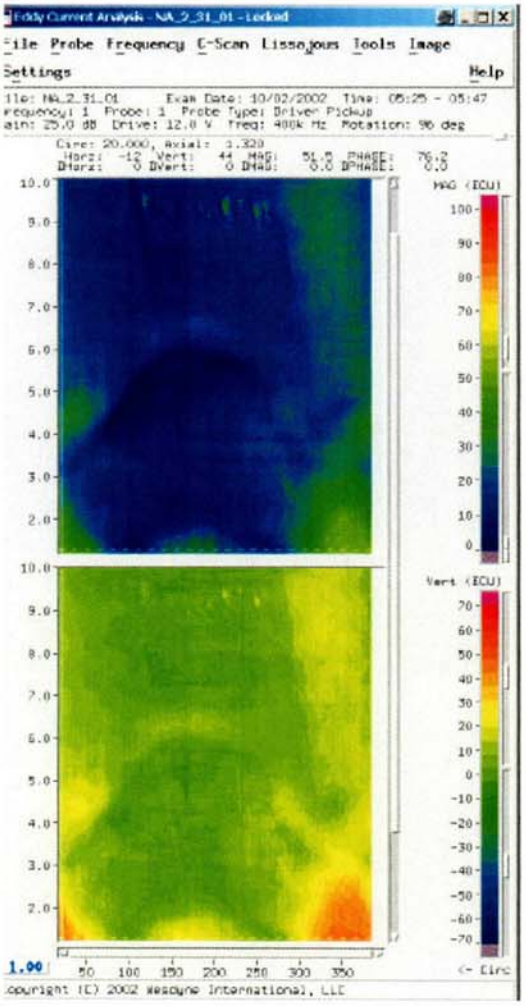
C-Scan



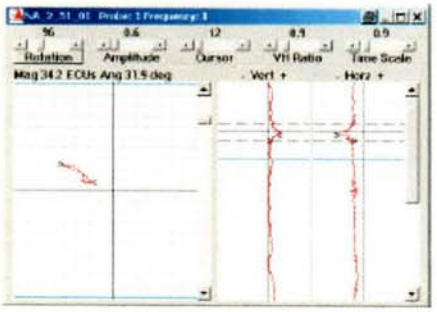
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 31

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	34	32	9.12	9.60	115	263	0.48	N/A	PV



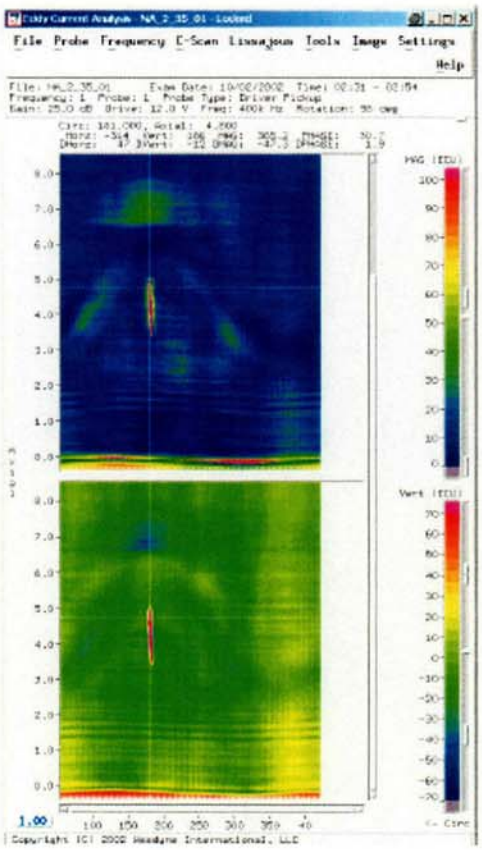
C-Scan



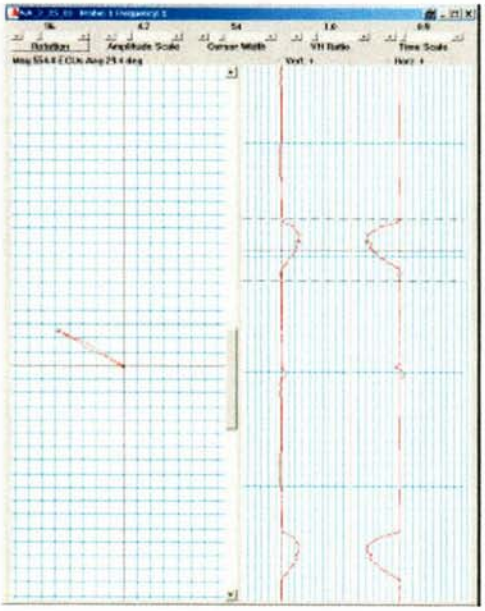
Permeability Variation Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 35

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	558	29.5	3.44	5.240	181	181	1.8	N/A	Axial



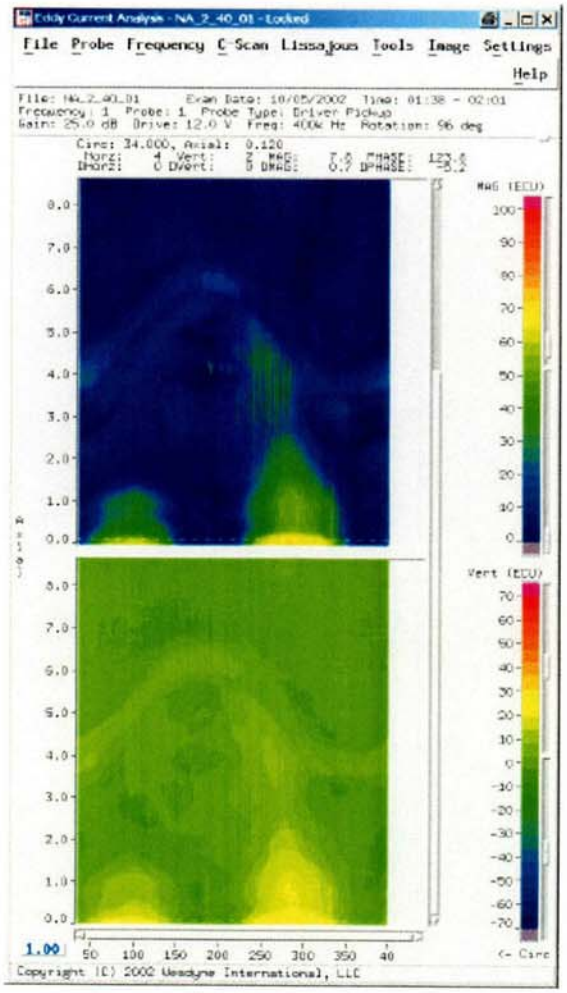
C-Scan



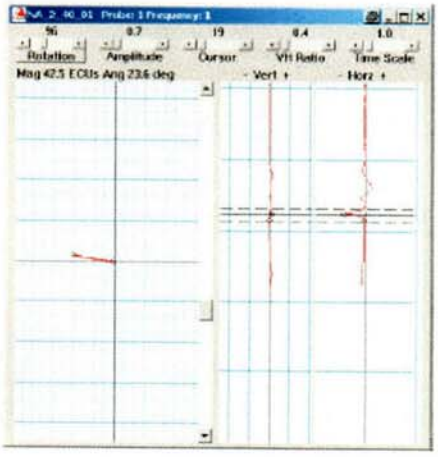
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 40

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	42	24	4.20	4.48	188	188	0.28	N/A	Axial
2	31	25	4.00	4.28	210	210	0.28	N/A	Axial



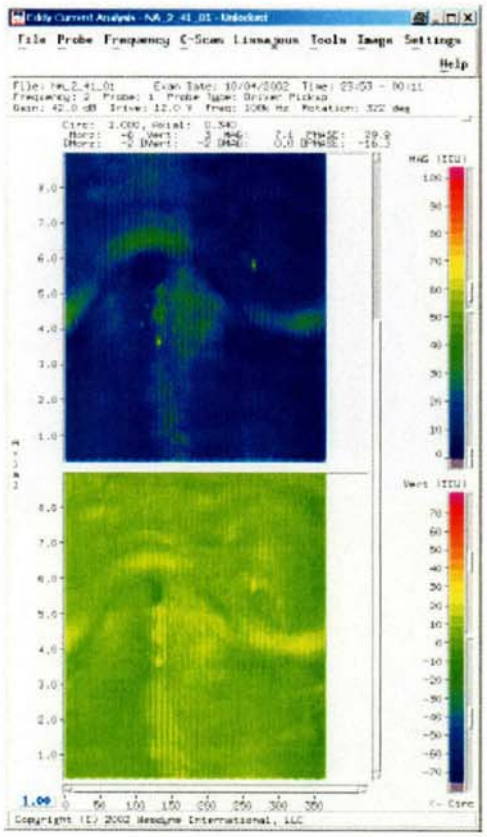
C-Scan



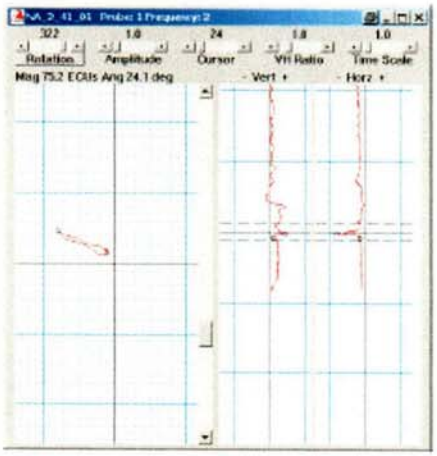
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 41

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	28	21.5	3.98	4.22	107	107	0.24	N/A	Axial
2	22	25	4.62	4.82	114	114	0.20	N/A	Axial
3	75	24	3.50	3.78	131	131	0.28	N/A	Axial
4	30	17	4.30	4.66	127	127	0.36	N/A	Axial
5	19	23	3.94	4.22	154	154	0.28	N/A	Axial
6	82	30	5.62	6.02	265	265	0.40	N/A	Axial



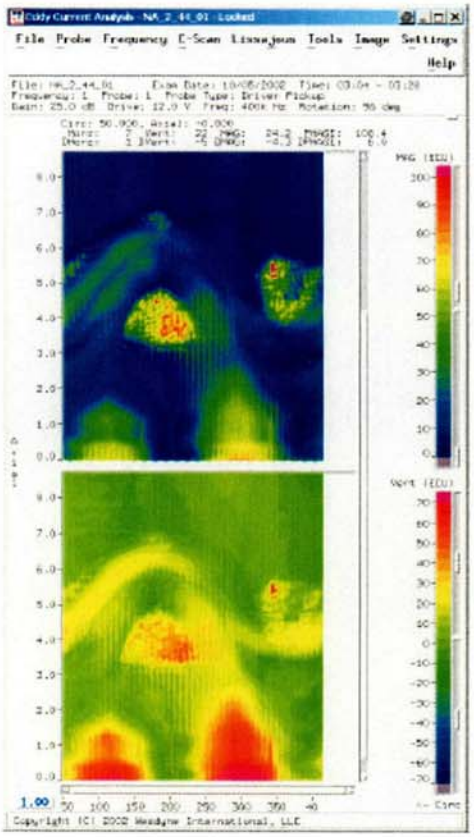
C-Scan



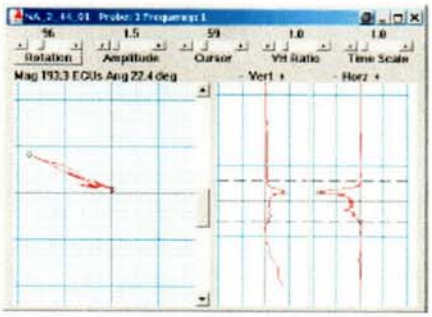
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 44

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	107	23	3.12	4.92	133	244	1.80	2.68	M-Axial
2	193	22	3.76	5.80	326	71	2.04	2.54	Axial
3	19	15	6.60	7.00	157	198	0.40	1.00	Axial



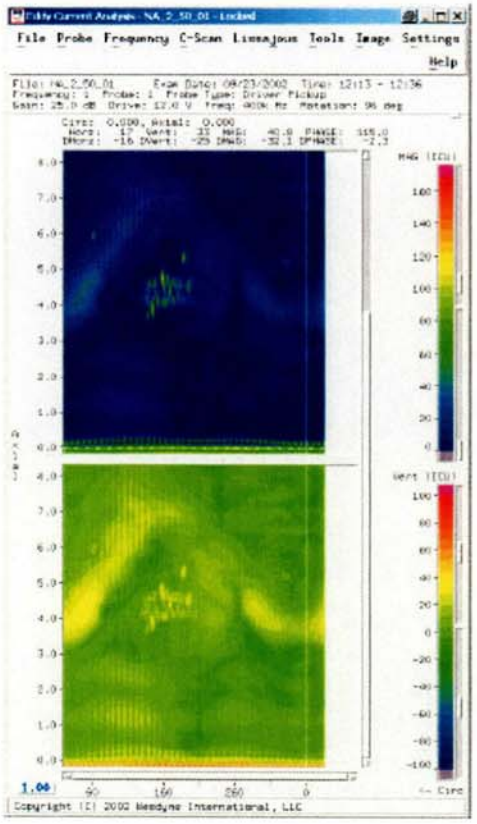
C-Scan



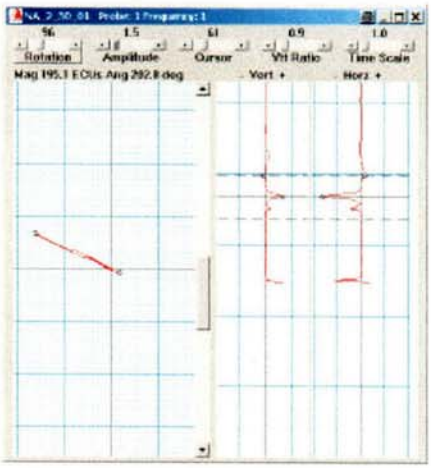
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 50

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	54	26	6.08	6.40	68	68	0.32	N/A	Axial
2	132	24	3.76	5.08	152	152	1.32	N/A	Axial
3	163	24	4.04	5.36	166	166	1.32	N/A	Axial
4	126	24	4.00	5.32	177	177	1.32	N/A	Axial
5	146	24	4.04	6.04	196	196	2.00	N/A	Axial
6	61	23	5.12	5.52	343	343	0.40	N/A	Axial



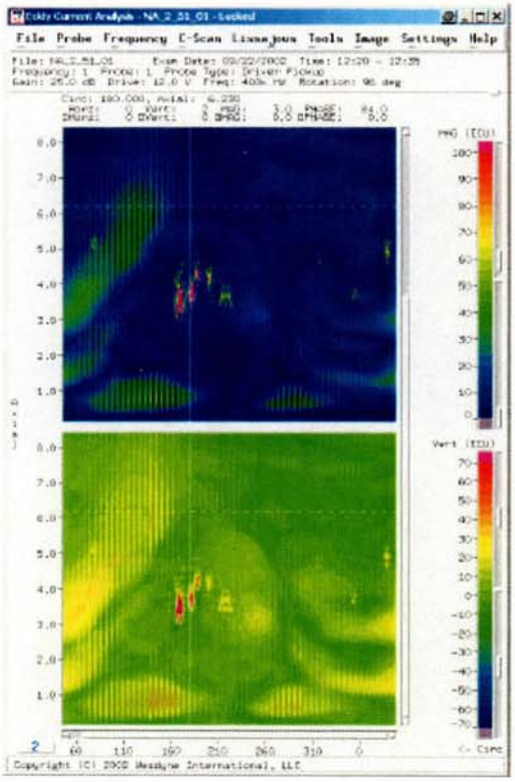
C-Scan



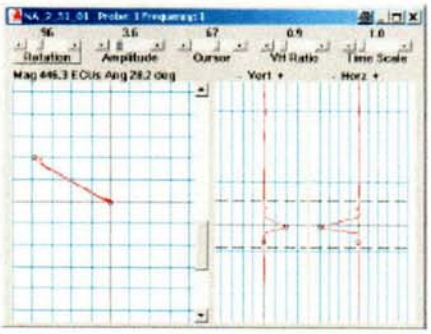
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 51

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	71	37	4.95	5.39	73	73	0.44	N/A	Axial
2	446	28	2.99	3.87	166	166	0.88	N/A	Axial
3	298	26	3.35	4.15	178	178	0.80	N/A	Axial
4	238	24	3.91	4.75	184	184	0.84	N/A	Axial
5	119	22	3.75	4.47	196	196	0.72	N/A	Axial
6	102	29	3.59	4.03	210	217	0.44	N/A	Multi Axi
7	52	17	4.87	5.03	313	313	0.16	N/A	Axial
8	73	33	3.75	4.03	351	351	0.28	N/A	Axial
9	74	23	4.83	5.35	25	25	0.52	N/A	Multi Axi



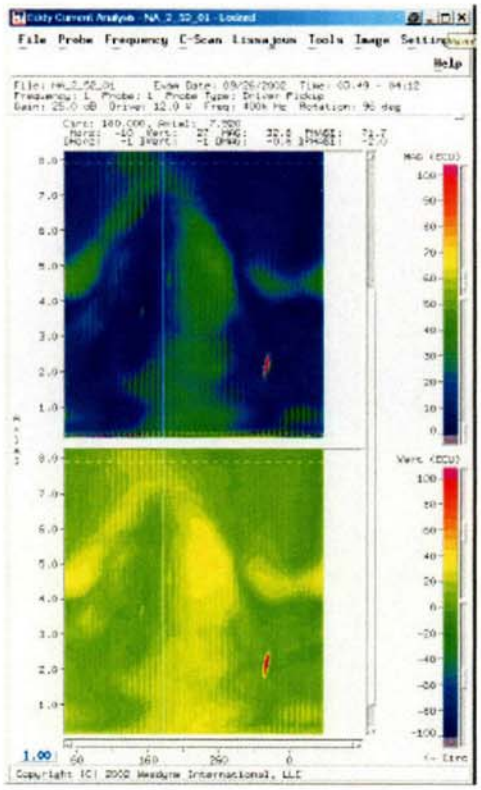
C-Scan



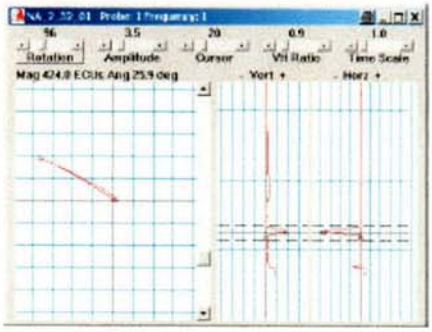
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 52

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	424	26	1.76	2.64	328	328	0.88	N/A	Axial
2	43	29	4.32	4.92	189	189	0.60	N/A	Axial
3	57	29	3.44	4.00	151	151	0.56	N/A	Axial



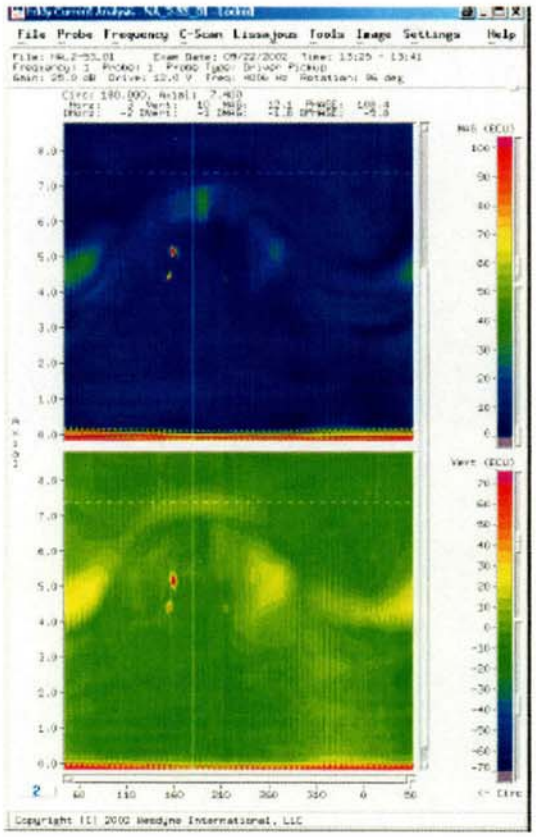
C-Scan



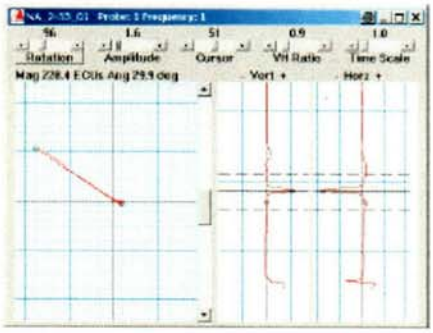
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 53

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	171	28	4.56	5.00	154	154	0.44	N/A	Axial
2	228	30	5.40	5.96	159	159	0.56	N/A	Axial
3	56	31	4.56	4.96	214	214	0.40	N/A	Axial



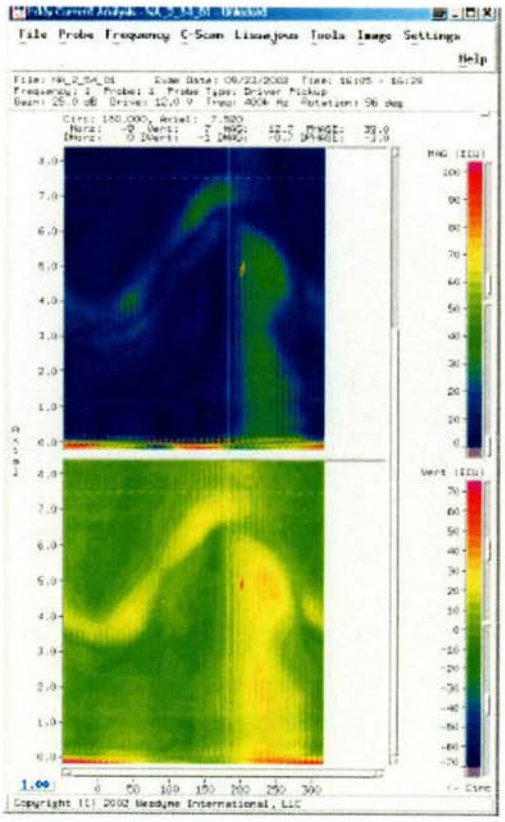
C-Scan



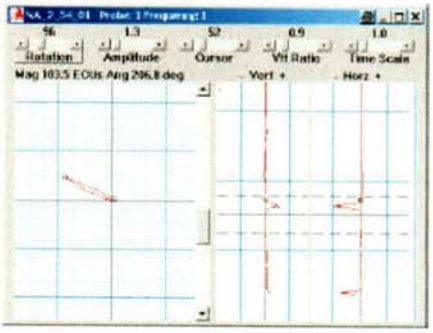
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 54

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	109	28	4.60	5.20	200	200	0.60	N/A	Axial



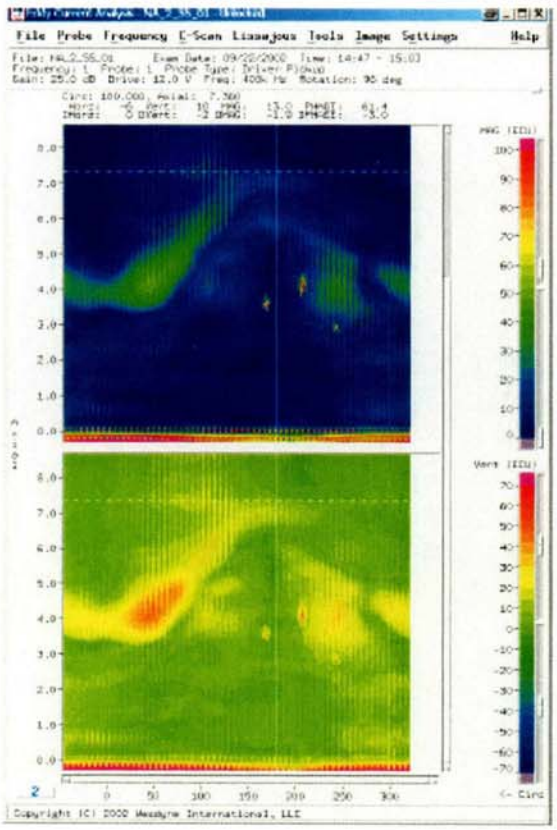
C-Scan



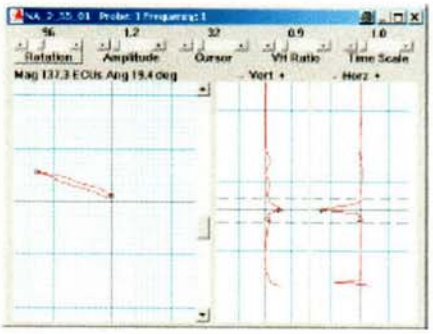
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 55

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	128	22	3.56	4.16	169	169	0.60	N/A	Axial
2	137	19	4.16	4.88	207	207	0.72	N/A	Axial
3	83	28	3.04	3.32	241	241	0.28	N/A	Axial



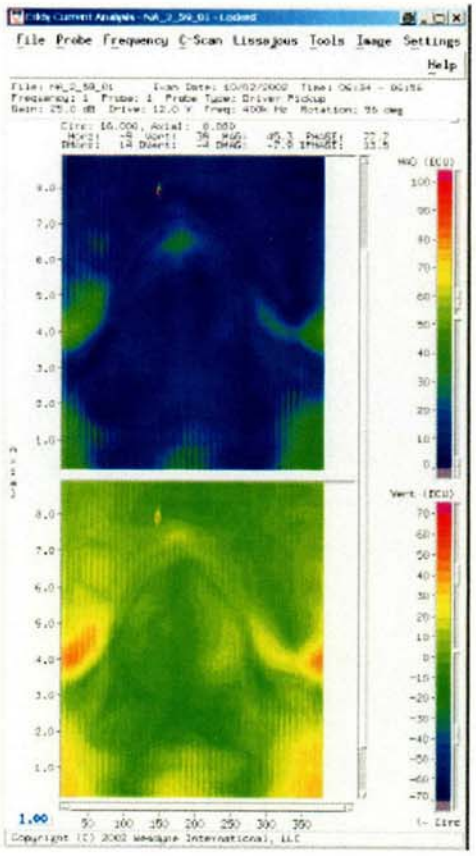
C-Scan



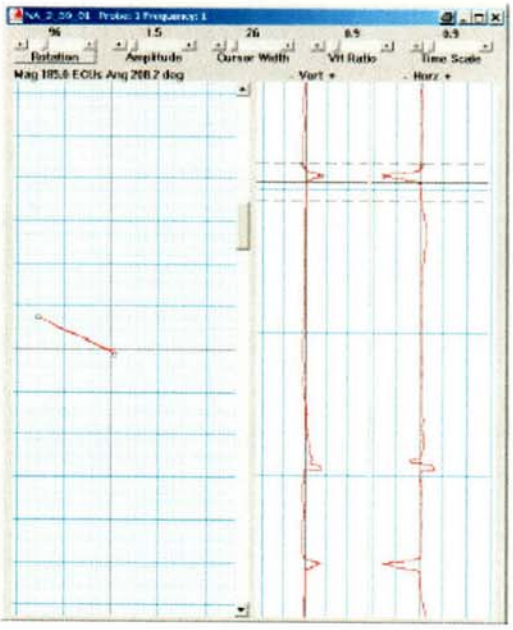
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 59

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	186	25	7.64	8.28	146	146	0.64	N/A	Axi



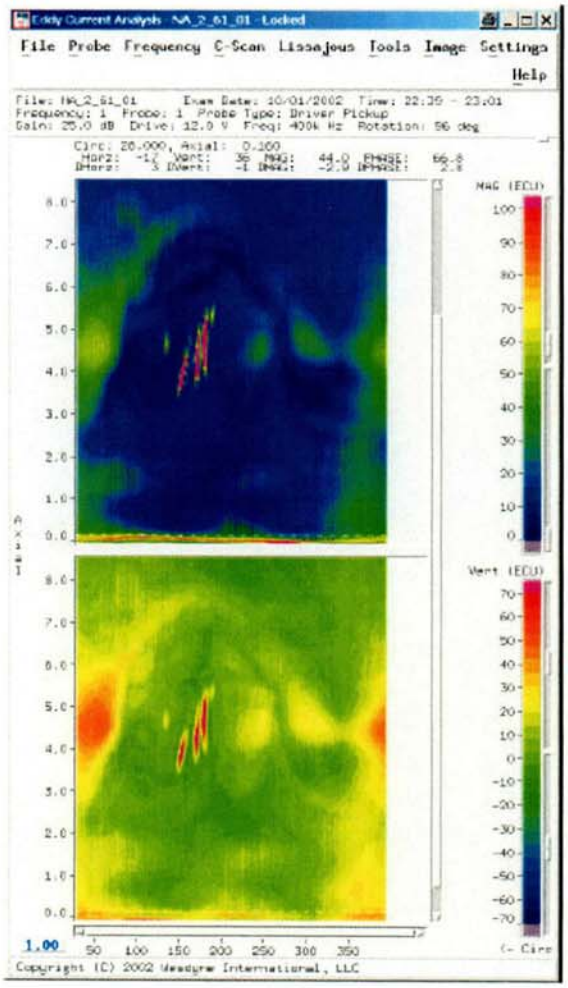
C-Scan



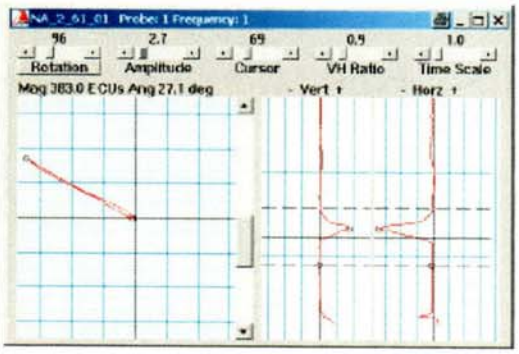
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 61

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	81	28.5	4.32	5.12	134	134	0.80	N/A	Axial
2	330	25.4	3.32	5.08	147	164	1.76	0.41	Axial
3	383	27	3.52	5.32	170	170	1.80	N/A	Axial
4	320	24	3.80	5.64	179	179	1.84	N/A	Axial
5	75	26	4.96	5.72	188	188	0.76	N/A	Axial



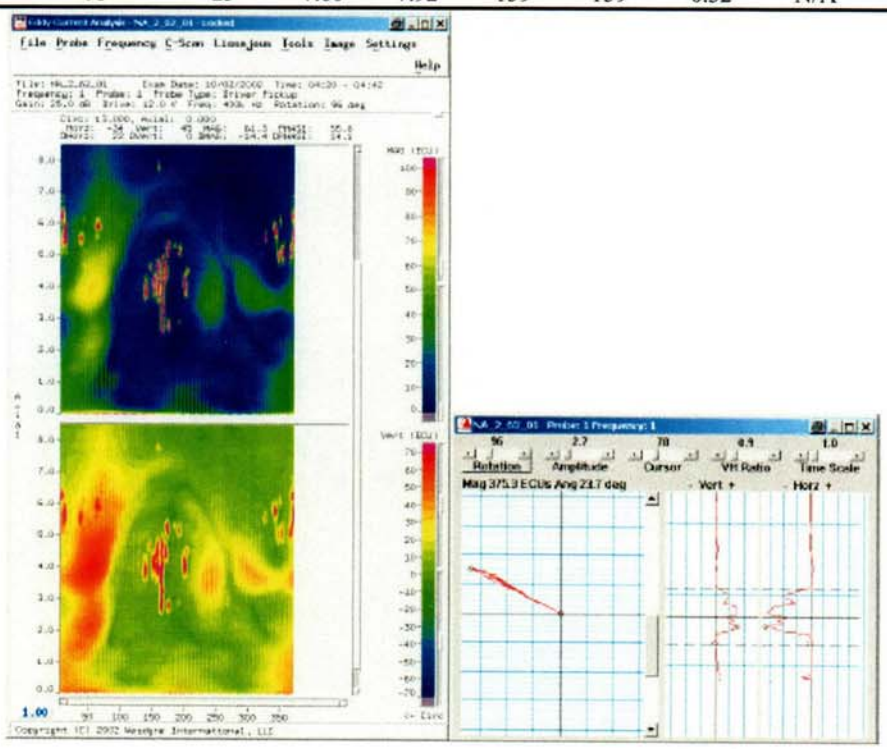
C-Scan



Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 62

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	224	28	4.68	6.92	5	14	2.24	0.21	Axial
2	100	21	5.20	6.36	35	43	1.16	0.19	Axial
3	138	29.5	5.40	6.52	59	68	1.12	0.22	Axial
4	224	24	3.52	4.60	139	139	1.08	N/A	Axial
5	140	22	4.36	4.84	147	147	0.48	N/A	Axial
6	336	24	3.44	5.00	159	159	1.56	N/A	Axial
7	375	24	2.44	5.20	165	165	2.76	N/A	Axial
8	314	26	4.04	5.64	171	174	1.60	0.07	Axial
9	205	24	2.52	3.04	176	176	0.52	N/A	Axial
10	80	26	5.16	5.48	185	185	0.32	N/A	Axial
11	53	28	2.72	3.12	191	191	0.40	N/A	Axial
12	168	24	4.92	5.56	192	192	0.64	N/A	Axial
13	272	28.5	3.64	4.72	200	203	1.08	N/A	Axial
14	39	21	4.92	5.52	318	321	0.60	0.07	Axial
15	129	21	5.32	5.88	328	328	0.56	N/A	Axial
16	223	23	4.52	6.32	343	347	1.80	0.09	Axial
17	186	22	4.64	5.52	353	353	0.88	N/A	Axial
18	106	25	5.88	6.32	351	351	0.44	N/A	Axial
19	93	25	7.60	7.92	159	159	0.32	N/A	Axial

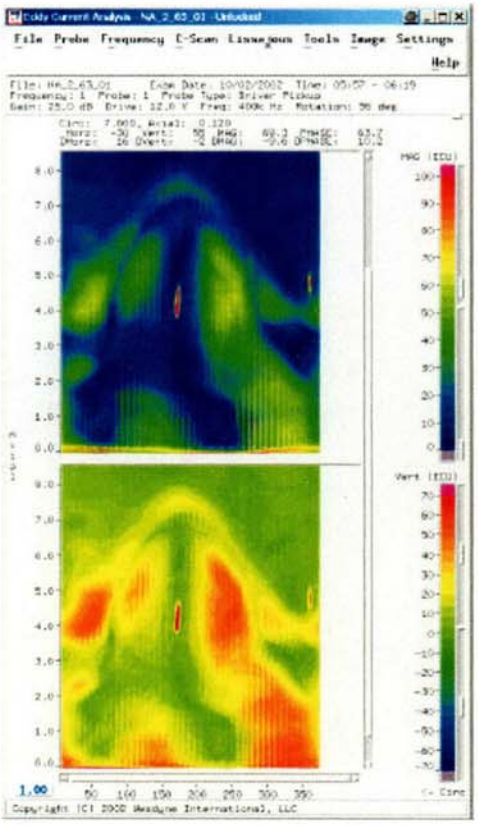


C-Scan

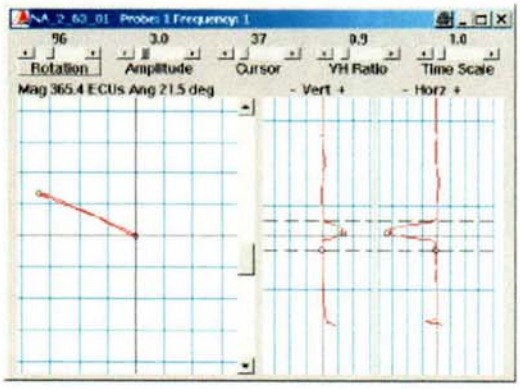
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 63

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	365	21.5	3.80	4.80	172	172	1.00	N/A	Axial
2	117	24	4.48	5.24	360	360	0.76	N/A	Axial



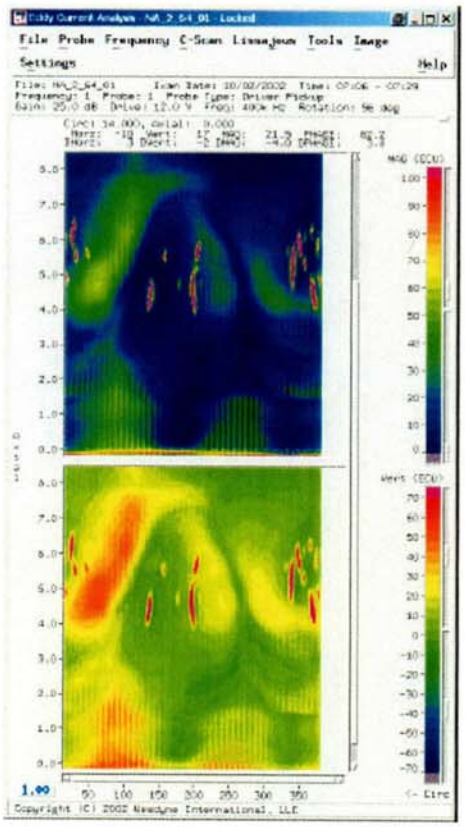
C-Scan



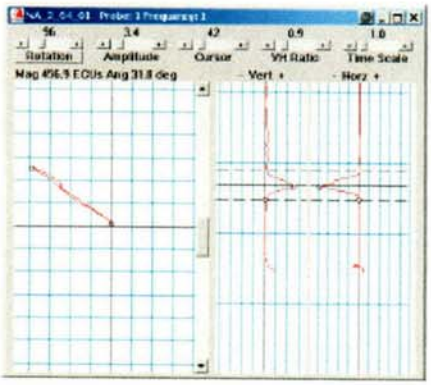
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 64

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	141	31.5	5.96	6.60	5	5	0.64	N/A	Axial
2	403	33	4.04	5.20	9	9	1.16	N/A	Axial
3	98	31	5.48	6.36	15	15	0.88	N/A	Axial
4	116	23	4.80	5.24	17	17	0.44	N/A	Axial
5	321	29	5.60	6.80	24	24	1.20	N/A	Axial
6	150	27	5.32	6.04	29	29	0.72	N/A	Axial
7	67	21	5.40	6.00	45	45	0.60	N/A	Axial
8	376	28	3.92	5.04	136	136	1.12	N/A	Axial
9	121	29	5.40	5.92	155	155	0.52	N/A	Axial
10	69	30	4.44	4.96	176	176	0.52	N/A	Axial
11	457	32	3.96	6.04	196	202	2.08	0.15	Axial
12	438	27	4.36	6.04	338	338	1.68	N/A	Axial
13	247	32	`5.72	6.48	347	347	0.76	N/A	Axial
14	165	27	5.12	5.84	355	355	0.72	N/A	Axial



C-Scan



Axial. Indication Lissajous

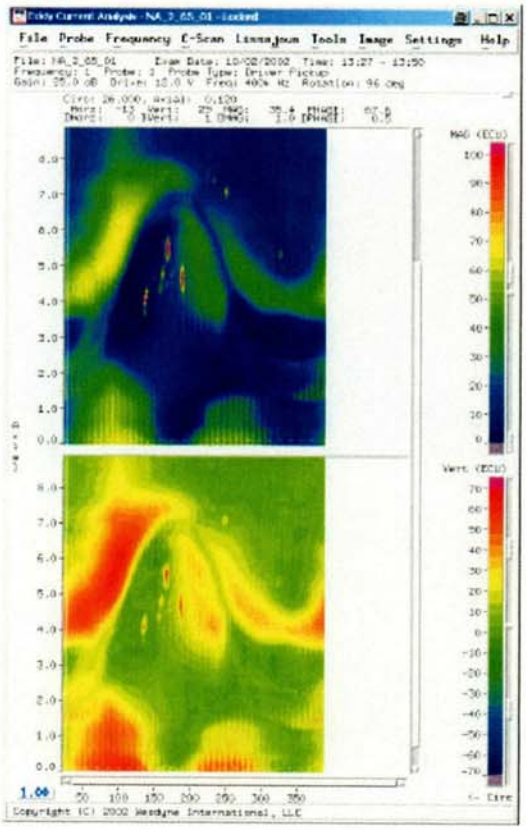
North Anna – Unit 2

Inspection on CRDM Open Penetrations (7010 Scan)

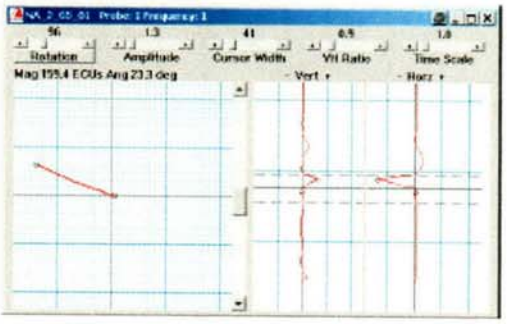
September 2002 Outage

CRDM Open Penetration Inspection – Indications in CRDM No. 65

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	134	26	3.52	4.56	135	135	1.04	N/A	Axial
2	94	26	5.12	4.28	159	159	0.84	N/A	Axial
3	159	23	4.92	6.00	166	166	1.08	N/A	Axial
4	95	30	4.16	5.20	186	186	1.04	N/A	Axial
5	24	24	7.48	7.68	222	222	-.20	N/A	Axial
6	40	24	7.40	7.68	231	231	0.28	N/A	Axial
7	89	22	6.76	7.48	248	248	0.72	N/A	Axial
8	43	23	5.28	5.72	325	325	0.44	N/A	Axial
9	13	7	5.48	5.72	8	8	0.24	N/A	Axial



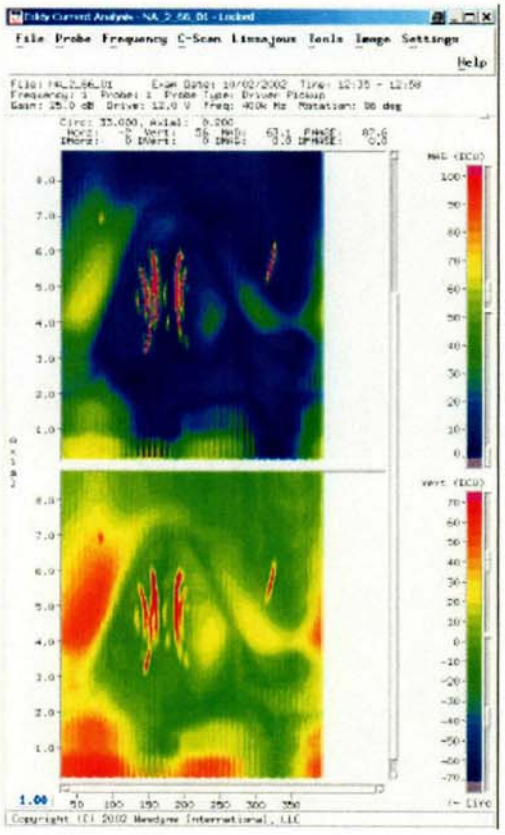
C-Scan



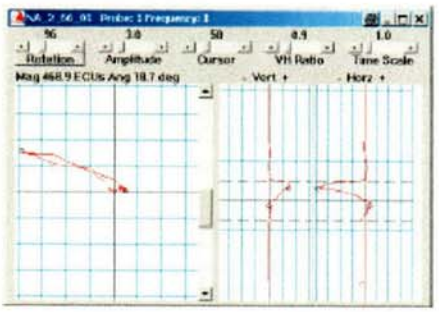
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 66

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	89	29	6.76	7.20	83	83	0.44	N/A	Axial
2	123	26	4.20	5.08	134	134	0.88	N/A	Axial
3	308	22.5	4.04	5.64	137	148	1.6	0.26	Axial
4	469	19	3.12	6.12	142	164	3.00	0.29	Axial
5	104	24.5	4.52	5.32	171	171	0.80	N/A	Axial
6	88.5	29	3.60	4.28	176	176	0.68	N/A	Axial
7	369	23	3.33	6.24	185	185	2.92	0.31	Axial
8	58	30	3.20	3.80	202	202	0.60	N/A	Axial
9	278	23.5	5.16	6.40	315	326	1.24	0.26	Axial



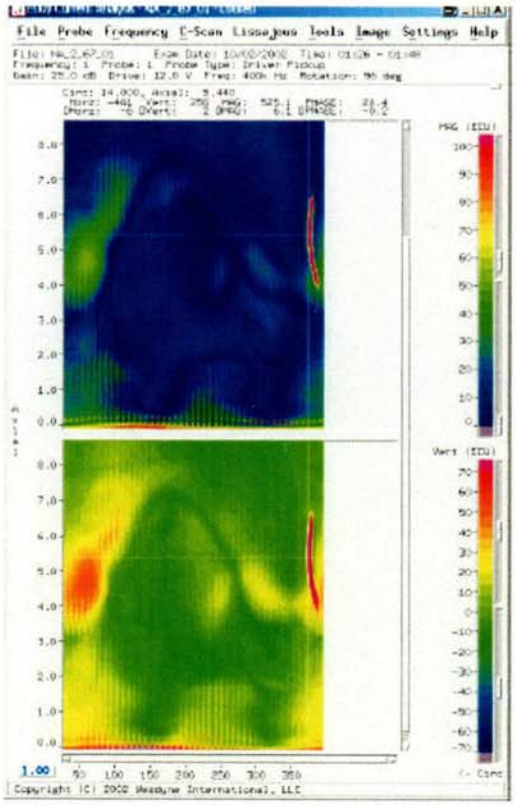
C-Scan



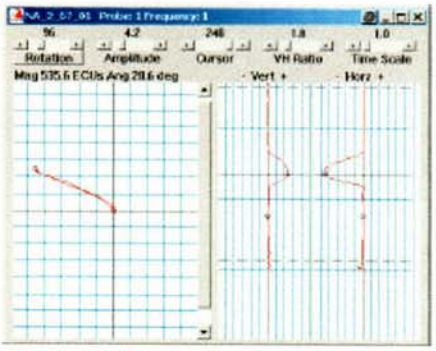
Axial. Indication Lissajous

CRDM Open Penetration Inspection – Indications in CRDM No. 67

Indication N0.	Amplitude 400kHz [ECU]	Phase 400kHz [Dgr.]	Axial Start [inch]	Axial End [inch]	Circ. Start [Dgr.]	Circ. End [Dgr.]	Axial Length [inch]	Circ. Length [inch]	Comment
1	535	14	3.88	6.84	24	17	2.96	.165	AXI



C-Scan



Axial. Indication Lissajous