TURKEY POINT 4 STEAM GENERATOR

INSPECTION PROGRAM

I. INTRODUCTION

An extensive inspection program for the Turkey Point Unit 4 steam generators was conducted in May, 1980. The following items were accomplished:

1. Gauging of steam generator hot legs and cold legs - all steam generators.
2. Measurements of visible flow slots in all steam generators.
3. Eddy current inspection of small radius U-bends in steam generator B.
4. Regulatory Guide 1.83 eddy current measurements in the hot legs and cold legs of all steam generators.
5. Preventive plugging.
6. Profilometry of selected tubes.

Table 1 is a summary of the approximate number of steam generator tubes inspected in each category and in each steam generator.

Table 1: Summary of Total Steam Generator Tubes Inspected.

	A Hot Leg	A Cold Leg	B Hot Leg	B Cold Leg	C Hot Leg	C Cold Leg
Gauging	1205	170	1276	140	1209	179
U-Bend Rows 2-5	-	-	-	55	-	-
R.G. 1.83	301	360	283	169	146	275

This report summarizes the inspections conducted, the results of these inspections, and preventive plugging programs accomplished.

II. INSPECTION PROGRAMS

A. Gauging Program

The tube gauging program in the tubelane area is based on previously defined

regions where significant tube deformation has occurred. These regions are also determined using finite element analysis technique which yield tube hoop strain contours as a function of plate deformation. The boundary in the peripheral tubelane areas near the three and nine o'clock wedge locations is modified in the anlaysis to take into account the deformation in this region of the plate determined by previous experience. Initially, a 12.5% strain boundary was used in the gauging program when little plant specific data was available. After two initial inspections and four reinspections of the Turkey Point Plants, review of specific information indicated the conservatism of the 12.5% boundary. Consequently, a 15% boundary was adopted and used in the guaging program during the last inspection. With the addition of the information gained from that inspection (then totaling five reinspections), it became apparent that the 15% boundary was also overly conservative and the 17.5% boundary would be more appropriate. That is, the majority of the tubes inspected did not restrict the .650 probe. In addition, all tubes restricting the .610 inch or .540 inch probe in the tubelane area all fell within the inspection boundary. This is significant since the .610 inch and .540 inch restricted tubes form the basis for the plugging patterns in the tubelane region. It is now apparent that the predicted 17.5% stain contour progresses much more rapidly than what actually occurs in the S/G's (as indicated by the plant inspection data). Since full closure of the flowslots was observed in Turkey Point 4 steam generators during the May, 1977 inspection, Turkey Point 4 is regarded as beyond full closure by approximately 25.5 EFPM's. Since the 17.5% contours at 24 months appears to involve much of the hotleg tube bundle, the program was adjusted to reflect prior experience. Additional inspection programs were defined for the periphery, wedge, and patch plate regions. These programs were based on previous tube leakage histories at Turkey Point as well as previous gauging results at the Turkey Point sites as deemed appropriate.

Due to the current awareness of the potential for tube deformation on the cold leg side, inspections of all three steam generator cold legs were performed.

The gauging inspection boundaries for the May 1980 inspection are indicated in Figure 1 (typical hot leg) and Figure 2 (typical cold leg). Tubes restricted to a .650 mil probe in previous inspections were retested. If a restricted tube was found close to the inspection boundary, the inspection was expanded in that area.

In addition to the specific gauging inspection program, it should be noted that the central portion of the tube bundles from row 14 upward were tested with 700 mil probes, providing early indications on any new deformation which might exist away from the regions usually regarded as active, i.e. the tubelane, patch plate, wedges, and periphery.

B. Flow Slot Measurements

Photographs were taken in each steam generator through the secondary handholes. These photographs were then utilized to measure the openings in the visible flow slots. Results are discussed in Section III. Flow slow measurements provide a gross measure of the continuation of denting, as reflected in the rate of flow slot hourglassing.

C. Other Denting Related Inspections

The U-bends of unplugged tubes in rows 3 thru 5 in steam generator B were examined with 100 kHz. These inspections are performed to confirm the integrity of the small radius U-bends in low number rows.

D. Regulatory Guide 1.83 (R.G. 1.83 Inspection)

The types and extent of inspections required in this area are specified in R.G. 1.83. Typical inspection plans are included (Figures 3 - 8). During the inspections, expansion of the program in each steam generator was accomplished as required by R.G. 1.83. Results of the inspection are discussed later in this report (as available).

III. Inspection Results

A. Gauging Programs

Results of the gauging inspections are indicated in Figures 9 - 13 and are summarized in Table 2.

Table 2: Tube Restriction Summary

Number of Tubes Restricting Passage of Gauge

SG Gauge Diameter	Tubelane Hot Leg	Tubelane Cold Leg	Periphery and Wedge Hot Leg	Periphery and Wedge Cold Leg	Patch Plate Hot Leg
SG A					
.650"	20	0	22	0	2
.610"	15	0	5	0	0
.540"	4	0	2	0	0
SG B					
.650"	23	0	32	0	6
.610"	9	0	5	2	0
.540"	3	0	2	0	0

SG/Gauge Diameter	Tubelane Hot Leg	Tubelane Cold Leg	Periphery and Wedge Hot Leg	Periphery and Wedge Cold Leg	Patch Plate Hot Leg
SG C					
.650"	28	0	23	0	12
.610"	14	4	5	2	4
.540"	3	0	1	0	0

Summary comments resulting from the review of this and other data are as follows:

1. Tubes in the tubelane region that restrict the 0.650 inch probe lie adjacent to the areas in which such restrictions occurred in prior examinations.
2. There were no tubes restricting a 0.540 inch probe in the tubelane regions of the cold legs in any of the three SG's.
3. Tube restrictions were noted in the wedge areas and the patch plates of all three steam generators; this activity appears consistent with previous experience at this and other units.
4. In steam generator B several tube restrictions appeared away from the pattern of prior results; these were located in the Reg. Guide 1.83 inspection program and appropriate expansions were performed. Three of the restrictions, four in all, were located adjacent to a tube which had been pulled in Sept. 1975, as part of the earliest field investigations of denting. The fourth tube lay adjacent to the patch plate inspection area.
5. Only limited cold leg activity, i.e. restrictions less than 0.610 inches, was observed: No tubes in SG A, 2 in SG B, and 6 in SG C. The level of cold leg activity remains quite low compared to the hot leg experience.
6. No forced shutdowns because of tube leakage occurred in 10 EFPM of operations, though slight leakage was reported late in March, 1980. A post-plugging hydro in SG A located R40C68 hot leg as the probable source of leakage.
7. Review of the gauging results shows that 80 tubes restricted the 0.610 inch probe after 10 months operation; this compares with 72 such restrictions observed in April, 1979 after 6 months operations. As a measure of denting progression, the smaller per month figure (8 tubes with 0.610 inch restrictions/month) indicates that some slowing in the denting process may have occurred, and/or indicates an over-conservative preventive plugging program.

B. Flow Slot Measurements

The results of the flow slot measurements are indicated in Figure 19. Only the lower support plates are visible in each S/G. The results are consistent with previous behavior.

C. Other Denting Related Inspections

The U-bends of unplugged tubes in rows 3 thru 5 in steam generator B were examined at 100 kHz. No indications were noted in these small radius U-bends.

D. Regulatory Guide 1.83 Inspection Results and Evaluation

As a result of the periodic inservice eddy current testing done in accordance with Reg. Guide 1.83, 14 tubes were plugged, as follows:

SG A	SG B	SG C
R5C19HL	R9C47CL	R8C34CL
R5C50CL	R11C47CL	R14C46CL
R5C72HL	R36C55HL	R18C27CL
R10C30CL		
R22C57HL	HL - Hot Leg Indication	
R23C44CL	CL - Cold Leg Indication	
R25C57HL		
R26C49CL		

The inspection results of these 14 tubes were evaluated to assure that thinning rates were not escalating. The 1979 EC results for these tubes were looked at and compared to the present EC data. This comparison indicated an average change (in wall thinning) of approximately 1%. The difference in this year's results for these tubes compared to last year's results, is explained more on the basis of differences between EC data interpreters, than on significant degradation of the tubes.

E. Profilometry of Selected Tubes

This inspection (Figure 14) was performed primarily as a hardware field check of an eddy current profilometry probe currently under development. The resulting data (magnetic tape recordings) will be processed at a later date, and used primarily to determine/refine the effectiveness of this inspection technique. It is hoped that ultimately this technique will provide an additional assessment of S/G condition.

IV. Plugging Criteria

A. Gauging Program

The progression of strain contours over the intended operating period is utilized as the basis for preventive plugging of tubes in the tubelane region which are located in rows beyond 0.540" restricted tubes. In earlier inspections the closeness of the strain contour lines prevented identification of the appropriate contour which most reasonably indicated the extent and progression of tubes with greatest deformation. Initially, the 15% strain contour was chosen when limited plant specific data was available and the strain contour lines indicated by finite element analysis fell close together on the plots. Later, review of the relationship between the most restricted tubes at Turkey Point Units 3 and 4 and the finite element analysis strain contours indicated that the 17.5% strain contour more realistically estimated the boundary of these restricted tubes. Present data supports a program which incorporates all previously observed activity with several rows margin beyond, plus a sampling of the central portion of the tube bundle to permit detection of new areas of denting/restriction activity.

For six months operation proposed for Turkey Point #4, the practice of plugging tubes two rows beyond any 0.540 inch was retained, even though review of the data over all prior inspections indicates that this rate of progression is not occurring on a general basis. Again, it should be pointed out that there have been numerous cases of tubes restricting the 0.540 inch probe for some time and not leaking.

The criterion established for plugging tubes in the region of the patch-plate differs from that used for other regions of the bundle. All leaks in the patchplate region have occurred at the perimeter of the plate or near to the patchplate boundary, where plug welds connect the patchplate to the main body of the tube support plate. All observed data indicate that the phenomenon at the patch plate is local in nature and is not consistent with the general strained state of the plate, nor is the phenomenon represented by the finite element model. Due to these factors, the regions of the patchplate are inspected and a specific set of plugging criteria applied. Because of the fact that leakers in this region have not always restricted 0.540 inch probes, leakers and tubes that restrict the 0.540 inch probe should be treated alike, and the surrounding tubes about both should be plugged. In addition, tubes that restrict the 0.610 inch probe should be plugged and tubes on either side of the patchplate boundary (plate perimeter on one side, the plug welds on the other three sides) that restrict the 0.650 inch probe should be plugged.

Due to the local plate cracking that is believed to occur at the periphery and near wedge locations, tube leaks may occur here at lower levels of tube restriction than in the tubelane. Thus, the wedge areas should have their own inspection program and plugging criteria. The plugging criteria at hot leg wedge locations call for treating leakers

and tubes that restrict the 0.540 inch probe in a similar manner. In addition, tubes that restrict the 0.610 inch probe and peripheral tubes that restrict the 0.650 inch probe should be plugged. Cold leg plugging will be based on the degree of activity noted and rates of progression observed from gauging.

Additionally, the observation of tube I.D. restrictions surrounding a gap in the bundle, where a tube pull had been performed, was deemed a local phenomenon requiring only plugging of specific tubes restricting passage of the 0.610 inch or 0.540 inch probe.

The plugging criteria which supports at least six months of operation are:

1. All tubes which do not pass the 0.540 inch probe will be plugged.
2. Additionally, two (2) tubes beyond (i.e., higher row numbers) any tube in columns 1-92 which did not pass the 0.540 inch probe in the tubelane region will be plugged.
3. All tubes which do not pass the 0.610 inch probe will be plugged.
4. The tubes in any column for which plugging under criteria (1) (2), or (3) above is implemented in the tubelane region will also be plugged in the lower row numbered tubes back to the tubelane if not already plugged.
5. As a conservative measure, tubes completely surrounding any known leaking tubes including the diagonally next tube will be plugged if not already covered by the foregoing criteria.
6. In any given column which is surrounded by columns containing tubes with significant tube restrictions or prior plugging, (thereby creating a "plugging valley" in the pattern) engineering judgment will be used to fill the bottom of the valley. In the

peripheral tubelane areas near the three and nine o'clock wedges, tubes surrounded by previously plugged tubes or tubes exhibiting high deformation activity will be plugged based on engineering judgement.

7. Additional preventive plugging will be implemented at the hot leg wedge locations. This plugging will include all tubes that:
   a. Restrict the 0.540 inch probe.
   b. Restrict the 0.610 inch probe.
   c. Restrict the 0.650 inch probe at the periphery.
   d. Surround leakers and tubes that restrict the 0.540 inch probe. including the diagonally next tube.
8. Application of the criteria specified in 7 above, will be made on the basis of engineering judgement for cold leg wedge locations.
9. Additional preventive plugging will be implemented in the patch plate region. This plugging will include all tubes that:
   a. Restrict the 0.540 inch probe.
   b. Restrict the 0.610 inch probe.
   c. Surround leakers and tubes that restrict the 0.540 inch probe including the diagonally next tube.
   d. Lie on either sides of the patchplate boundary (plate perimeter on one side, the plug welds on the other three) and restrict the 0.650 inch probe.

The six month operating period was also evaluated relative to a postulated main steam line break accident (MSLB). In doing this, the finite element analysis plot 24 EFPM beyond closure (Figure 15)was considered. This is considered to be representative of the conditions of the Turkey Point Unit 3 steam generators. It was assumed that the actual boundary of the 17.5% tube loop strain contour in the most advanced steam generator (B) is indicated in the tubelane region by

the previous plugging boundary and the present .540" restricted tubes. Using the finite element analysis results above, the advancement of the 17.5% tube loop strain contour over the next six months was conservatively assumed to be 2 rows. Assuming there are 92 tubes in a row, the total predicted tubes in the tubelane region lying within the 17.5% strain contour at the end of the next six months is:

2 rows in six months x 92 tubes per row = 184 tubes

Subtracting out the tubes that were preventively plugged in this area in steam generator B this time (14) results in a total of 170 unplugged tubes within the 17.5% strain contour at the end of the six month operating period. Assuming one intersection involvement per tube and assuming these tubes would leak during a postulated main steam line break, the total resulting leakage from these tubes would be:

$$170 \text{ tubes} \times 0.05 \frac{\text{GPM}}{\text{tube}} \doteq 8.50 \text{ GPM}$$

This added to the 0.3 GPM leakage assumed to be present at the start of a postulated main steam line break (which would increase to approximately 0.7 GPM due to MSLB differential pressures) yield a total leakage less than 10 GPM, which has been determined in previous submittals to be an acceptable level of leakage during a postulated MSLB.

B. Regulatory Guide 1.83

The criteria for plugging tubes in this area are established in the regulatory guide.

C. Preventive Plugging Accomplished

The preventive plugging programs that were implemented are indicated in Figures 16, 17 and 18. Both gauging and Regulatory Guide 1.83 program plugging are indicated. Table 3 summarizes this plugging.

TABLE 3 Summary of Tubes Plugged

	Gauging	R.G. 1.83
SG A	64	8
SG B	45	3
SG C	53	3
	162	14

SERIES 44

FLA-A

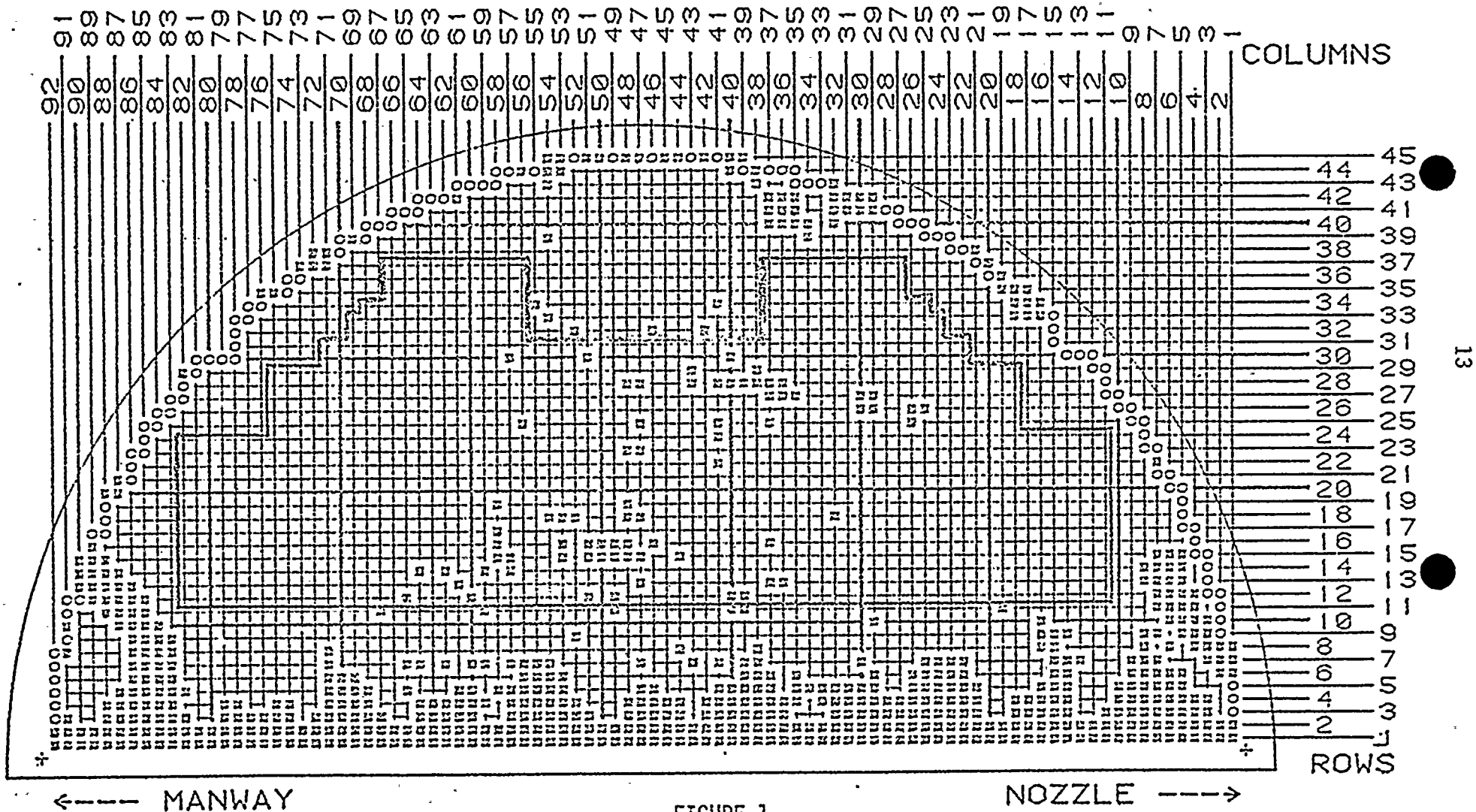


FIGURE 1

GAUGING PROGRAM (TYPICAL) INLET
ALL TUBES OUTSIDE LINED AREA

MAY, 1980

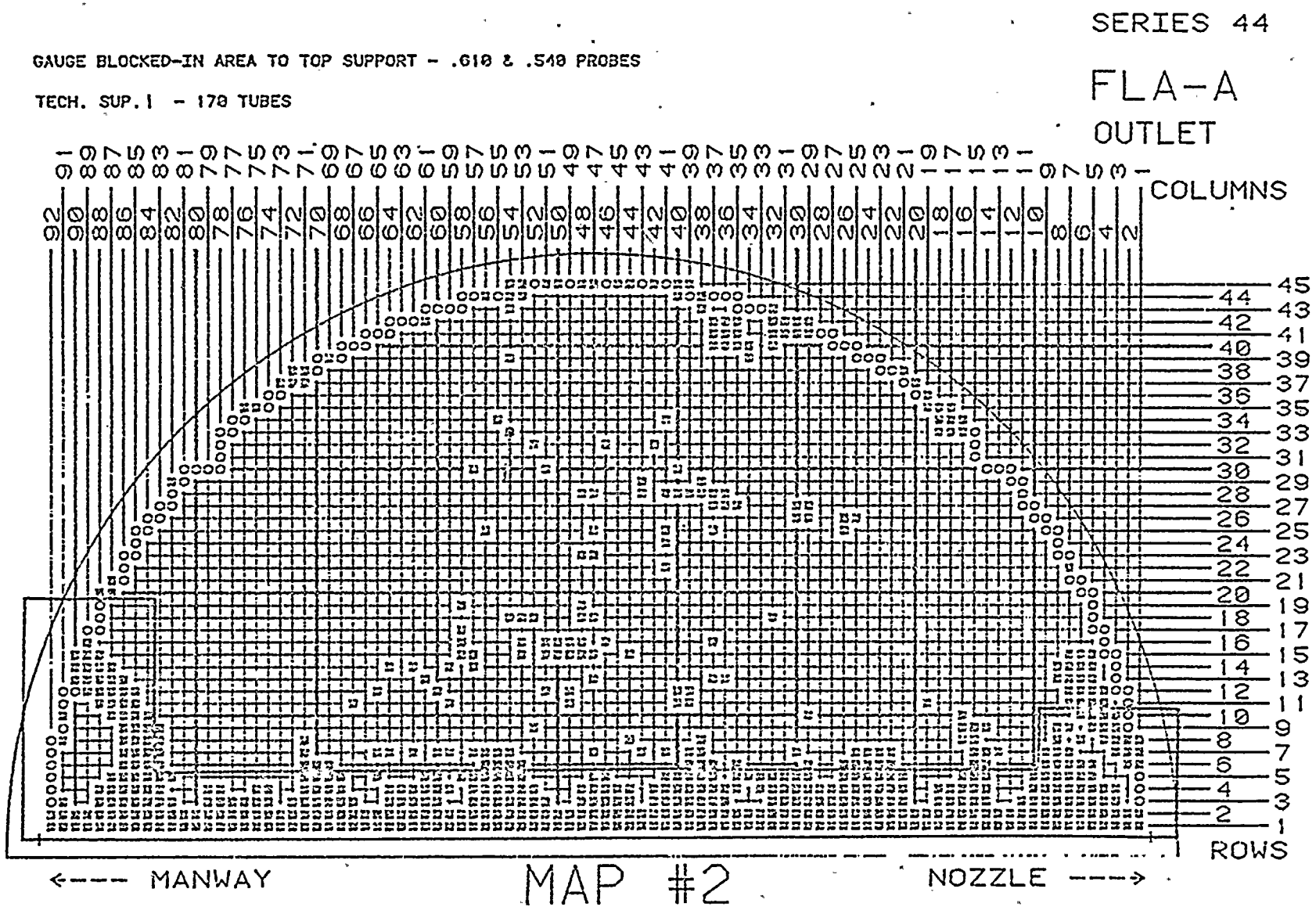


FIGURE 2

GAUGING PROGRAM (TYPICAL) OUTLET
ALL TUBES WITHIN BOUNDED AREA

MAY, 1980

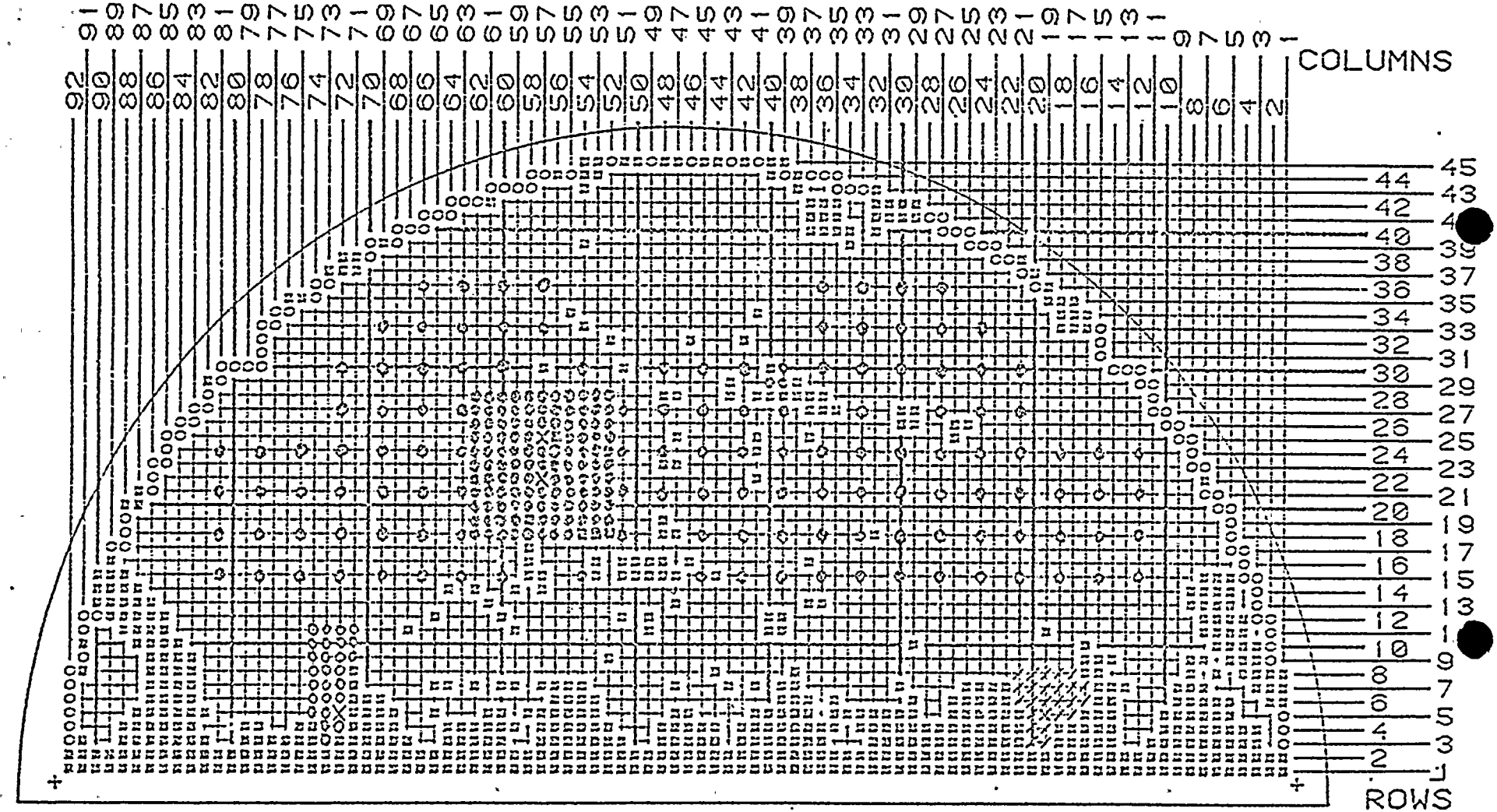
SERIES 44

FLA-A

INLET

- o - COMPLETE U-BEND TEST - 143 TUBES
- ⊘ - FIRST EXPANSION THRU U-BEND WITH .760 F - 100 TUBES
- ⊘ - RESTRICTION TO .700 F PROBE - PASSED .650 LC - 4 TUBES
- X - PLUGGABLE TUBES - 4 TUBES
- / - FIRST EXPANSION TO FIRST SUPPORT WITH .720 LC - 24 TUBES
- o - GAUGING TUBES USED TO BOX PLUGGABLE TUBE .650 LC PASSES - 26 TUBES

TOTAL 301 TUBES INSPECTED



Reg Guide Program - 400 KHz through U-Bend (Tech Sup #1)

MAY, 1980

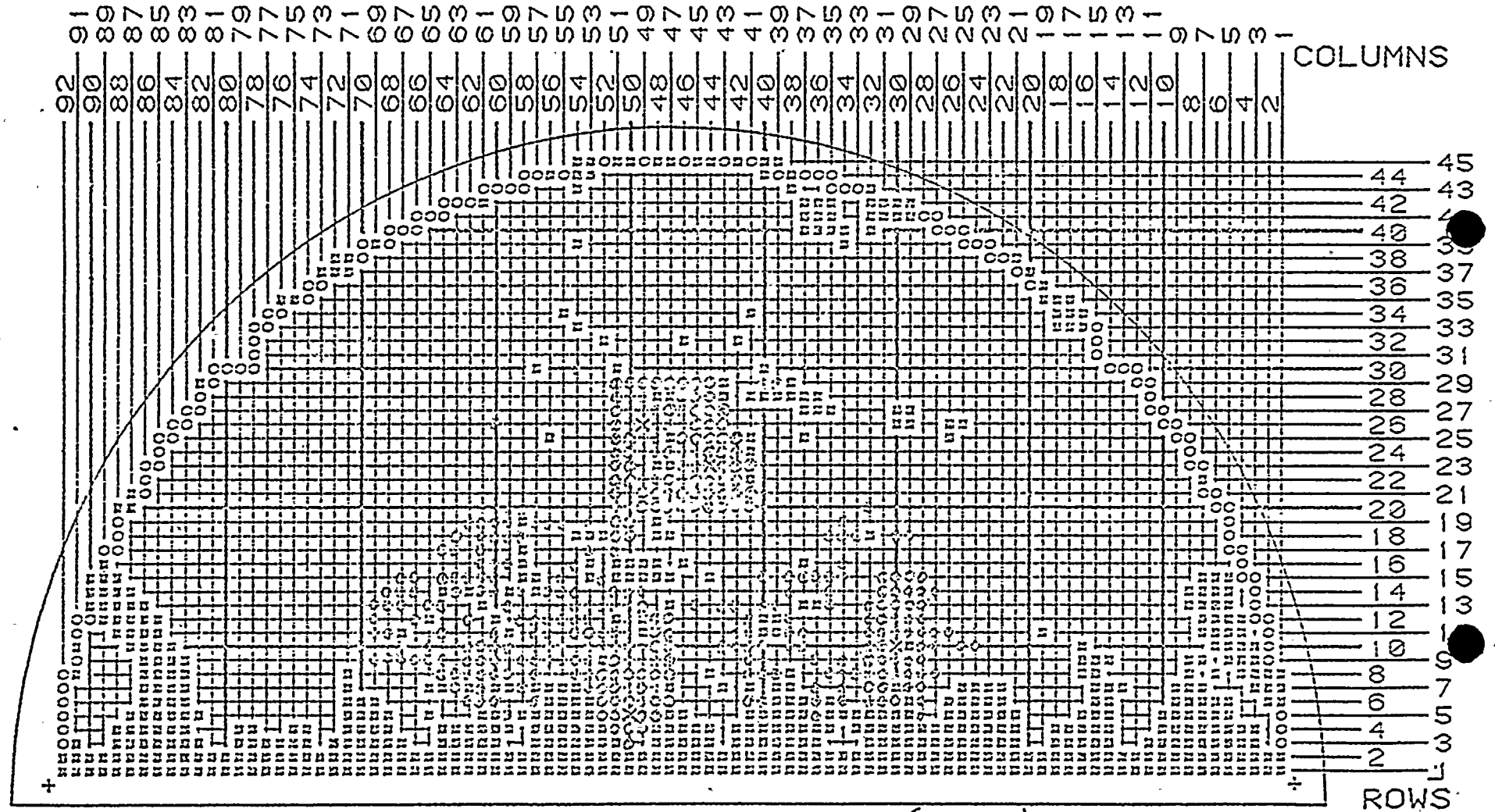
FIGURE 3

O - INITIAL PROGRAM - COMPLETED TEST - [illegible]
O - FIRST EXPANSION 115 TUBES
O - RESTRICTED TO .720 LC - PASSES .610 - 6 TUBES
X - PLUGGABLE - 4 TUBES

SERIES 44

FLA-A

OUTLET



MAY, 1980

FIGURE 4

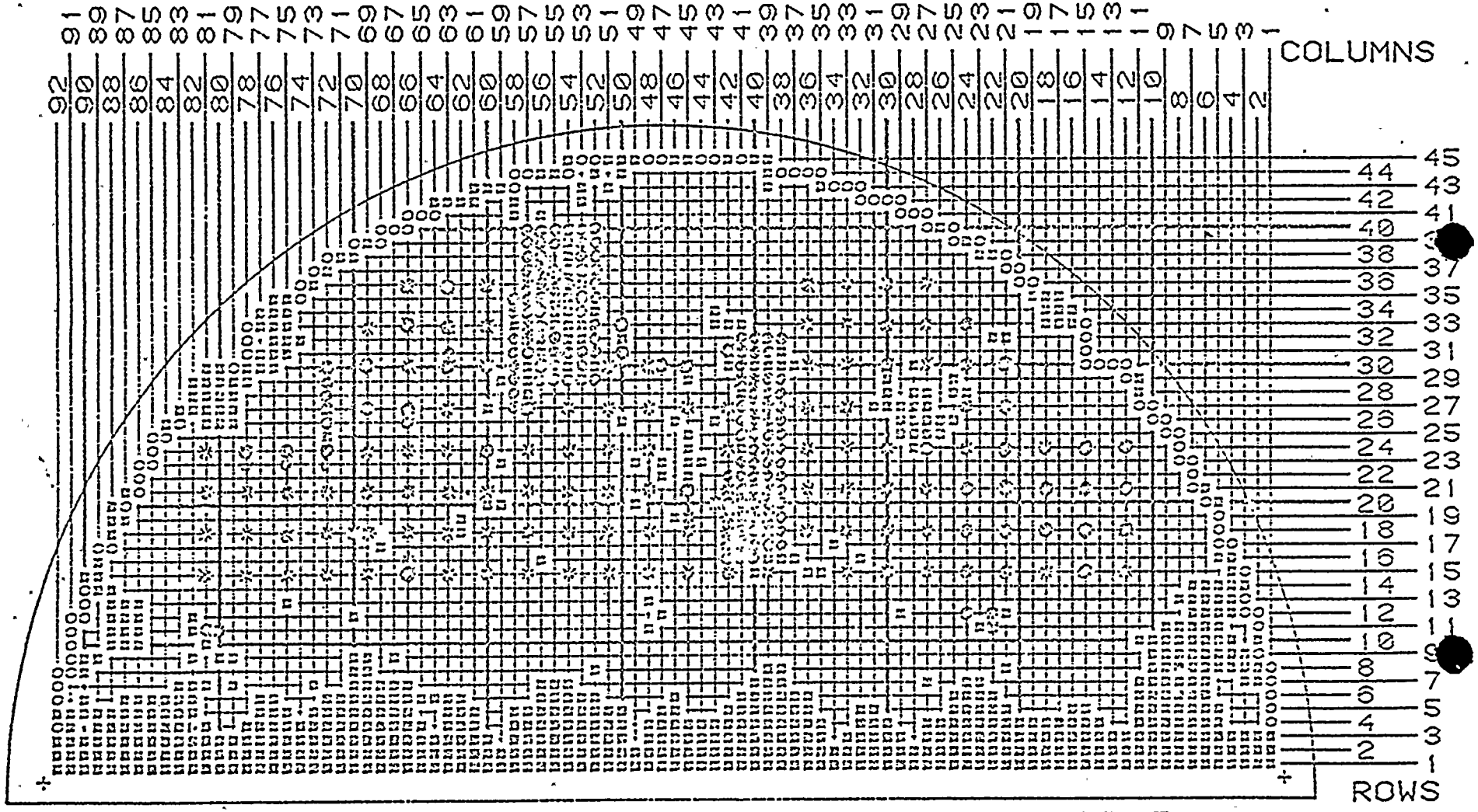
⊠ - INDICATES COMPLETE U-BEND — 30 TUBES
⊙ - INDICATES RESTRICTED TO .700 E PROBE — 41 TUBES
X - PLUGGABLE — 1 TUBE
O - FIRST EXPANSION — 111 TUBES

TOTAL 283 TUBES INSPECTED

SERIES 44

FLA-B

INLET



← MANWAY Reg. Guide Program - 400 KHz through U-bend (Tech Sup #1) NOZZLE →

162 Tubes (ORIGINAL PROGRAM)

MAY, 1980

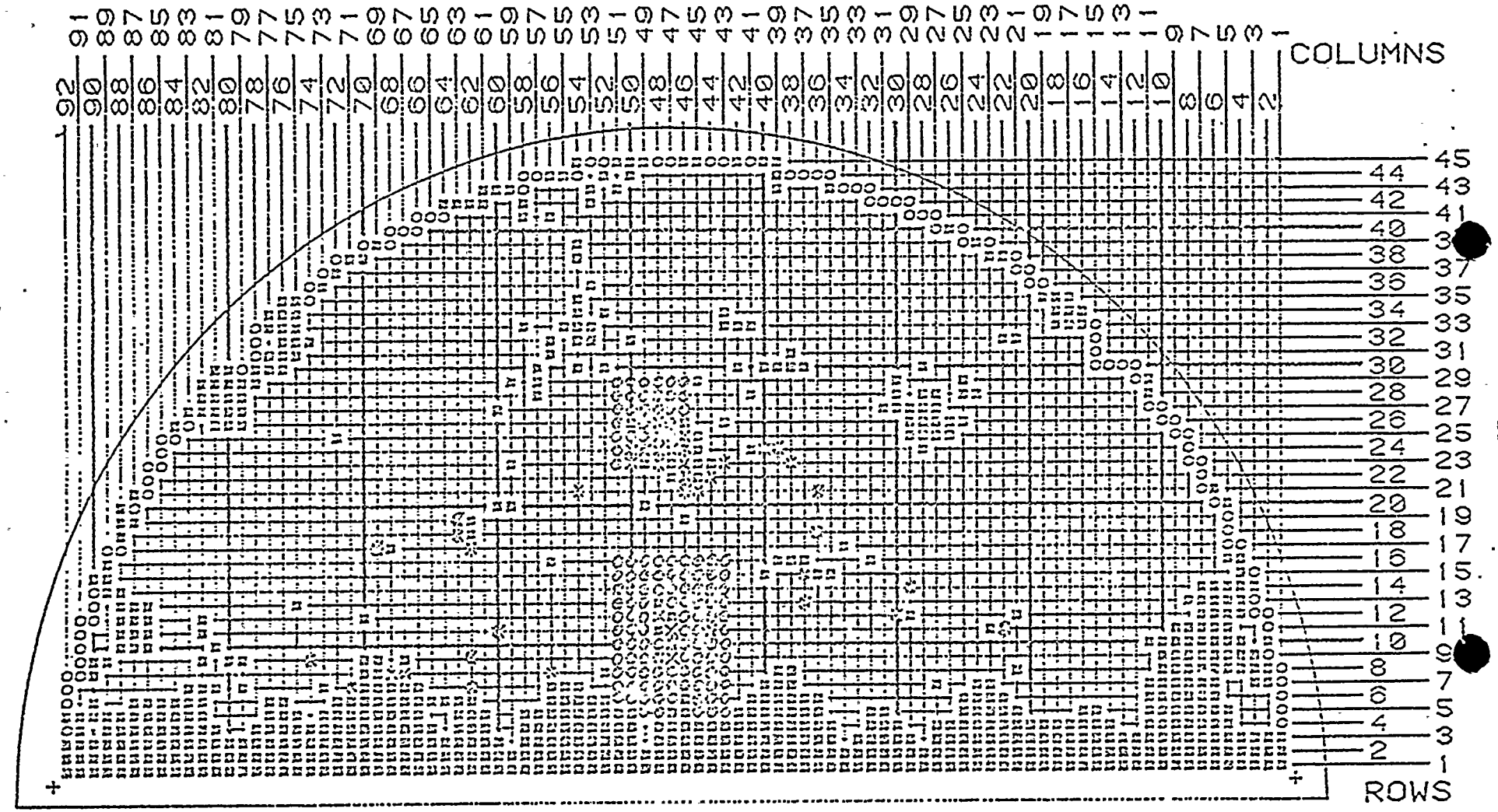
FIGURE 5

⊠ - INITIAL SAMPLE - 45 TUBES
○ - FIRST EXPANSION - 124 TUBES
X - PLUGGABLE TUBES - 2 TUBES

TOTAL 169 TUBES INSPECTED

SERIES 44

FLA-B
OUTLET



Previous Indications- 400 KHz through First Support
45 Tubes (ORIGINAL PROGRAM)

MAY, 1980

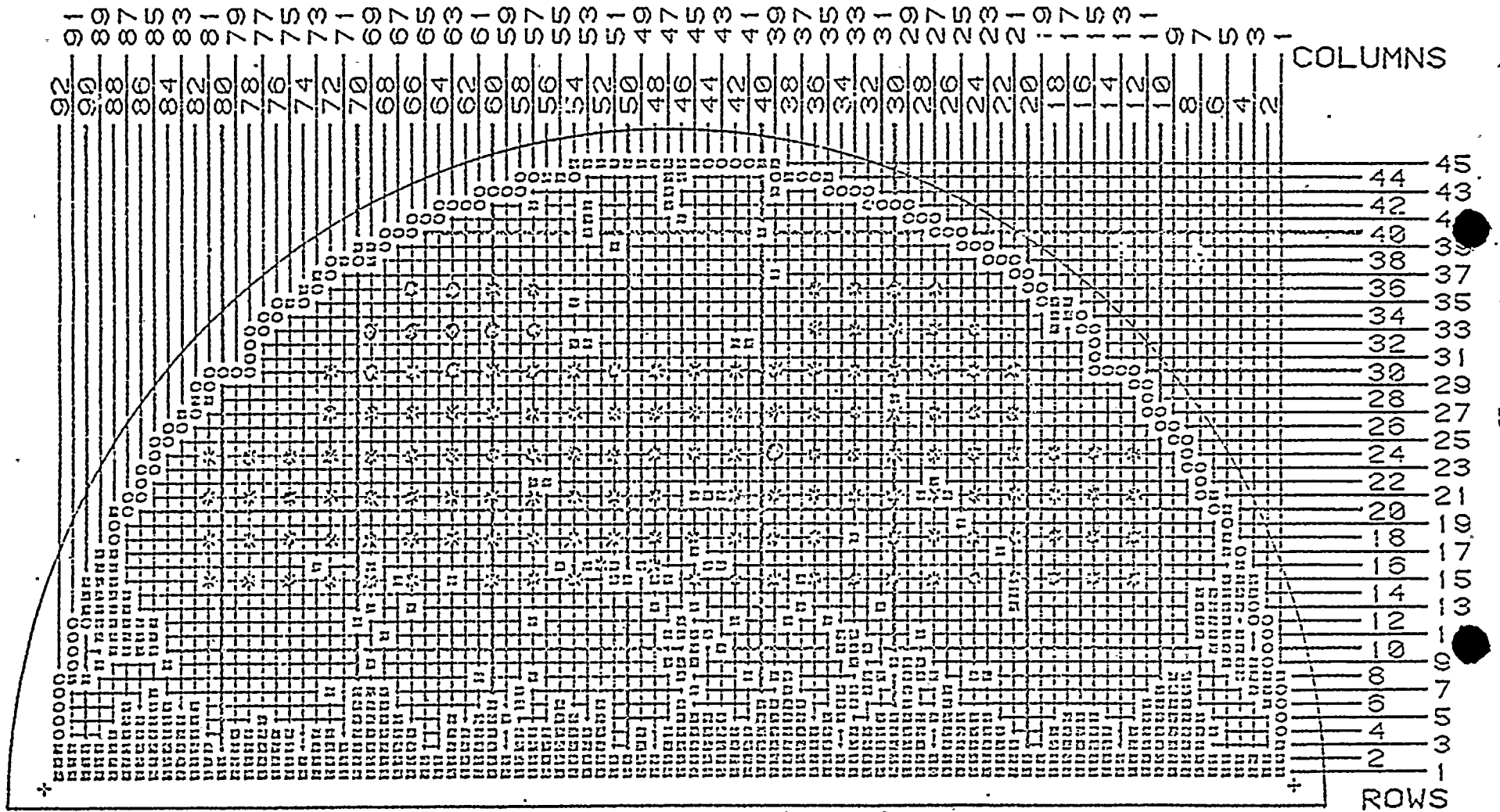
FIGURE 6

⊠ COMPLETED U-BEND TEST .700 F PROBE – 134 TUBES
⊠ RESTRICTED TO .700 F PROBE – 11 TUBES
⊛ NT .710 F – TESTED W/A .650 LC. – 1 TUBE

SERIES 44

TOTAL 146 TUBES TESTED

FLA-C
INLET



MAY, 1980

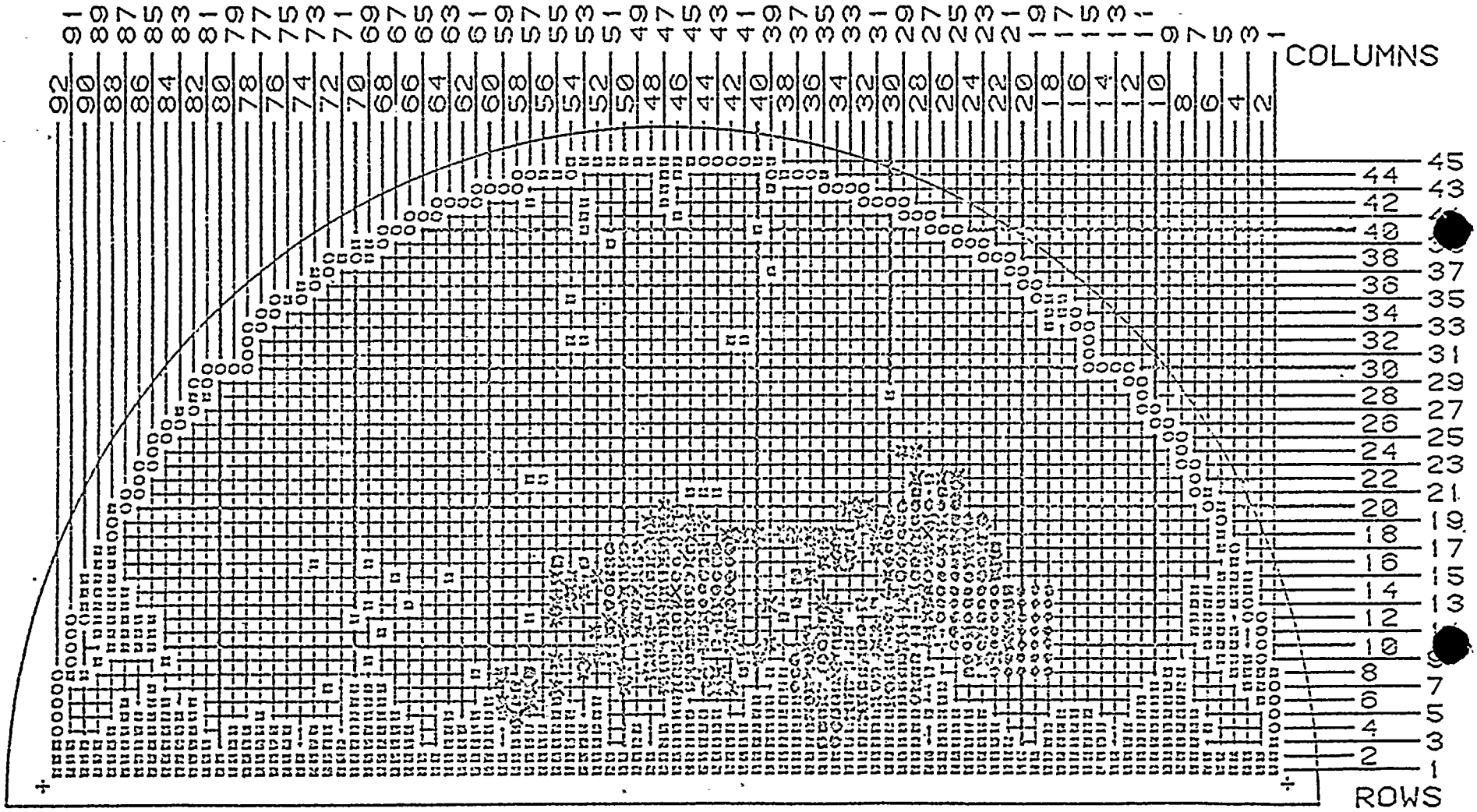
FIGURE 7

X INITIAL PROGRAM - 162 TUBES
O FIRST EXPANSION - 110 TUBES
X PLUGGABLE - 3 TUBES

TOTAL 275 TUBES INSPECTED

SERIES 44

FLA-C
OUTLET



←--- MANWAY Previous Indications - 400 KHz through First Support NOZZLE --->

720 L.C. PROBS

MAY, 1980

FIGURE 8

A	33	9/74; TUBES PLUGGED	H	1	7/77; WELD REPAIR HL, E/P CL
B	63	6/75; TUBES PLUGGED	I	169	2/78; TUBES PLUGGED
C	1	DATE NOT KNOWN; TUBES PLUGGED	J	86	8/78; TUBES PLUGGED
D	1	SHOP WELD	K	2	SHOP WELD, HL MISDRILLED
E	2	5/76; TUBES PLUGGED	L	78	4/79; TUBES PLUGGED
F	92	11/76; TUBES PLUGGED			
G	132	7/77; TUBES PLUGGED			

SERIES 44

FLA-A

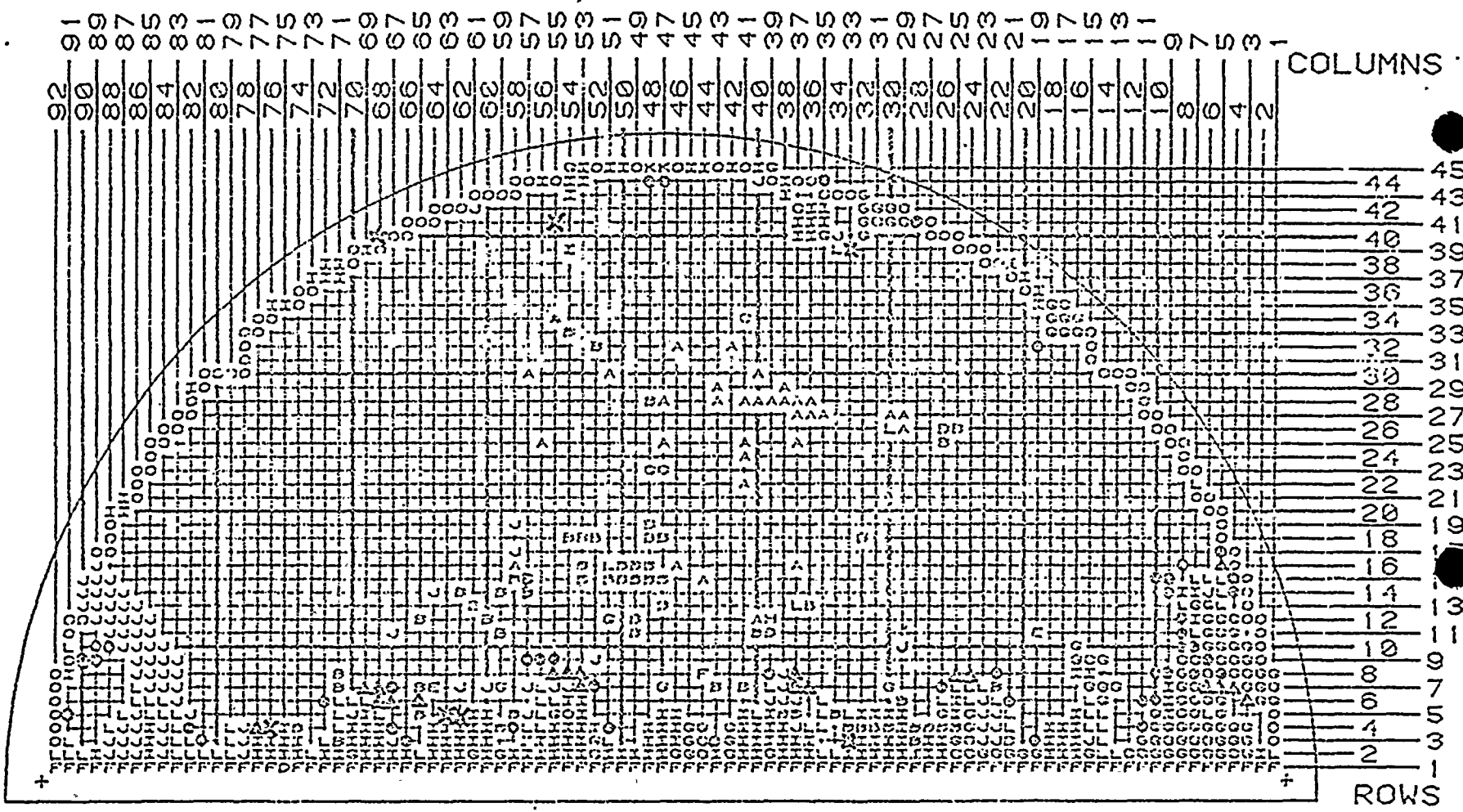


FIGURE 9

TURKEY POINT UNIT #4
STEAM GENERATOR A HOT LEG
GAUGING RESULTS - MAY, 1980

☆ = LEAKER

RESTRICTIONS	NO. OF TUBES
⊙ = .650	44
△ = .610	20
X = .540	6

A	42	9/74; TUBES PLUGGED	I	45	7/75; TUBES PLUGGED
B	1	8/75; TUBE PLUGGED	J	103	11/76; TUBES PLUGGED
C	1	8/75; BARE HOLE PLUG HL-E/P CL	K	1	7/77; WELD REPAIR
D	66	6/75; TUBES PLUGGED	L	324	7/77; TUBES PLUGGED
E	1	SHOP WELD	M	9	10/77; TUBES PLUGGED
F	1	9/75; BARE HOLE PLUGS--HL,CL	N	79	2/78; TUBES PLUGGED
G	11	9/75; TUBES PLUGGED	P	28	8/78; TUBES PLUGGED
H	3	5/76; TUBES PLUGGED	R	52	4/79; TUBES PLUGGED

SERIES 44

FLA-B

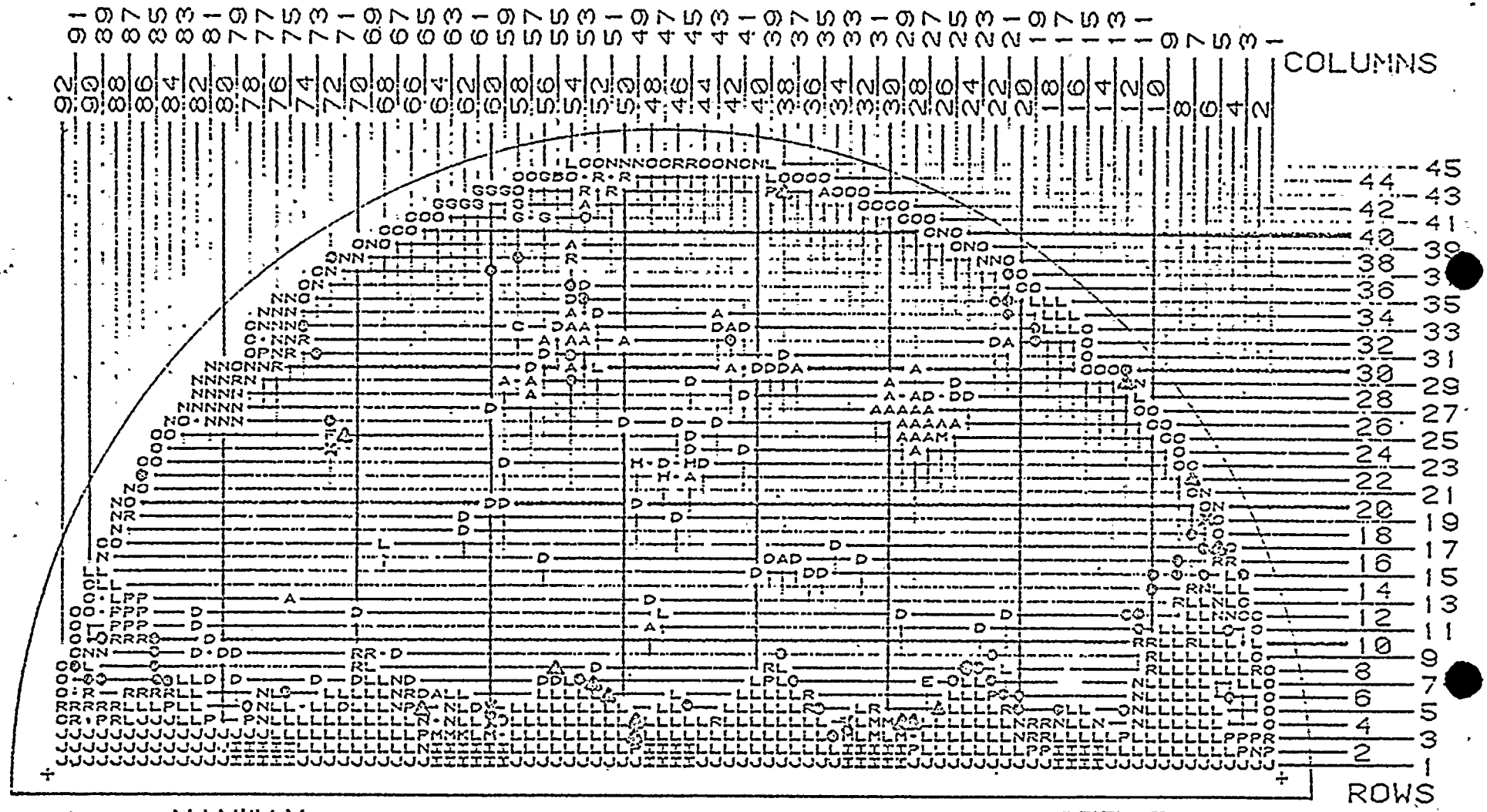


FIGURE 10

TURKEY POINT UNIT #4
GAUGING RESULTS, May, 1980
STEAM GENERATOR B HOT LEG

RESTRICTED TUBES:	NO. OF TUBES
X = .540 Probe	5
△ = .610 Probe	14
⊗ = .650 Probe	61

A	42	9/74, TUBES PLUGGED	I	48	9/76; TUBES PLUGGED
B	1	8/75, TUBE PLUGGED	J	100	11/76, TUBES PLUGGED
C	1	8/75, BARE HOLE PLUG HL-E/P CL	K	1	7/77, WELD REPAIR
D	68	6/75, TUBES PLUGGED	L	304	7/77; TUBES PLUGGED
E	1	SHOP WELD	M	9	10/77, TUBES PLUGGED
F	1	9/75, BARE HOLE PLUGS--HL,CL	N	79	2/78, TUBES PLUGGED
G	11	9/75, TUBES PLUGGED	P	28	8/78, TUBES PLUGGED
H	3	5/76, TUBES PLUGGED	R	52	4/79, TUBES PLUGGED

SERIES 44

FLA-B

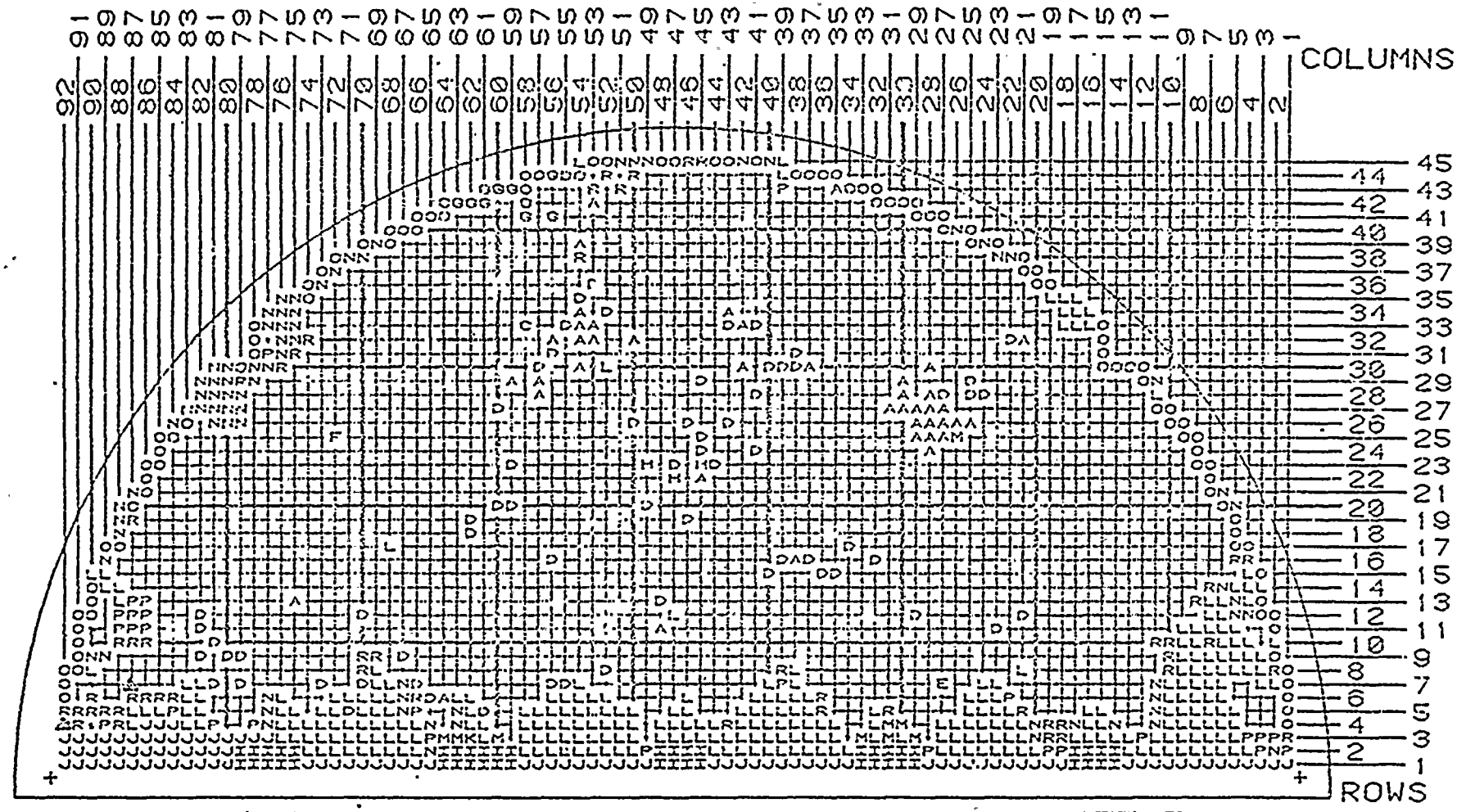


FIGURE 11

TURKEY POINT UNIT #4
STEAM GENERATOR B COLD LEG
GAUGING RESULTS, MAY, 1980

RESTRICTIONS	NO OF TUBES
⊙ =.650	0
△ =.610	2
X =.540	0

A	8	9/74; TUBES PLUGGED
B	96	6/75; TUBES PLUGGED
C	2	1/76; TUBES PLUGGED
D	5	5/76; TUBES PLUGGED
E	2	9/76; TUBES PLUGGED
F	93	11/76; TUBES PLUGGED
G	5	1/77; TUBES PLUGGED
H	2	3/77; TUBES PLUGGED
I	9	4/77; TUBES PLUGGED
J	2	7/77; BARE HOLE HL, E/P OUTLET
K	157	7/77; TUBES PLUGGED
L	113	2/78; TUBES PLUGGED
M	62	8/78; TUBES PLUGGED
N	54	4/79; TUBES PLUGGED
P	1	8/78; EP 5/76, WR HL

SERIES 44

FLA-C

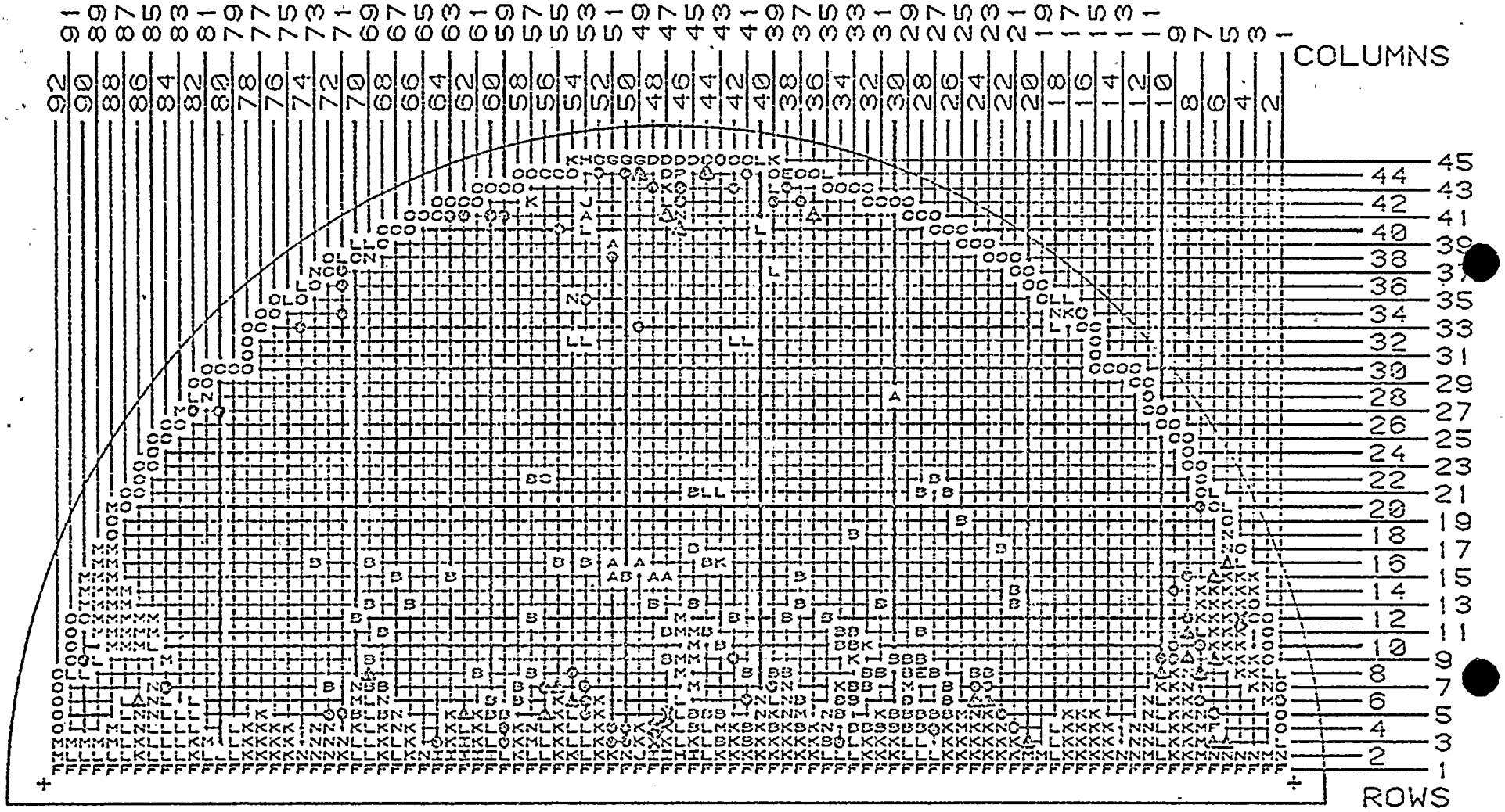


FIGURE 12

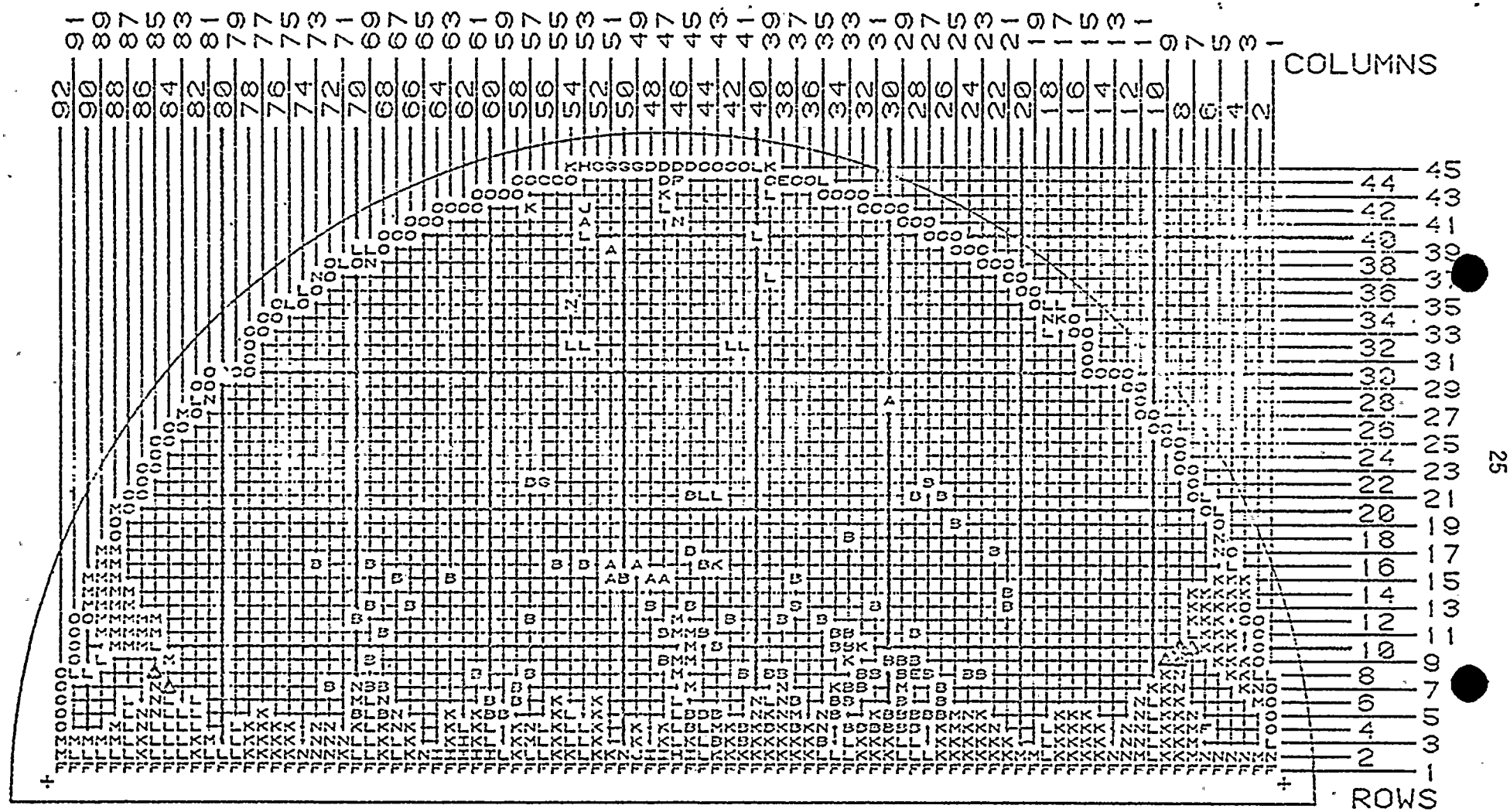
TURKEY POINT #4
STEAM GENERATOR C HOT LEG
GAUGING RESULTS, MAY, 1980

RESTRICTED TUBES	NO. OF TUBES
X =.540 Probe	4
△ =.610 Probe	23
⊙ =.650 Probe	63

A	8	9/74; TUBES PLUGGED
B	96	6/75; TUBES PLUGGED
C	2	1/76; TUBES PLUGGED
D	5	5/76; TUBES PLUGGED
E	2	9/76; TUBES PLUGGED
F	93	11/76; TUBES PLUGGED
G	5	1/77; TUBES PLUGGED
H	2	3/77; TUBES PLUGGED
I	9	[illegible]7; TUBES PLUGGED
J	2	7/77; BARE HOLE HL, E/P OUTLET
K	157	7/77; TUBES PLUGGED
L	110	2/78; TUBES PLUGGED
M	62	8/78; TUBES PLUGGED
N	54	4/79; TUBES PLUGGED
P	1	8/78; EP 5/76, WR HL

SERIES 44

F-LA-C



← MANWAY

NOZZLE →

FIGURE 13

TURKEY POINT UNIT #4
STEAM GENERATOR C (COLD LEG)
GAUGING RESULTS, MAY, 1980

RESTRICTED TUBES	NO. OF TUBES
△ =.610 Probe	6

O - REST. TO .650

\ - REST. TO .610

SERIES 44

FLA-B

INLET

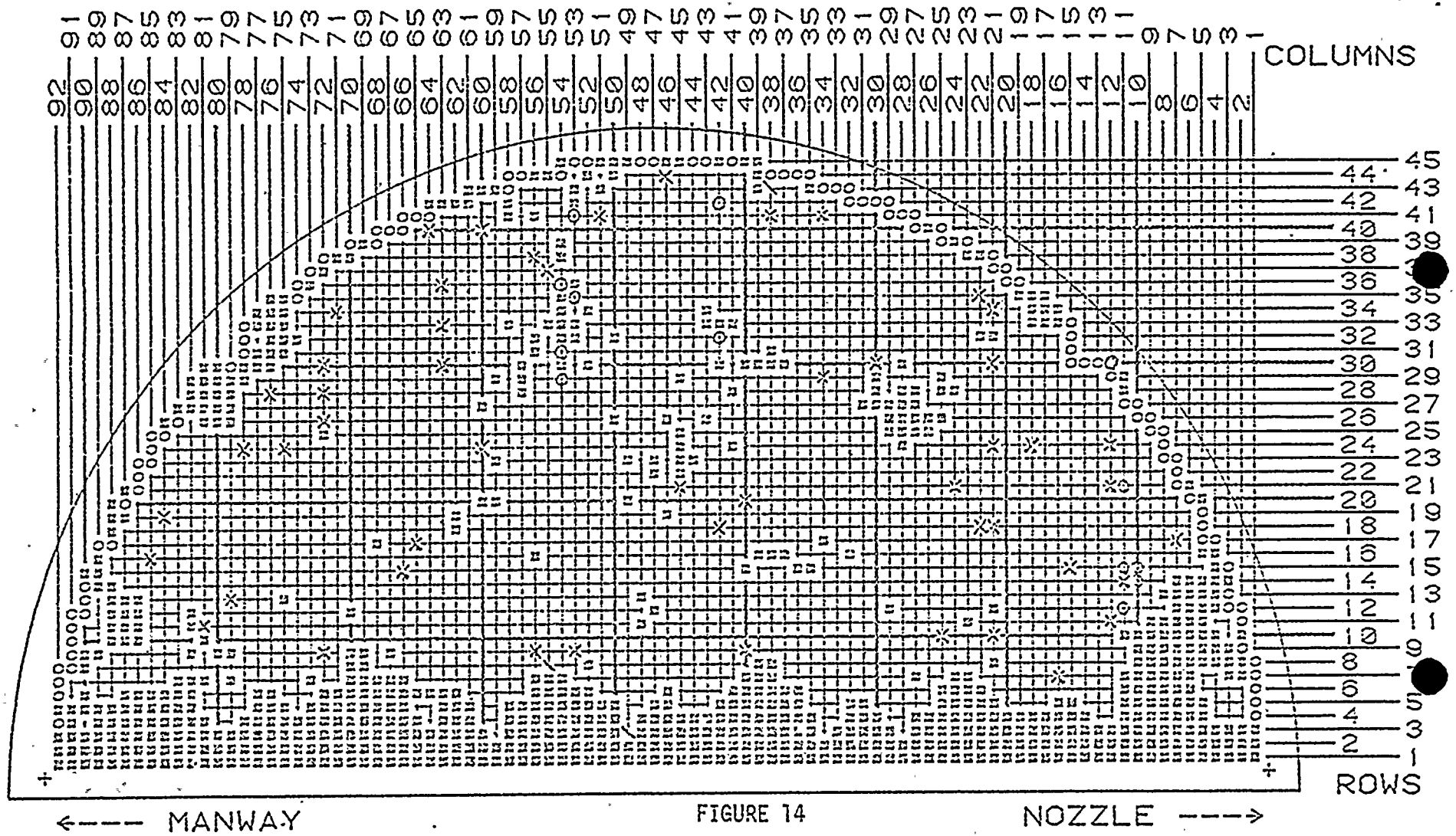


FIGURE 14

TURKEY POINT UNIT #4

PROFILOMETRY INSPECTION PROGRAM

MAY, 1980

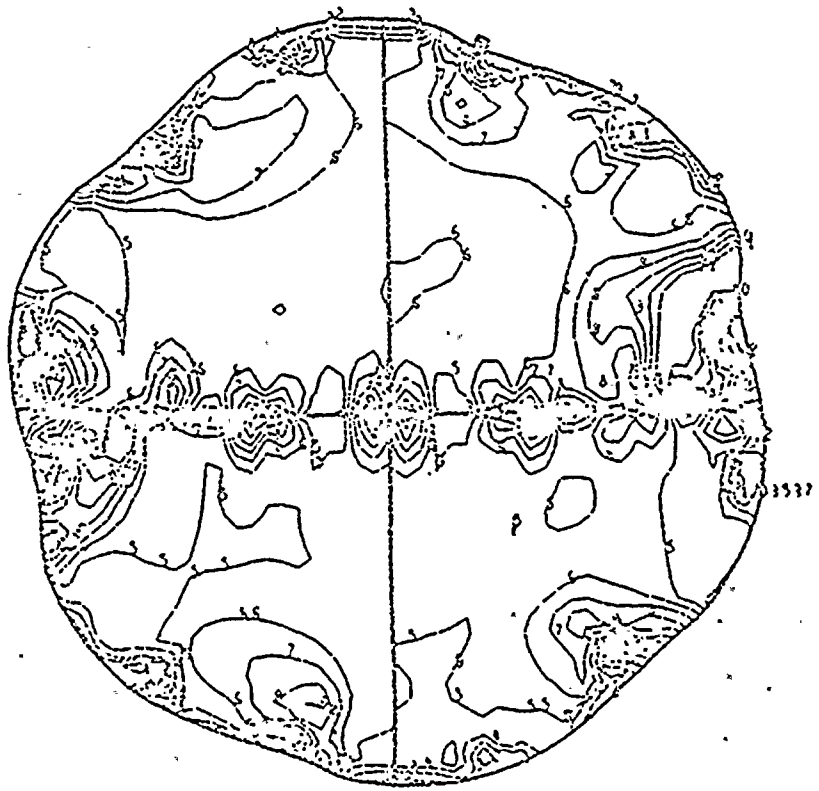


FIGURE 15 - TUBE HOOP STRAIN AT
24 EFPH's BEYOND FULL CLOSURE

MAY, 1980

SERIES 44

FLA-A

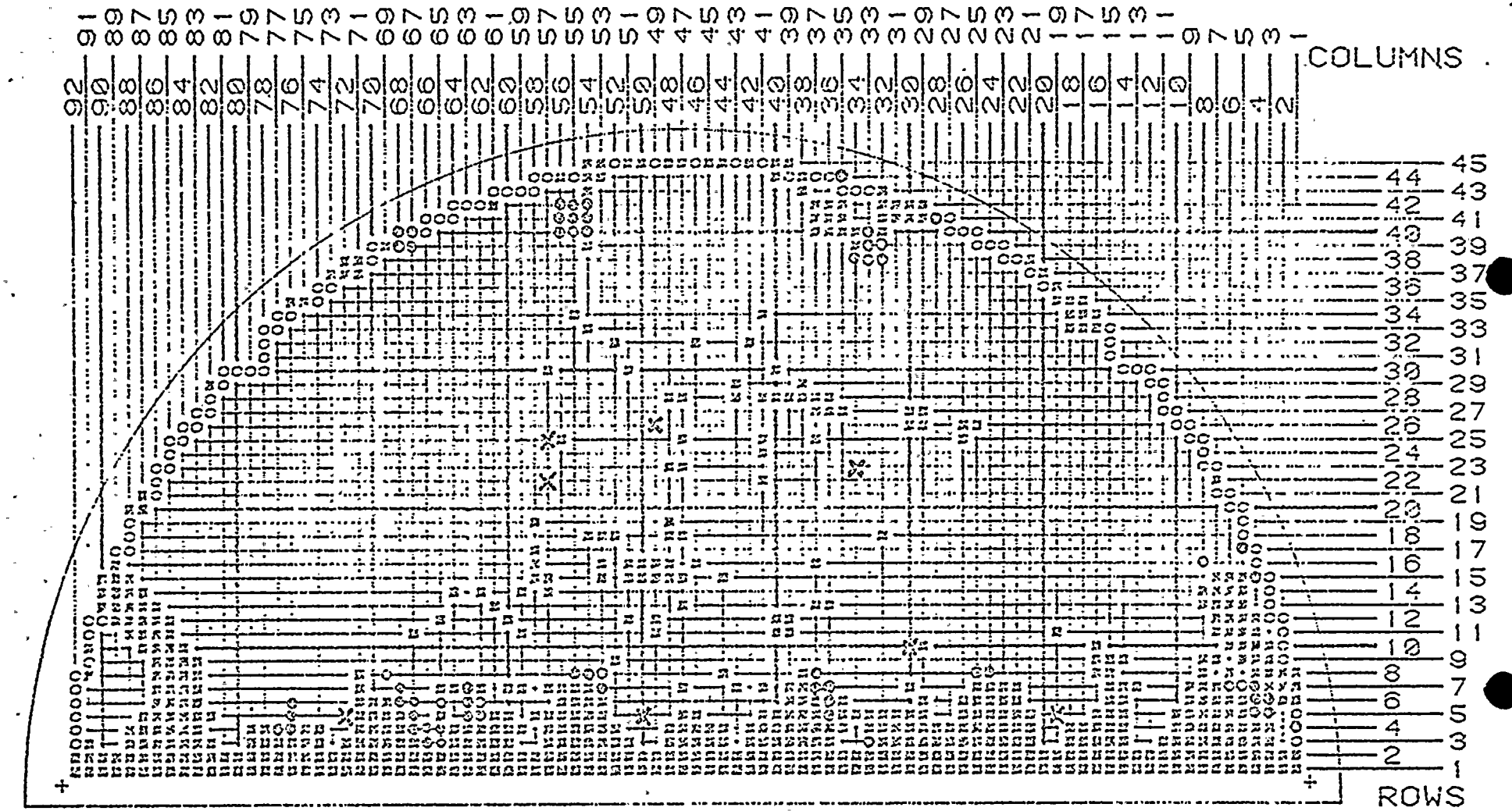


FIGURE 16

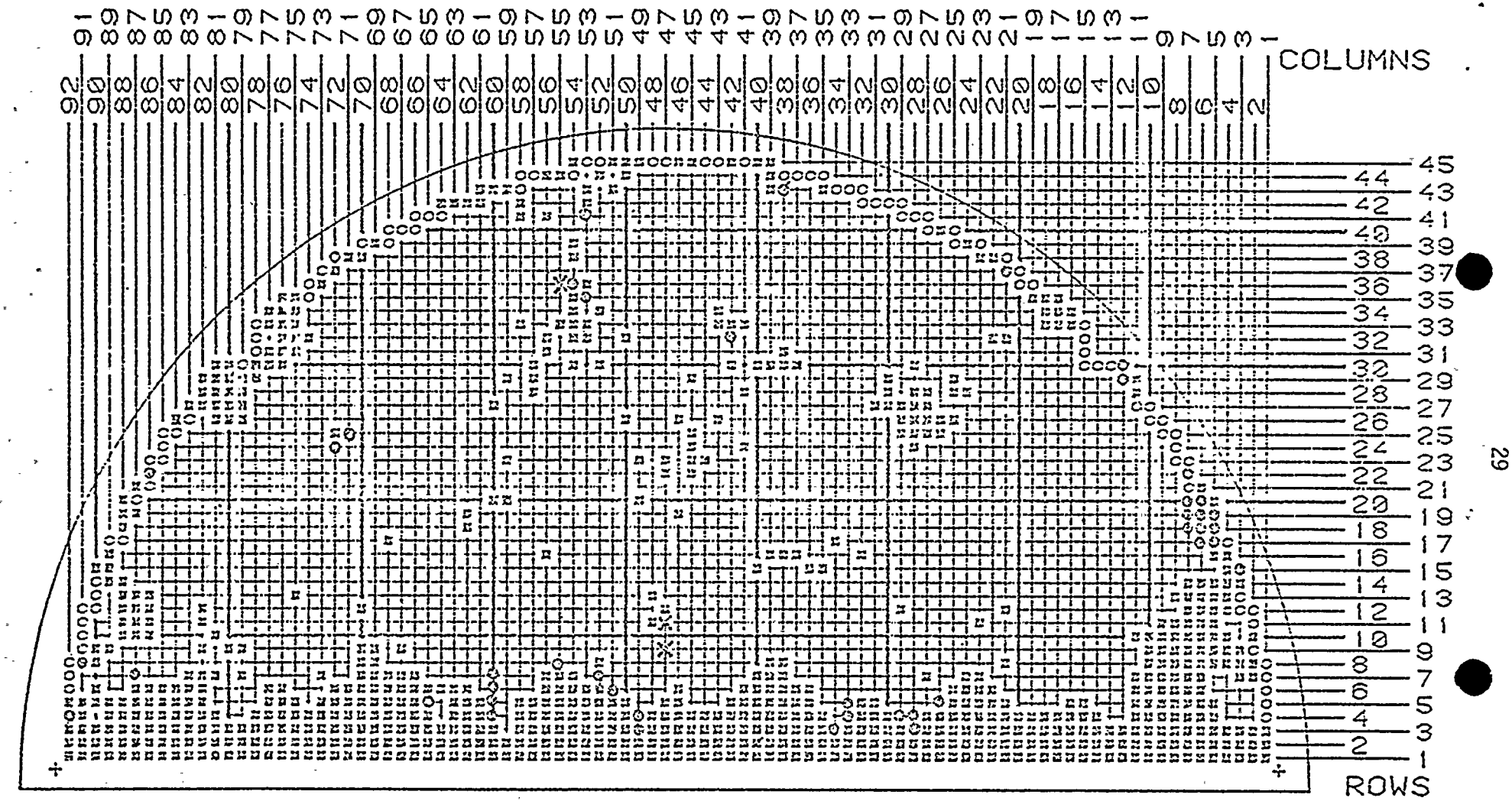
TURKEY POINT UNIT #4
STEAM GENERATOR A
MAY, 1980

RECOMMENDED PLUGGING PER:

⊘ = GAUGING RESULTS
X = REG. GUIDE 1.83
⊡ = PREVIOUS PLUGGING

SERIES 44

FLA-B



←--- MANWAY

NOZZLE --->

FIGURE 17

TURKEY POINT UNIT #4
STEAM GENERATOR B
MAY, 1980

RECOMMENDED PLUGGING PER:

⊙ = GAUGING RESULTS
× = REG. GUIDE 1.83
⊠ = PREVIOUS PLUGGING

SERIES 44

FLA-C

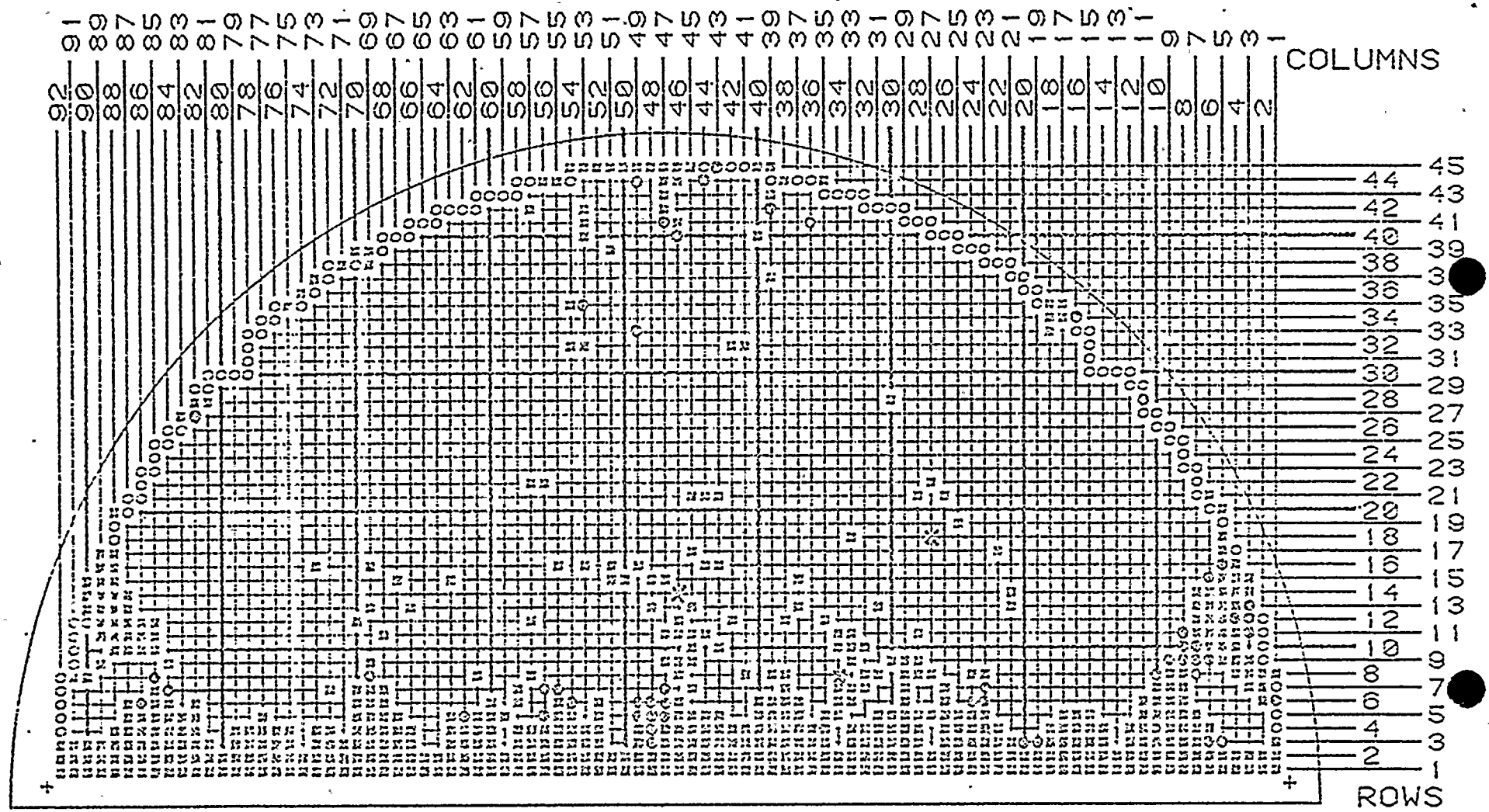


FIGURE 18

TURKEY POINT UNIT #4
STEAM GENERATOR C
MAY, 1980

RECOMMENDED PLUGGING PER:

- ○ = GAUGING RESULTS
- X = REG. GUIDE 1.83
- ▨ = PREVIOUS PLUGGING

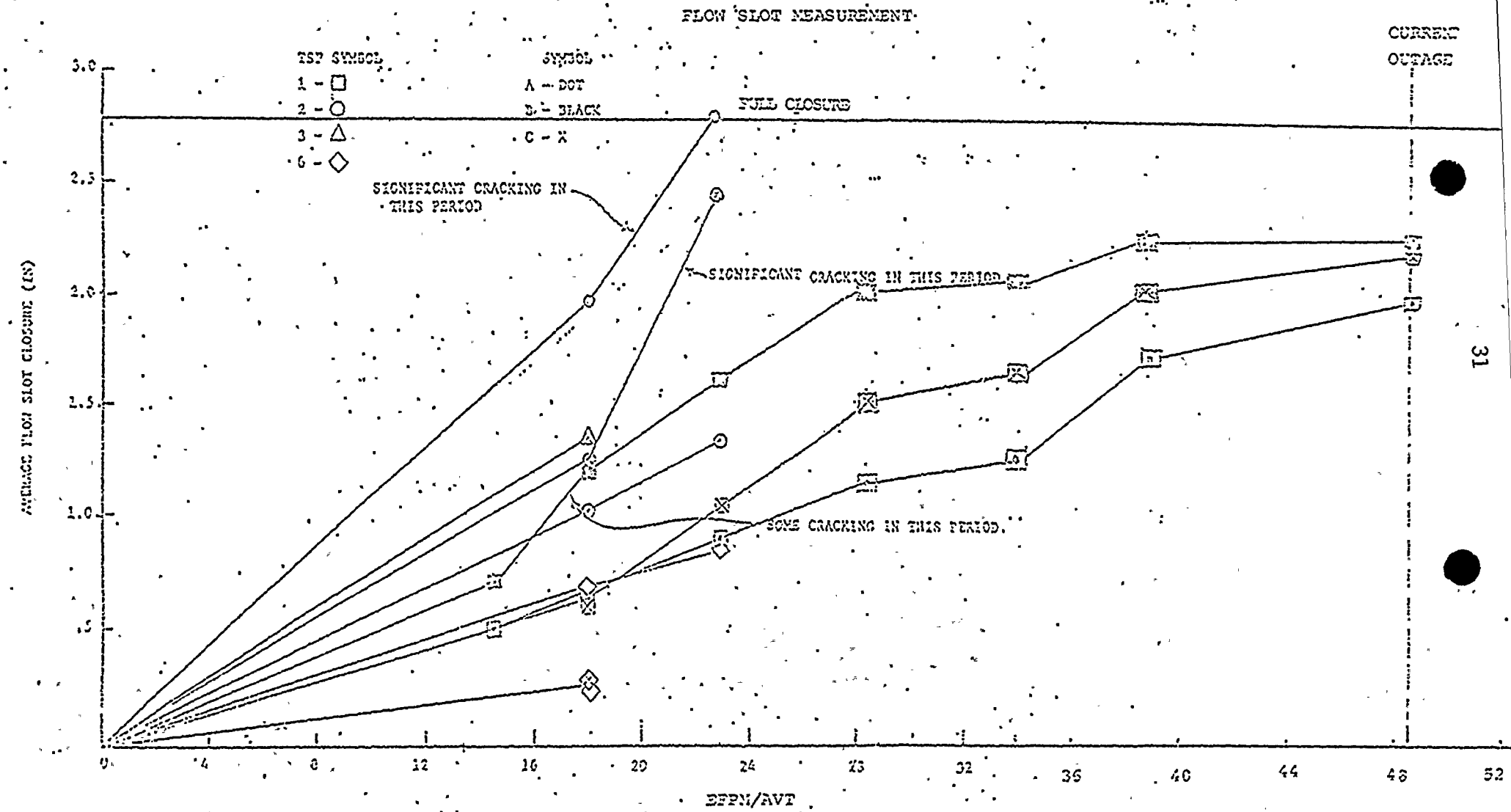

FLOW SLOT MEASUREMENT
CURRENT OUTAGE
TSP SYMBOL
1 - □
2 - ○
3 - △
6 - ◇
SYMBOL
A - DOT
B - BLACK
C - X
FULL CLOSURE
SIGNIFICANT CRACKING IN THIS PERIOD
SIGNIFICANT CRACKING IN THIS PERIOD
SOME CRACKING IN THIS PERIOD.
AVERAGE FLOW SLOT CLOSURE (IN)
3.0
2.5
2.0
1.5
1.0
.5
0
4
8
12
16
20
24
28
32
36
40
44
48
52
EFPN/AVT

Figure 19

TURKEY POINT 4 STEAM GENERATOR

INSPECTION PROGRAM

I. INTRODUCTION

An extensive inspection program for the Turkey Point Unit 4 steam generators was conducted in May, 1980. The following items were accomplished:

1. Gauging of steam generator hot legs and cold legs - all steam generators.
2. Measurements of visible flow slots in all steam generators.
3. Eddy current inspection of small radius U-bends in steam generator B.
4. Regulatory Guide 1.83 eddy current measurements in the hot legs and cold legs of all steam generators.
5. Preventive plugging.
6. Profilometry of selected tubes.

Table 1 is a summary of the approximate number of steam generator tubes inspected in each category and in each steam generator.

Table 1: Summary of Total Steam Generator Tubes Inspected.

	A Hot Leg	A Cold Leg	B Hot Leg	B Cold Leg	C Hot Leg	C Cold Leg
Gauging	1205	170	1276	140	1209	179
U-Bend Rows 2-5	-	-	-	55	-	-
R.G. 1.83	301	360	283	169	146	275

This report summarizes the inspections conducted, the results of these inspections, and preventive plugging programs accomplished.

II. INSPECTION PROGRAMS

A. Gauging Program

The tube gauging program in the tubelane area is based on previously defined