TURKEY POINT 4 STEAM GENERATOR

INSPECTION PROGRAM

I. INTRODUCTION

An extensive inspection program for the Turkey Point Unit 4 steam generators was conducted in November, 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-C.
4. Regulatory Guide 1.83 eddy current measurements in the hot legs and cold legs of all steam generators.
5. Preventive plugging.

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	1184	154	1159	117	1324	161
U-Bend Rows 2-5	-	-	-	-	-	79
R.G. 1.83 (Orig.Prog.)	265	317	272	260	157	351
R.G. 1.83 (Expand.Prog.)	132	-	111	267	111	110

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 were formerly determined using finite element analysis techniques 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 to take into account the greater extent of 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 gauging program during the April, 1979 inspection at Turkey Point #4. 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 for the next inspection (May, 1980). That is, the majority of the tubes inspected in April, 1979 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. Accordingly, the 17.5% boundary was used as the basis for the May, 1980 inspection. Since full closure of the flowslots was observed in Turkey Point 4 steam generators during the May, 1977 inspection, Turkey Point 4 was regarded in May, 1980 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.

As a result of the May, 1980 inspection at Turkey Point #4, it became apparent that the predicted 17.5% strain contour was overly conservative and was over predicting the plant inspection data, and that the finite element model no longer gave reasonable expectations as to the position of a strain boundary which might be linked to the locations of the most severly restricted tubes.

The next inspection was at Turkey Point Unit #3 in October, 1980. As a result of the prior experience at both Turkey Point Units as described above, the gauging inspection boundary at that unit was also 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 and Surry Plant sites, as well as previous gauging results at the Surry and 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 boundary for the present inspection (November, 1980 at Turkey Point #4 has also been adjusted to reflect prior experience at the Surry and Turkey Point plants, in accordance with the discussion in the preceeding paragraphs.

The typical inspection boundaries for the May, 1980 inspection (Fig. 1 & 2) are included for reference. The gauging inspection boundaries for the November, 1980 inspection are indicated in Figures 3 to 8 inclusive, for each leg of each steam generator.

The following conservatisms were utilized in determining the Turkey Point #4 inspection boundary for this inspection:

1. If a restricted tube was found close to the inspection boundary, the inspection was expanded in that area.
2. In addition to the specific gauging inspection program, it should be noted that tubes in the central portion of the tube bundles from Row 12 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.
3. Tubes restricted in previous inspections, including those that were not adjacent to the areas of predominant activity, were incorporated into the gauging program laid out generally for the three steam generators.

B. Flow Slot Measurements

Photographs were taken in each steam generator through the secondary hand-holes. These photographs were then utilized to measure the openings in the #1 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 C were examined with 100 kHz. These inspections are performed to confirm the integrity of the small radius U-bends in low number rows.

In the April, 1979 inspection, annulus measurements were taken in steam generator B. These measurements provide a qualitative indicator of the upper plate expansion trends in the most affected steam generator. That had been the third such measurement of this type for steam generator B. No obvious trends had been noted in this unit or in Turkey Point Unit #3. Therefore, this measurement was not made at the NOV. 1980 inspection and is not planned for future inspections.

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. The original inspection plans are included (Figs.3-8 inclusive). During the inspections, expansion of the program in steam generators A,B and C was accomplished as required by R.G. 1.83. Results of the inspection are discussed later in this report.

III. Inspection Results

A. Gauging Programs

Results of the gauging inspections are indicated in Figures 9,10,11,12,13 and 14 and are summarized in Table 2.

TABLE 2: TUBE RESTRICTION SUMMARY

Number of Tubes Restricting Passage of Gauge Listed But Allowing Next Smaller Gauge To Pass

S/G and 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"	29	0	25	0	3
.610"	7	0	3	0	1
.540"	0	0	1	0	0
SG B					
.650"	32	0	42	0	3
.610"	4	3	8	2	0
.540"	0	0	0	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"	34	0	15	0	13
.610"	5	1	5	3	1
.540"	1	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 four tube restrictions appeared away from the pattern of prior results. Two of the restrictions were located adjacent to a tube which had been pulled in Sept. 1975, as part of the earliest field investigations of denting. The other two tube restrictions were located adjacent to the patch plate inspection area.
5. In steam generator C, one tube restriction appeared away from the pattern of prior results; this was located adjacent to the patch plate inspection area.
6. Only limited cold leg activity, i.e. restrictions to the 0.610 inch probe, was observed: No tubes in SG A, 5 in SG B, and 4 in SG C. The level of cold leg activity remains quite low compared to the hot leg experience.
7. No leaking tubes were observed during the previous operating period.
8. Review of the gauging results shows that 46 tubes restricted the 0.610 inch probe after 4.75 months operation; this compares with 80 such restrictions observed in May, 1980 after 10 months operation and 72 such restrictions observed in April, 1979 after 6 months operations. As a measure of denting progression, the current rate is consistent with the previously observed slowing rate of the denting process since April, 1979.

B. Flow Slot Measurements

The results of the #1 TSP flow slot measurements are indicated in Fig. 18. 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 C were examined at 100 kHz. No indications were noted in these small radius U-bends.

D. Regulatory Guide 1.83 Inspection Results and Evaluation

The results of the Regulatory Guide 1.83 Inspection are summarized in Table 3. As a result of this inspection, a total of 25 tubes were plugged for indications equal to or greater than 40% wall penetration.

Preliminary evaluation of the results suggests probable thinning in the region of the sludge pile in the cold leg occuring at a rate which has not increased substantially since the April, 1979 inspection. An average change of the order of 1% was indicated for Steam Generators A and C, while an average increase of 9.9% was indicated for Steam Generator B.

Since a higher thinning rate was suggested for Steam Generator B, and a higher number of tubes were plugged for indications of 40% or greater as compared to the other two steam generators, additional evaluation of the data were made for this steam generator. Comparison of the eddy current signals from the affected tubes in Steam Generator B with corresponding signals from previous inspections shows the presence of an increased denting component. The dent signal influences the thinning signal, causing slight phase rotation and over estimations of the depth of penetration. While some additional thinning may have occurred, the overall increase is likely to be less than is indicated by the reported data. However, a conservative estimate of the rate of thinning can be made on the assumption that the reported data are accurate. Comparing the present data with corresponding data reported at the April, 1979 inspection for Steam Generator B, the maximum apparent increase in thinning is taken to be 19% of the wall

thickness which represents the growth from the minimum reportable 20% to the maximum size of indication still in service, at 39%. On this basis, the maximum growth rate over the last 14.75 EFPM of operation is calculated as 1.3%/EFPM. For 10 additional months of operation, the 39% indication might conservatively grow to 52% assuming the calculated apparent thinning rate of 1.3%/EFPM is continued. The minimum tube wall required to maintain pressure boundary integrity under faulted condition load is .013 inches (in the straight section of the tube). This corresponds to 26% of the nominal .050 inch tube wall. Thus an ample margin of 22% wall thickness would exist even if the calculated thinning rate were to continue for an additional 10 months.

TABLE 3

Regulatory Guide 1.83

Inspection Results

Size of Indication (% Wall Penetration)	SG A		SG B		SG C	
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
< 20	54	76	50	125	4	132
20-29	40	174	30	133	4	194
30-39	20	71	21	83	1	57
≥ 40	3	0	1	17	2	2

IV. Plugging Criteria

A. Gauging Program

Although experience has shown that advance of the predicted strain contours from the finite element model no longer is an appropriate basis for tube plugging, the plugging criteria which were developedusing the model have generally been retained, since their application has generally been effective in reducing the frequency of tube leakage events resulting from denting. As in the May, 1980 inspection of Turkey Point 4, and the October, 1980 inspection at Turkey Point 3, a program which incorporates all previously observed activity with several rows margin beyond is considered appropriate; again a sampling of central area tubes provided by the Reg. Guide 1.83 inspection permits detection of new areas of activity should any occur.

The criterion established for plugging tubes in the region of the patch-plate differ from those 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 behavior in the patch plate is local in nature and is not consistent with the general strained state of the plate, nor can the behavior be 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 calls 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.

The plugging criteria which support at least ten months of operation are:

1. All tubes which do not pass the 0.540 inch probe will be plugged.
2. Additionally, for in excess of ten (10) months operation, two (2) tubes beyond (i.e., higher row numbers) any tube in columns 1-92, in the tube and region which did not pass the 0.540 inch probe will be plugged.

   Calculation of the progression of the 17 1/2% strain contour, as determined from finite element plots through 24 EFPM after closure results in predicted advancement of this contour by 1.9 tube now for a 10 month operating period. Given the conservatism of this approach, plugging two additional tubes beyond observed 540 mils restrictions provides adequate margin. This criterion was applicable for only one 540 mil restriction, i.e. S/G C, R3-C64, in this inspection.

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 judgement 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. Particular attention was paid to 650" restricted tubes relative to the ten month operating period.

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 ten month operating period was also evaluated relative to a postulated main steam line break accident (MSLB). In doing this, it was conservatively assumed that each unplugged tube in the two rows beyond the present tube-lane plugging boundary in the most advanced SG(B) would leak at a rate of 0.05 gpm/tube during a postulated main steam line break. Using the fact that there are 92 tubes in a row, the total number of unplugged tubes in the tubelane region lying adjacent to the current plugging boundary at the

end of the 10 month operating interval is less than 184 tubes.

The total leakage resulting from 184 tubes is 9.2 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 to justify at least 10 months operation are indicated in Figures 15, 16 and 17. Both gauging and Regulatory Guide 1.83 program plugging are shown on the figures. The coordinates of the plugged tubes are listed for each steam generator in Tables 5, 6 and 7 respectively. The cumulative percentage of tubes plugged to date is 23.8%. Table 4 summarizes plugging performed during this outage.

TABLE 4

SUMMARY OF TUBES PLUGGED

	Gauging	R.G. 1.83	Plugged in Error
S/G A	24	3	0
S/G B	37	18	1
S/G C	44	4	0

TABLE 5

TURKEY POINT UNIT #4
NOVEMBER 1980 INSPECTION
STEAM GENERATOR A

A. Recommended Plugging for Gauging Results

For 6 Mo. Plugging Program:

R - C
14 - 4
16 - 4
17 - 4
8 - 5
16 - 5
9 - 6
16 - 6
17 - 6
15 - 9
15 - 10
17 - 11
28 - 11
7 - 26
3 - 43
44 - 47
7 - 69
10 - 89

Total Plugging for Gauging, 6 Mos. Program: 17 tubes

Additional for 10 Mo. Plugging Program:

R - C
14 - 9
16 - 11
17 - 12
18 - 12
10 - 88
9 - 89
9 - 90

Total Additional Plugging for Gauging, 10 Mos. Program: 7 tubes

B. Reg. Guide 1.83 Plugging:

R - C
6 - 75
11 - 22
9 - 21

Total Reg. Guide 1.83 Plugging: 3 tubes

TABLE 6

TURKEY POINT #4
NOVEMBER 1980 INSPECTION
STEAM GENERATOR B

A. Recommended Plugging for Gauging Results

For 6 Mo. Plugging Program:

R - C	R - C	R - C
4 - 1	41 - 65	7 - 90
9 - 2	26 - 72	7 - 92
11 - 4	37 - 73	
15 - 8	5 - 78	
23 - 8	7 - 84	
15 - 10	7 - 85	
5 - 17	8 - 85	
8 - 24	10 - 85	
42 - 30	9 - 86	
9 - 38	6 - 89	
45 - 44	7 - 89	
37 - 53	10 - 89	
29 - 54	11 - 89	
31 - 54	17 - 89	

Total Plugging for Gauging 6 Mo. Program: 30 tubes.

Additional for 10 Mo. Plugging Program:

R - C
16 - 9
14 - 10
16 - 10
17 - 10
7 - 25
25 - 73
9 - 85

Total Additional Plugging for Gauging, 10 Mo. Program: 7 tubes.

B. Reg. Guide 1.83 Plugging:

R - C	R - C	R - C
14 - 29	23 - 46	17 - 69
12 - 30	10 - 46	9 - 81
23 - 39	11 - 46	10 - 47
24 - 39	13 - 46	
24 - 40	7 - 62	
11 - 44	7 - 64	
22 - 44	7 - 65	
22 - 46		

Total Reg. Guide 1.83 Plugging: 18 tubes.

TABLE 7

TURKEY POINT UNIT #4
NOVEMBER 1980 INSPECTION
STEAM GENERATOR C

A. Recommended Plugging for Gauging Results

For 6 Mo. Plugging Program:

R - C	R - C
22 - 7	43 - 46
14 - 9	33 - 51
42 - 31	7 - 54
42 - 32	8 - 54
42 - 33	3 - 59
42 - 36	4 - 59
43 - 36	42 - 62
41 - 37	3 - 64
42 - 37	4 - 64
43 - 37	5 - 64
41 - 38	41 - 66
42 - 38	5 - 72
43 - 38	8 - 83
38 - 39	8 - 86
5 - 41	9 - 86
6 - 41	9 - 87
	9 - 90

Total Plugging for Gauging,
6 Mo. Program = 33 tubes.

Additional for 10 Mo. Plugging Program:

R - C
15 - 8
42 - 34
42 - 35
43 - 45
42 - 46
43 - 48
41 - 63
3 - 65
8 - 84
9 - 85
10 - 89

Total Additional Plugging for Gauging,
10 Mo. Program = 11 tubes

B. Reg. Guide 1.83 Plugging:

R - C
10 - 46
14 - 53
44 - 53
5 - 58

Total Reg. Guide 1.83 Plugging: 4

SERIES 44

FLA-A

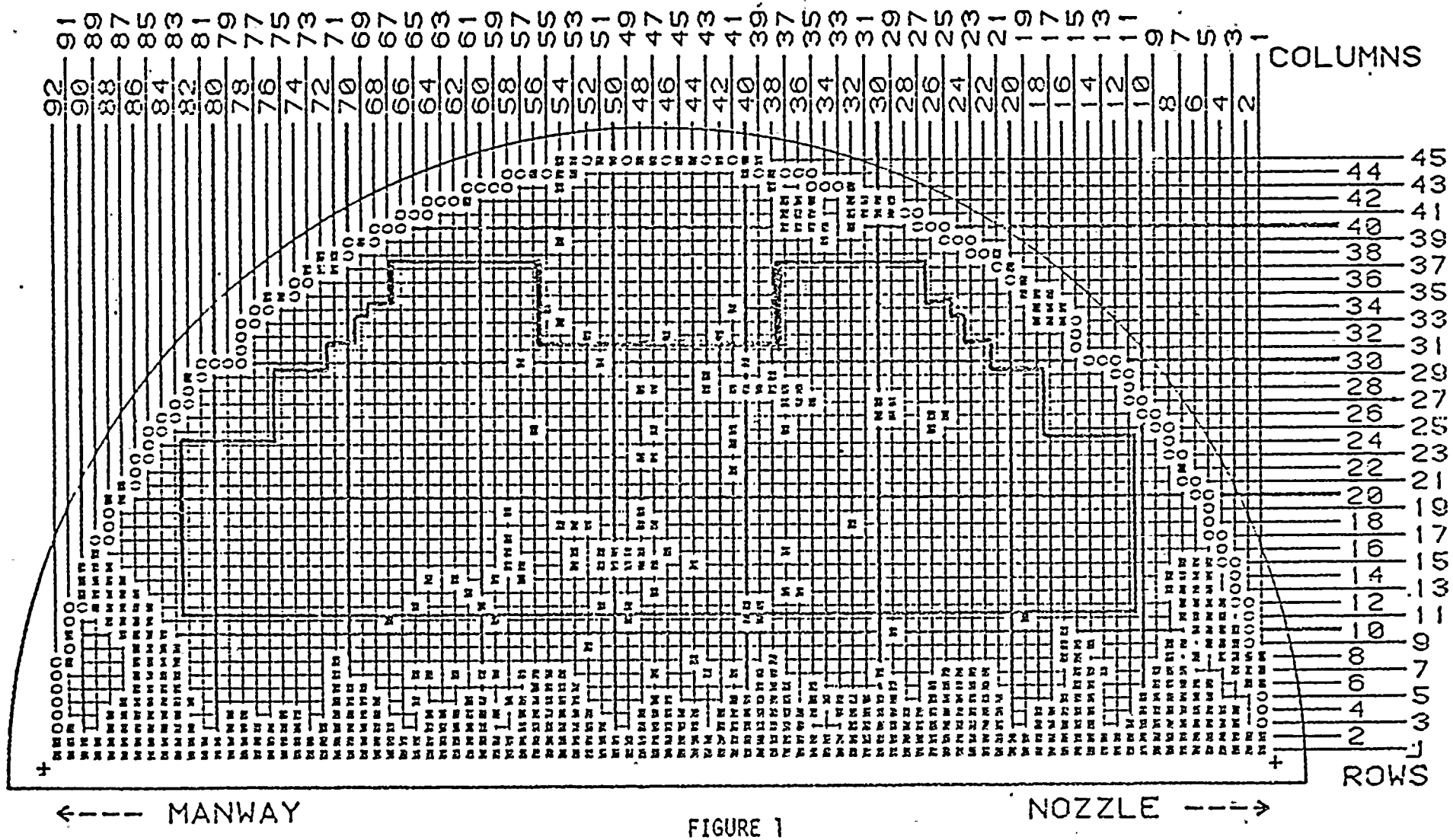


FIGURE 1

GAUGING PROGRAM (TYPICAL) INLET
ALL TUBES OUTSIDE LINED AREA

MAY, 1980

SERIES 44

FLA-A

OUTLET

GAUGE BLOCKED-IN AREA TO TOP SUPPORT - .610 & .548 PROBES

TECH. SUP. I - 178 TUBES

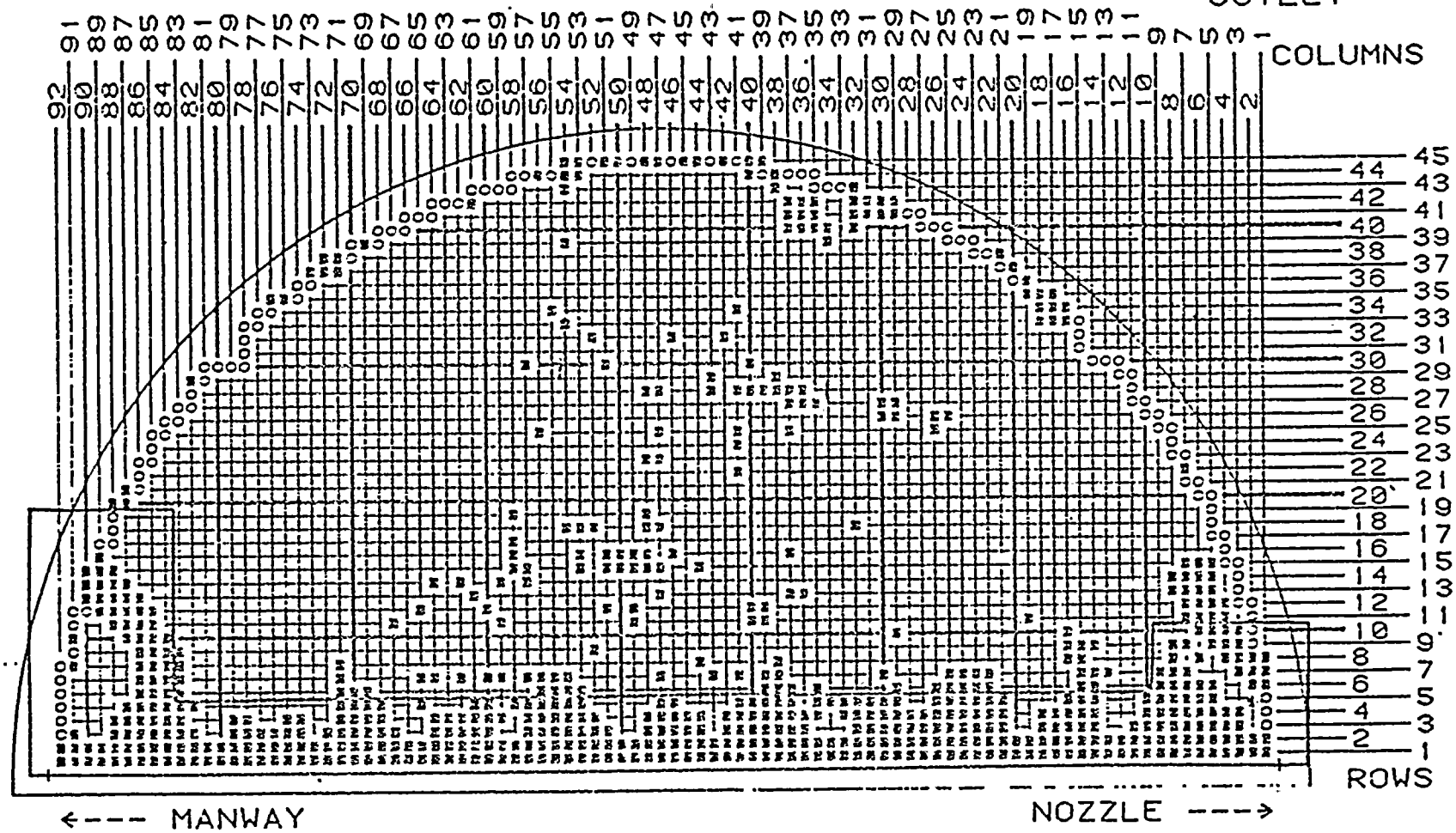


FIGURE 2

GAUGING PROGRAM (TYPICAL) OUTLET
ALL TUBES WITHIN BOUNDED AREA

MAY, 1980

1- x REG. GUIDE INSPECTION 134 TUBES THRU U-BEND
1 REG GUIDE INSPECTION 106 TUBES THRU 1ST SUPPORT } w 720 SF (ALT 300#) GAUGING ANY RESTRICTED TUBES DURING GAUGING PROGRAM. ≤650 RESTRICTED TUBES MUST BE SLEEVED

SERIES 44

GAUGING TO BE PERFORMED FOR 1184 TUBES OUTSIDE BOUNDED AREA TO TOP SUPPORT
-.650, .610, .540-

FLA-A
INLET (HOT LEG)

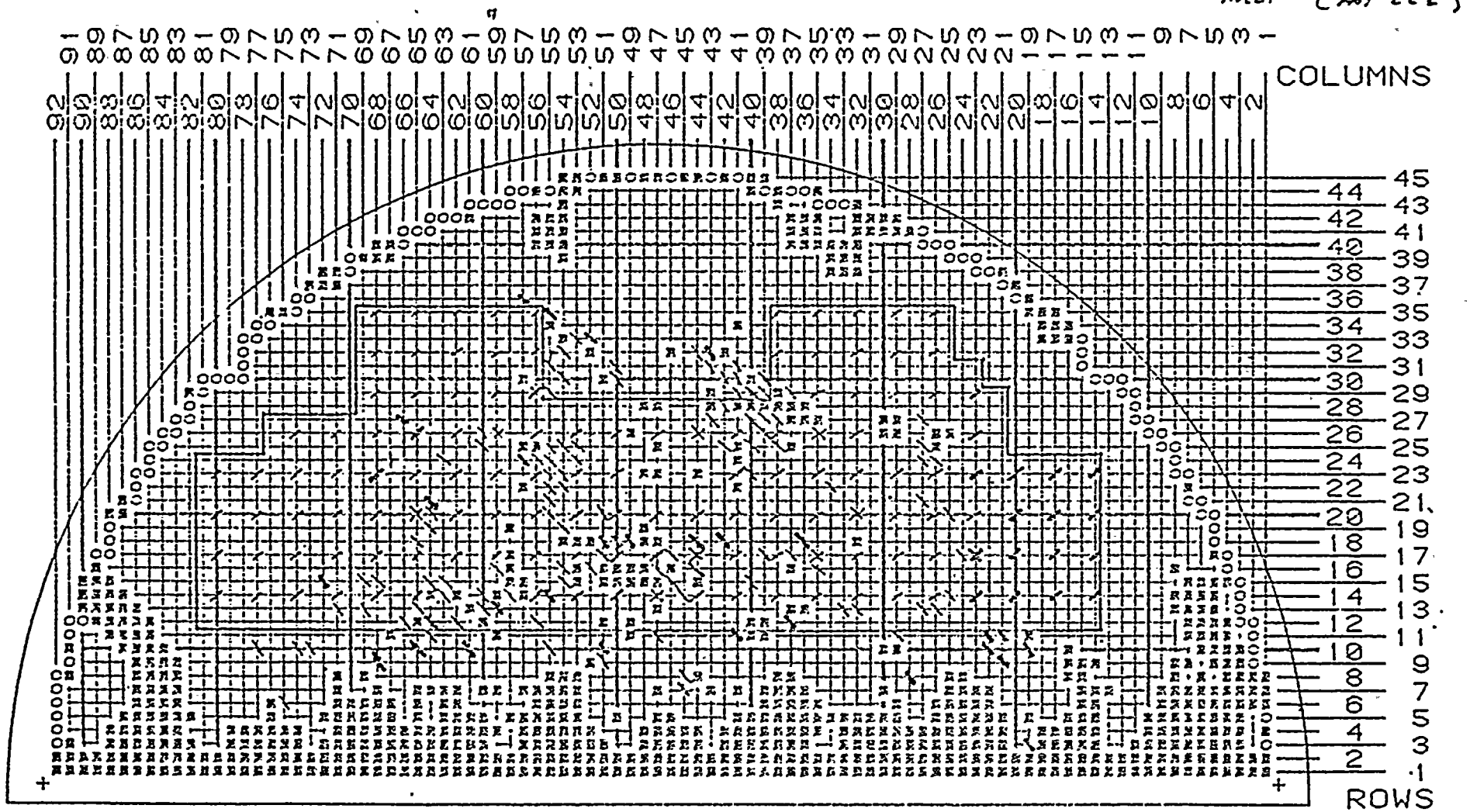


FIGURE 3

INSPECTION PROGRAM-NOV., 1980

TURKEY POINT UNIT #4

STEAM GENERATOR A

INLET

1 REC CYCLE - INSPECT 291 TUBES THAN 1st SUPPORT W/ 920 # (CALC .900") GAUGE ANY REJECTED TUBES WITH 610 # PRIOR DURING GAUGING PROGRAM.

GAUGE 154 TUBES WITHIN BOUNDED AREA THRU 6TH SUPPORT = .610 & .540 PROBES. ANY REJECTED TUBES UN COLD OF GAUGING PROGRAM MUST BE PLUGGED IN

SERIES 44

FLA-A

OUTLET / COLD LEG.

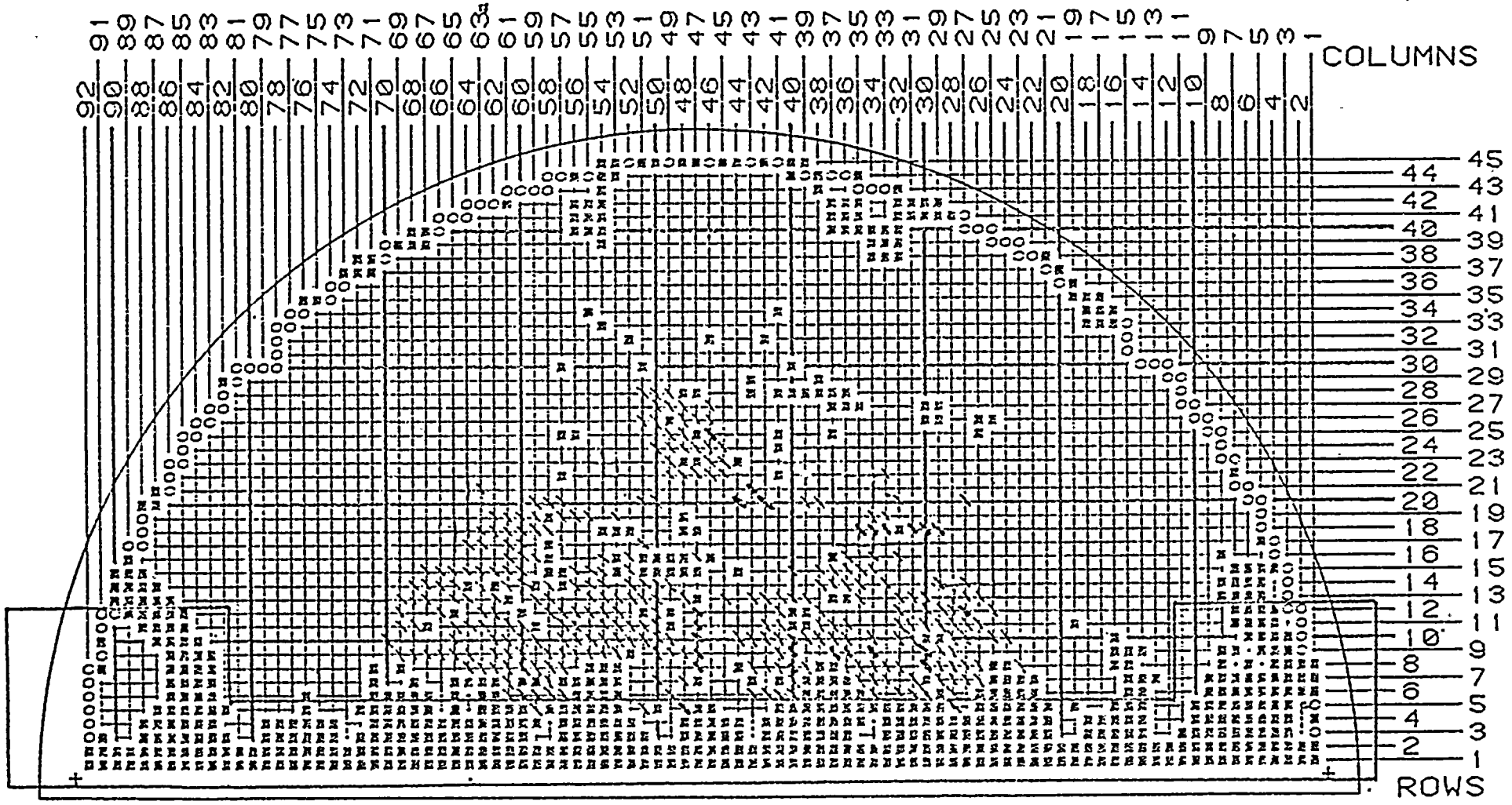


FIGURE 4

INSPECTION PROGRAM-NOV., 1980

TURKEY POINT UNIT #4
STEAM GENERATOR A
OUTLET

REC. GUIDE INSPECTION 127 TUBES THRU U-BEND
REC. SLUDGE INSPECTION 116 TUBES THRU 1ST SUPPORT } W 720 SP (ALT 700 SP) GAUGING ANY RESTRICTED TUBES DURING GAUGING PROGRAM.
≤ 660 RESTRICTED TUBE MUST BE PLUGGED

GAUGING TO BE PERFORMED 1159 TUBES OUTSIDE BOUNDARY AREA TO TOP SUPPORT
-.650, .610, .540 PROBES -

SERIES 44

FLA-B

INLET (HOT LEG)

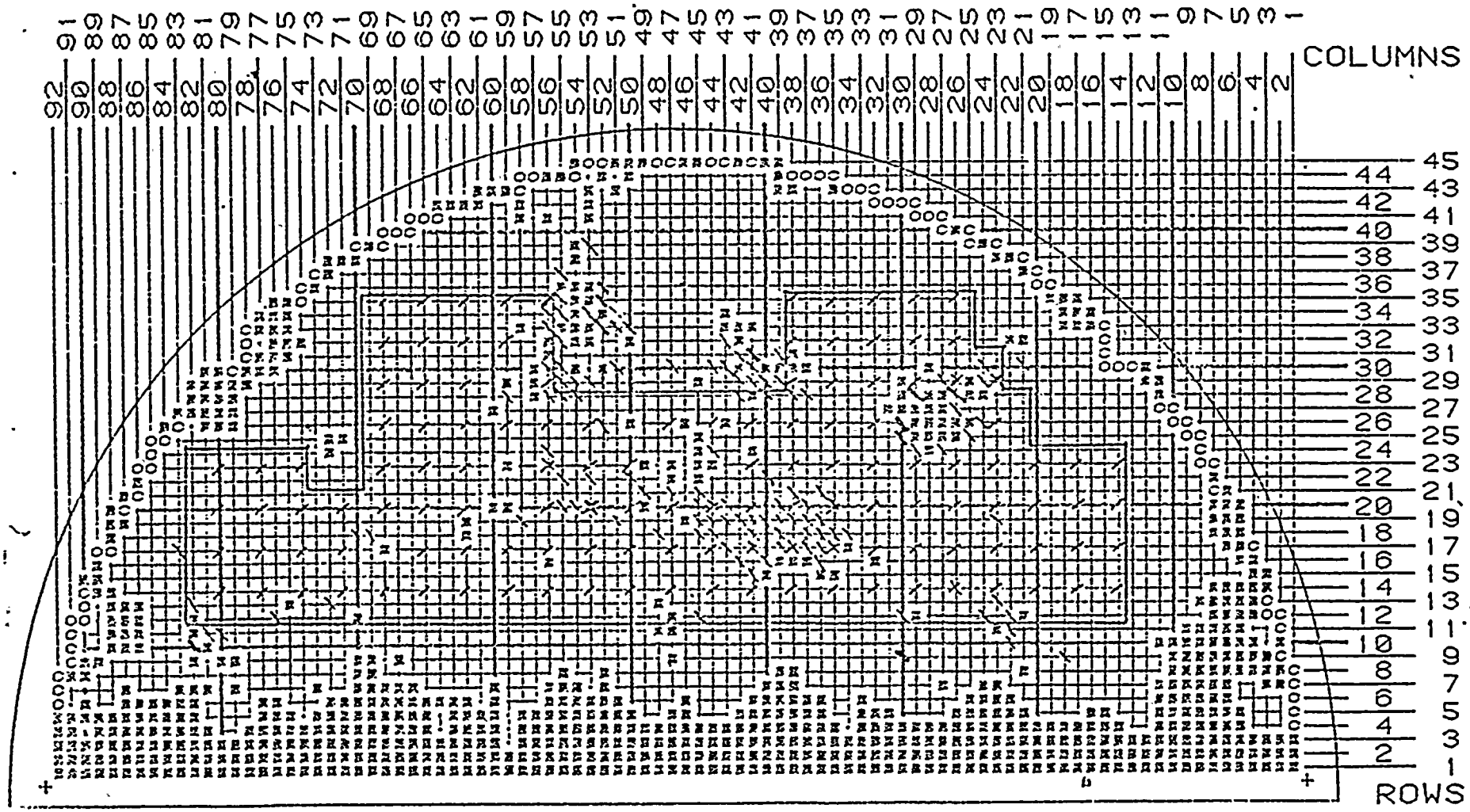


FIGURE 5
INSPECTION PROGRAM-NOV., 1980
TURKEY POINT UNIT #4
STEAM GENERATOR B
INLET

- REC. GUIDE - INSPECT 219 TUBES TURN 1ST SUPART W 720 SI (700F) GAUGE ANY. RESTRICTED TUBES WITH .610 R PROBE DURING EDDING PROGRAM

CAUSE 116 TUBES WITHIN BOUNDED AREA TO TOP SUPPORT — .610 x .540 PROBES. ANY RESTRICTED TUBES ON EDGE OF EDDING PROGRAM MUST BE BOXED IN.

SERIES 44

FLA-B

OUTLET / COLDLEG

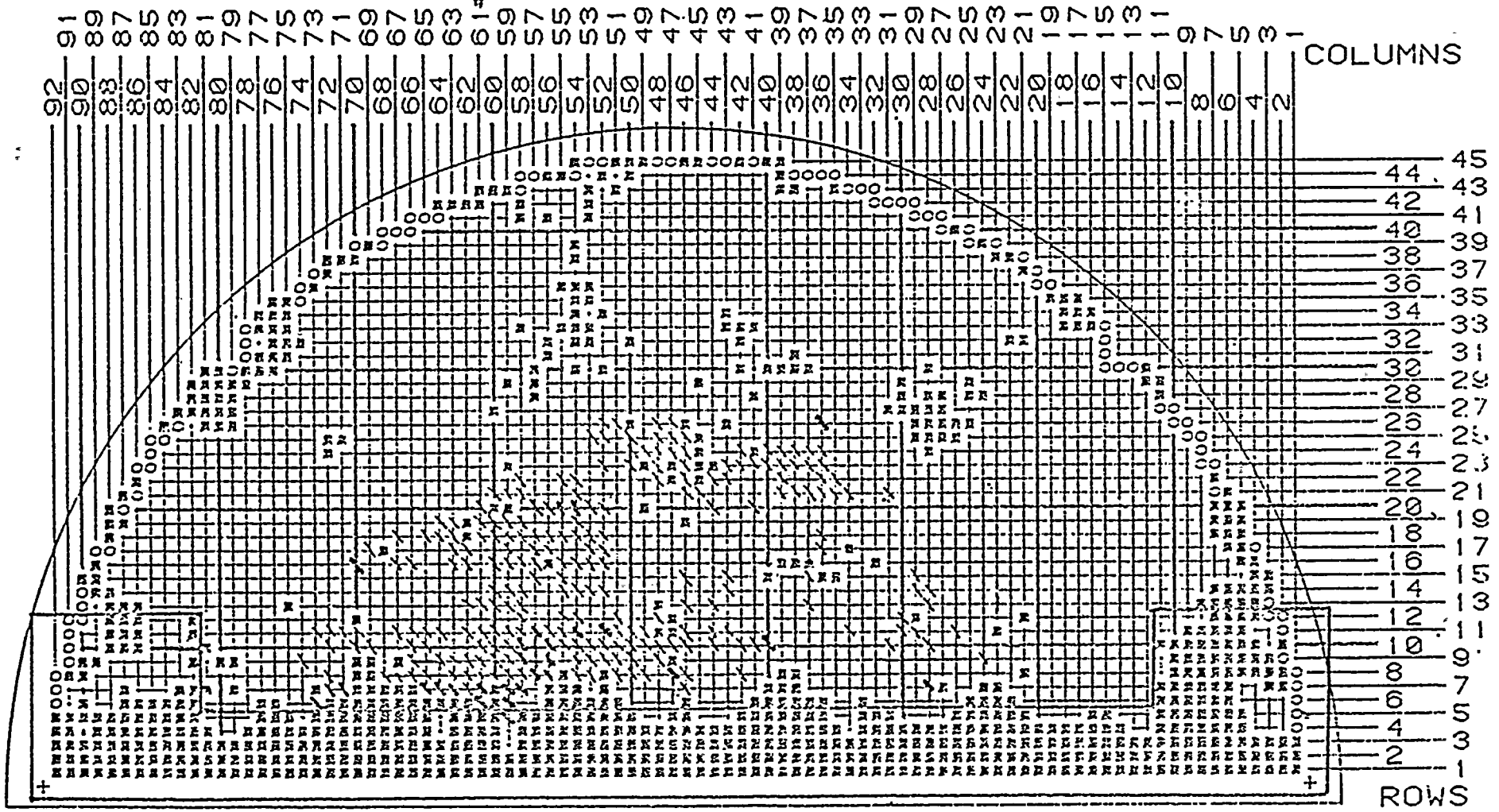


FIGURE 6

INSPECTION PROGRAM-NOV., 1980

TURKEY POINT UNIT #4

STEAM GENERATOR B

OUTLET

1 - X REG. BLIND INSPECTION M2 TUBES THAN EXPAND } W TWO SA (ALL 3 DOF) GAUGING ANY RESTRICTED
REG. BLIND INSPECTION 10 TUBES THAN 1ST SUPPORT. } TUBES DURING GAUGING PROGRAM.
650 RESTRICTED TUBES MUST BE BOND

SERIES 44

GAUGING TO BE PERFORMED FOR 1324 TUBES OUTSIDE BOUNDED AREA TO TOP SUPPORT
-.650, .610, .580 PROBES.

FLA-C

INLET (HOT LEG)

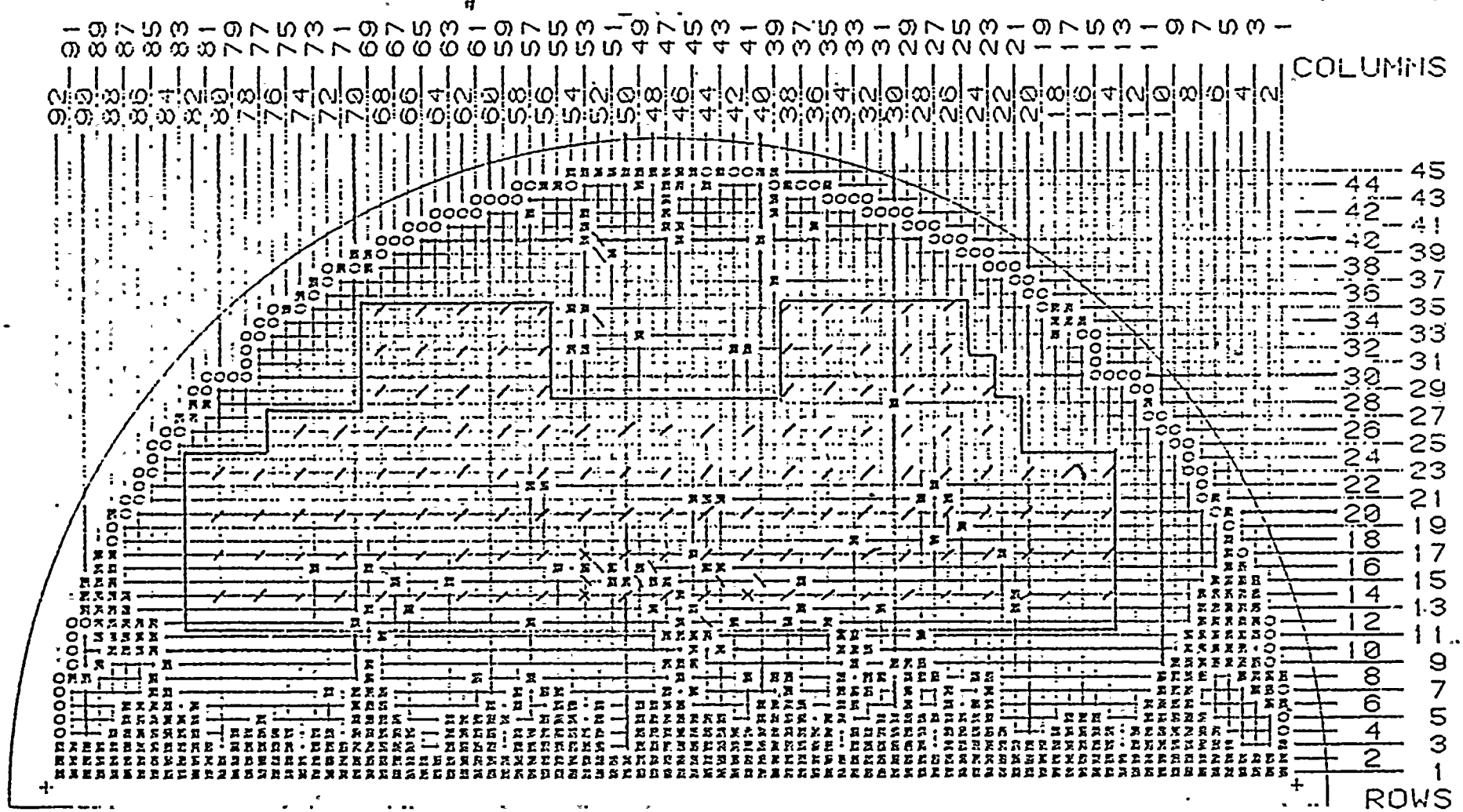


FIGURE 7

INSPECTION PROGRAM-NOV., 1980

TURKEY POINT UNIT #4

STEAM GENERATOR C

INLET

1. REG. GUIDE INSPECT 3RD TUBES THRU 1ST SUPPORT @ 920 SF (ALT 900 SF) GAUGE ANY RESTRICTED TUBE WITH .610 @ PAUSE DURING GAUGING PROGRAM

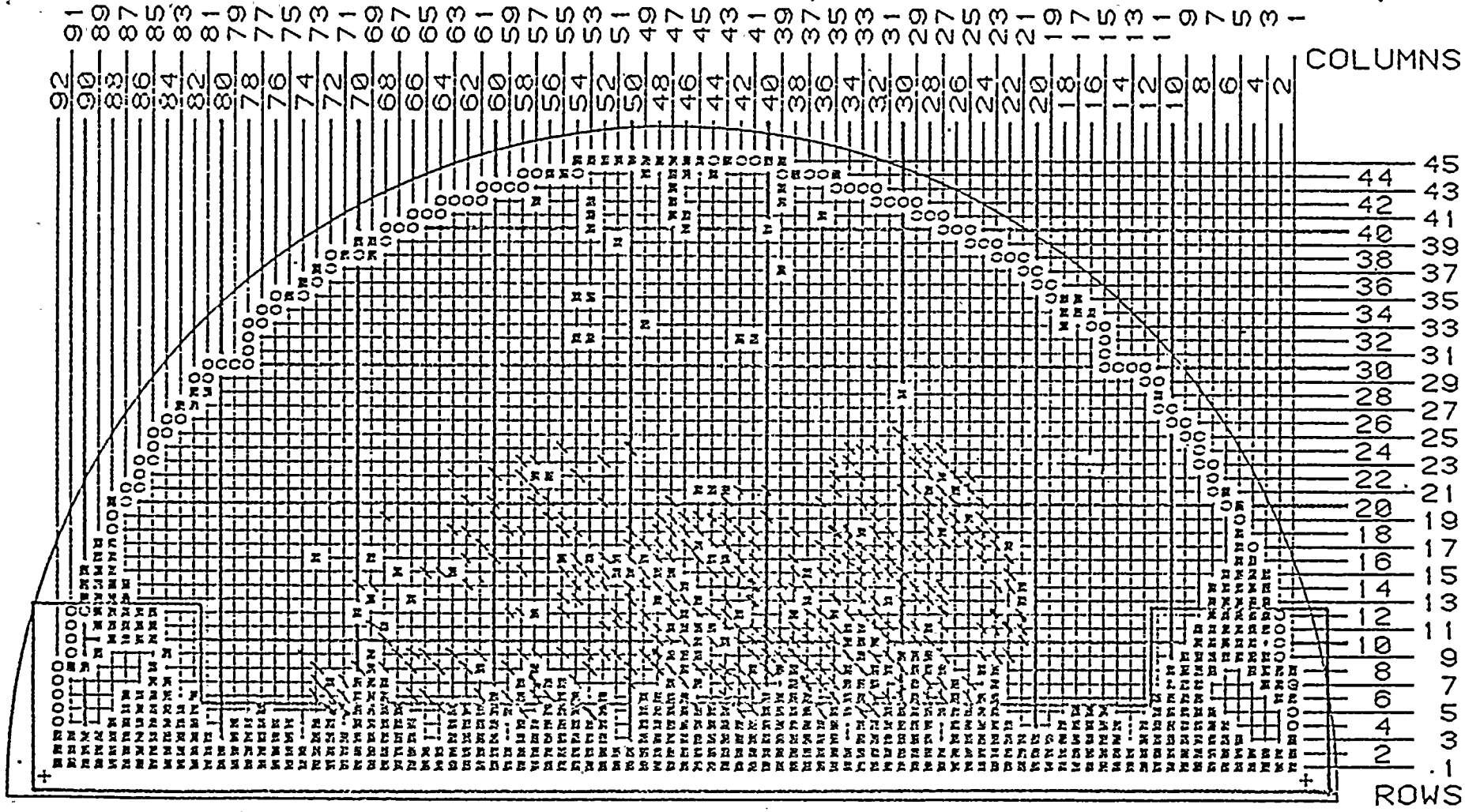
GAUGE 161 TUBES WITHIN BOUNDARD AREA TO TOP SUPPORT — .610 @ .540 PROBES. ANY RESTRICTED TUBES ON EDGE OF GAUGING PROGRAM MUST BE BOXED IN.

U-BEND TESTING ALL TUBES ROWS 1-5 / COLUMNS 1-92 .610 BF

SERIES 44

FLA-C

OUTLET (COLD LEG)



← MANWAY

NOZZLE →

FIGURE 8

INSPECTION PROGRAM-NOV.,1980

TURKEY POINT UNIT #4

STEAM GENERATOR C

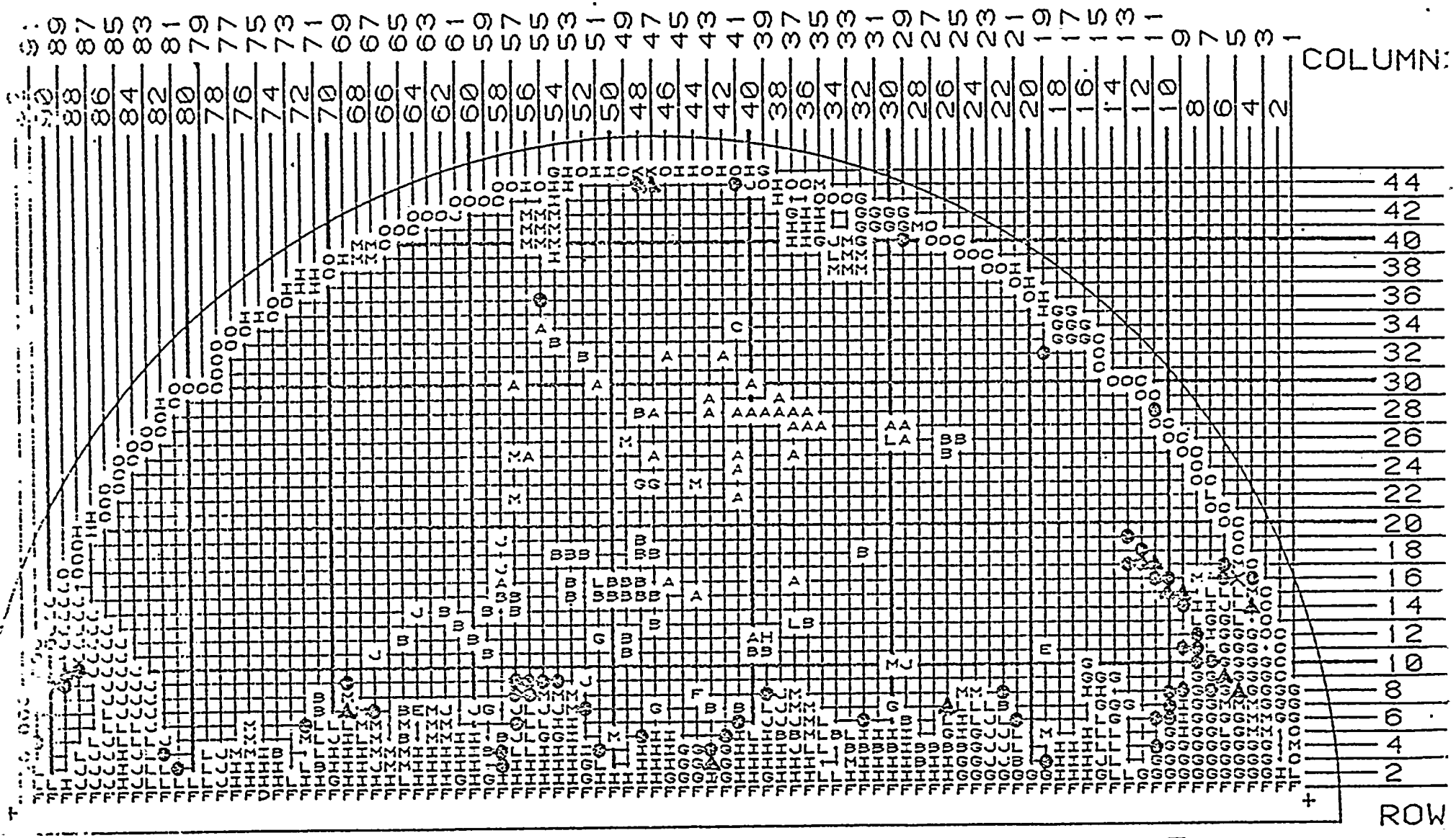
OUTLET

FIGURE 9

53	9/74; TUBES PLUGGED	
63	6/75; TUBES PLUGGED	
1	DATE NOT KNOWN; TUBES PLUGGED	
1	SHOP WELD	
2	5/76; TUBES PLUGGED	
2	11/76; TUBES PLUGGED	
2	7/77; TUBES PLUGGED	
H	1	7/77; WELD REPAIR HL, E/P CL
I	169	2/78; TUBES PLUGGED
J	86	8/78; TUBES PLUGGED
K	2	SHOP WELD, HL MISDRILLED
L	79	4/79; TUBES PLUGGED
M	72	5/80; MECH PLUGGED

SERIES 44

FLA-A



<--- MANWAY

NOZZLE --->

TURKEY POINT UNIT #4
GAUGING RESULTS, NOV.,1980
STEAM GENERATOR A INLET

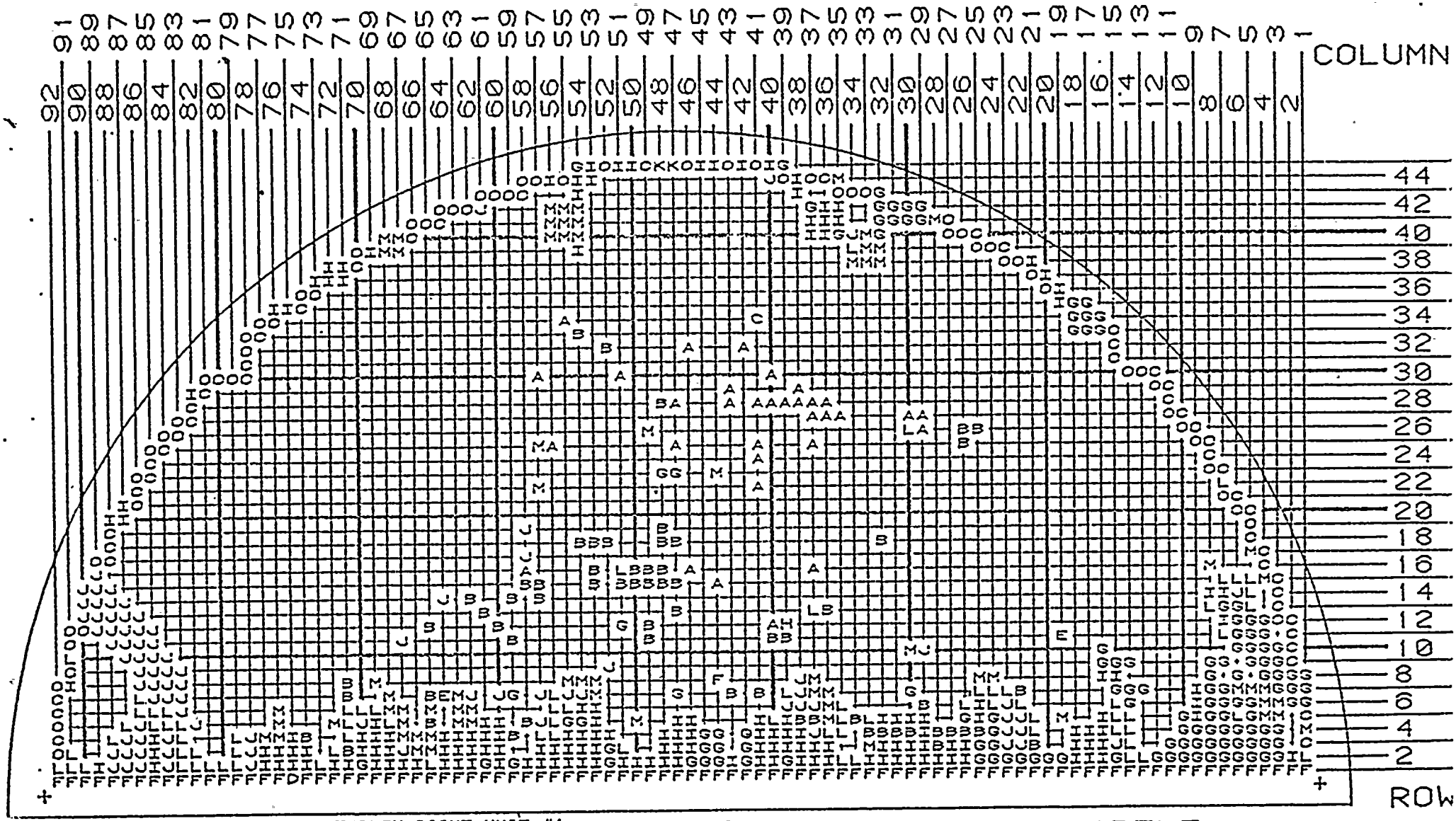
RESTRICTED TUBES	NO. OF TUBES
X = .540 PROBE	1
▲ = .610 PROBE	11
o = .650 PROBE	57

FIGURE 10

SERIES 44

FLA-A

A	33	9/74; TUBES PLUGGED
B	63	6/75; TUBES PLUGGED
C	1	DATE NOT KNOWN; TUBES PLUGGED
D	1	SHOP WELD
E	2	5/76; TUBES PLUGGED
F	92	11/76; TUBES PLUGGED
G	132	7/77; TUBES PLUGGED
H	1	7/77; WELD REPAIR HL, E/P CL
I	169	2/78; TUBES PLUGGED
J	86	8/78; TUBES PLUGGED
K	2	SHOP WELD, HL MISDRILLED
L	79	4/79; TUBES PLUGGED
M	72	5/80; MECH PLUGGED



← MANWAY

TURKEY POINT UNIT #4
GAUGING RESULTS NOV., 1980
STEAM GENERATOR A OUTLET

RESTRICTED TUBES	NO. OF TUBES
X= .540 PROBE	NONE
Δ= .610 PROBE	NONE
o= .650 PROBE	NOT TESTED

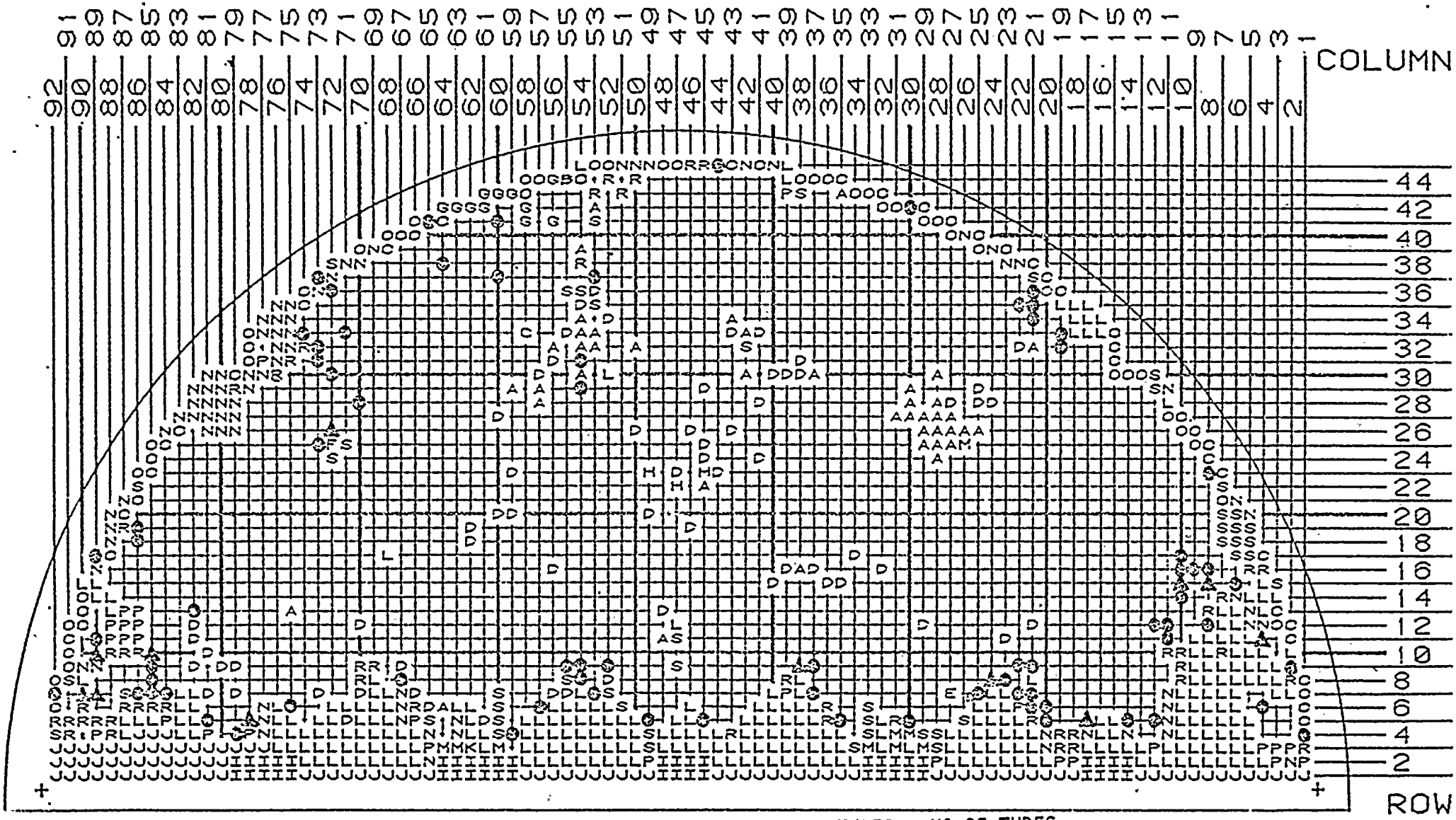
NOZZLE →

URE 11

SERIES 44

FLA-B

42	8/7[illegible] TUBES PLUGGED	J	128	11/76; TUBES PLUGGED
1	8/75; TUBE PLUGGED	K	1	7/77; WELD REPAIR
1	8/75; BARE HOLE PLUG HL-E/P CL	L	384	7/77; TUBES PLUGGED
68	8/75; TUBES PLUGGED	M	9	10/77; TUBES PLUGGED
1	SHOP WELD	N	79	2/78; TUBES PLUGGED
1	8/75; BARE HOLE PLUGS--HL,CL	P	28	8/78; TUBES PLUGGED
11	8/75; TUBES PLUGGED	R	52	4/79; TUBES PLUGGED
3	5/76; TUBES PLUGGED	S	48	5/80; MECH PLUGGED
48	9/76; TUBES PLUGGED			



← MANWAY

TURKEY POINT UNIT #4
GAUGING RESULTS NOV.,1980
STEAM GENERATOR B INLET

RESTRICTED TUBES	NO. OF TUBES
X = .540 PROBE	NONE
▲ = .610 PROBE	12
⊙ = .650 PROBE	77

NOZZLE →

FIGURE 12

A	42	9/76; TUBES PLUGGED
B	1	8/75; TUBE PLUGGED
C	1	8/75; BARE HOLE PLUG HL-E/P CL
D	68	6/75; TUBES PLUGGED
E	1	SHOP WELD
F	1	8/75; BARE HOLE PLUGS--HL,CL
G	11	8/75; TUBES PLUGGED
H	3	5/76; TUBES PLUGGED
I	48	8/76; TUBES PLUGGED
J	188	11/76; TUBES PLUGGED
K	1	7/77; WELD REPAIR
L	384	7/77; TUBES PLUGGED
M	9	10/77; TUBES PLUGGED
N	79	2/78; TUBES PLUGGED
P	28	8/78; TUBES PLUGGED
R	52	4/79; TUBES PLUGGED
S	48	5/80; MECH PLUGGED

SERIES: 44

FLA-B

COLUMN

ROW

← MANWAY

NOZZLE →

TURKEY POINT UNIT #4
GAUGING RESULTS NOV.,1980
STEAM GENERATOR B OUTLET

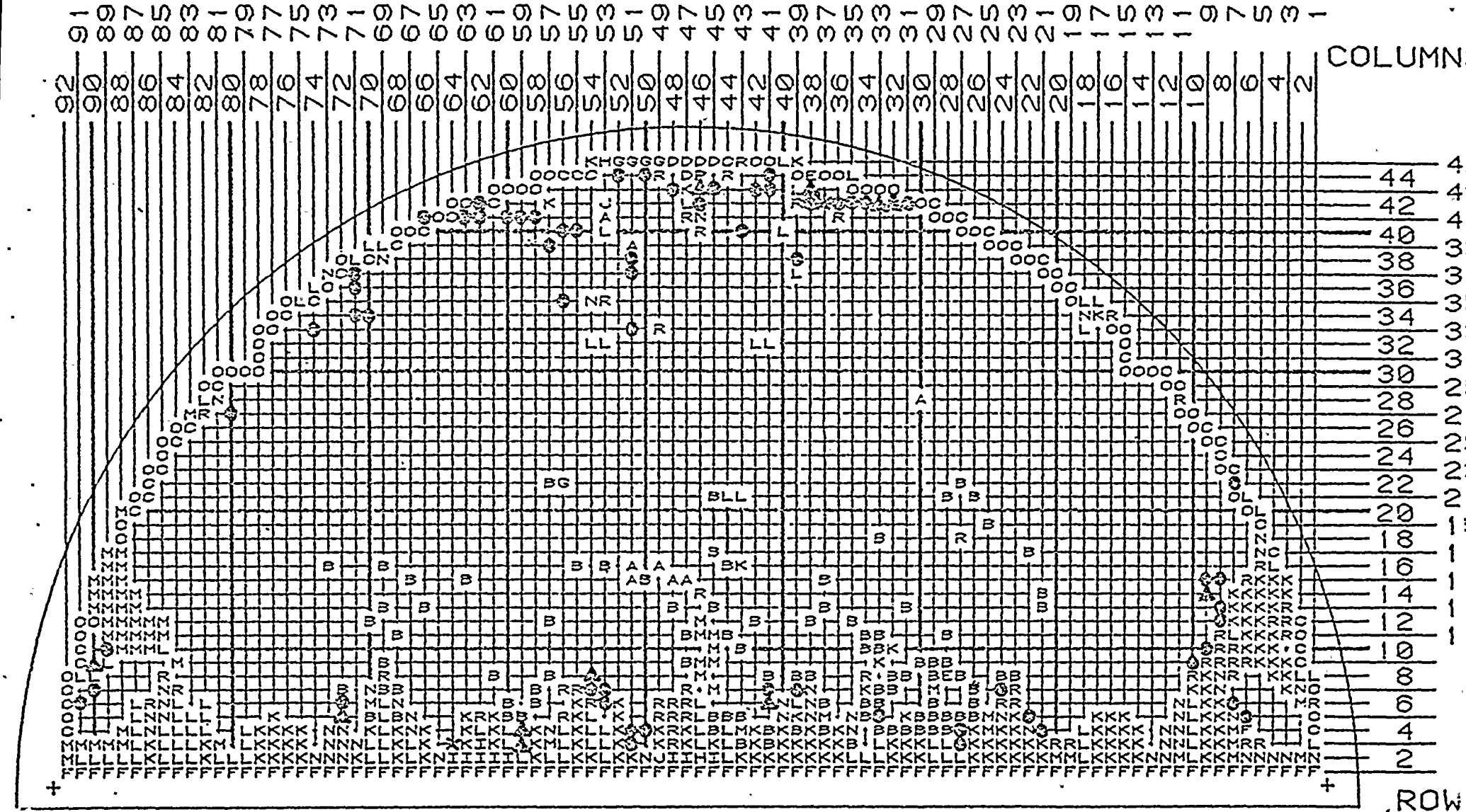
RESTRICTED TUBES:	NO. OF TUBES
X= .540 PROBE	None
Δ= .610 PROBE	5
⊖= .650 PROBE	Not Tested

URE 13

SERIES 44

FLA-C

8	9/74,	TUBES PLUGGED	I	9	4/77, TUBES PLUGGED
96	6/75,	TUBES PLUGGED	J	2	7/77, BARE HOLE HL, E/P OUTLET
2	1/76,	TUBES PLUGGED	K	157	7/77, TUBES PLUGGED
5	5/76,	TUBES PLUGGED	L	110	2/78, TUBES PLUGGED
2	9/76,	TUBES PLUGGED	M	62	8/78, TUBES PLUGGED
93	11/76,	TUBES PLUGGED	N	54	4/79, TUBES PLUGGED
5	1/77,	TUBES PLUGGED	P	1	8/78, EP 5/76, WR HL
2	3/77,	TUBES PLUGGED	R	.56	5/80, MECH PLUGGED



TURKEY POINT UNIT #4
GAUGING RESULTS NOV. 1980
STEAM GENERATOR C INLET

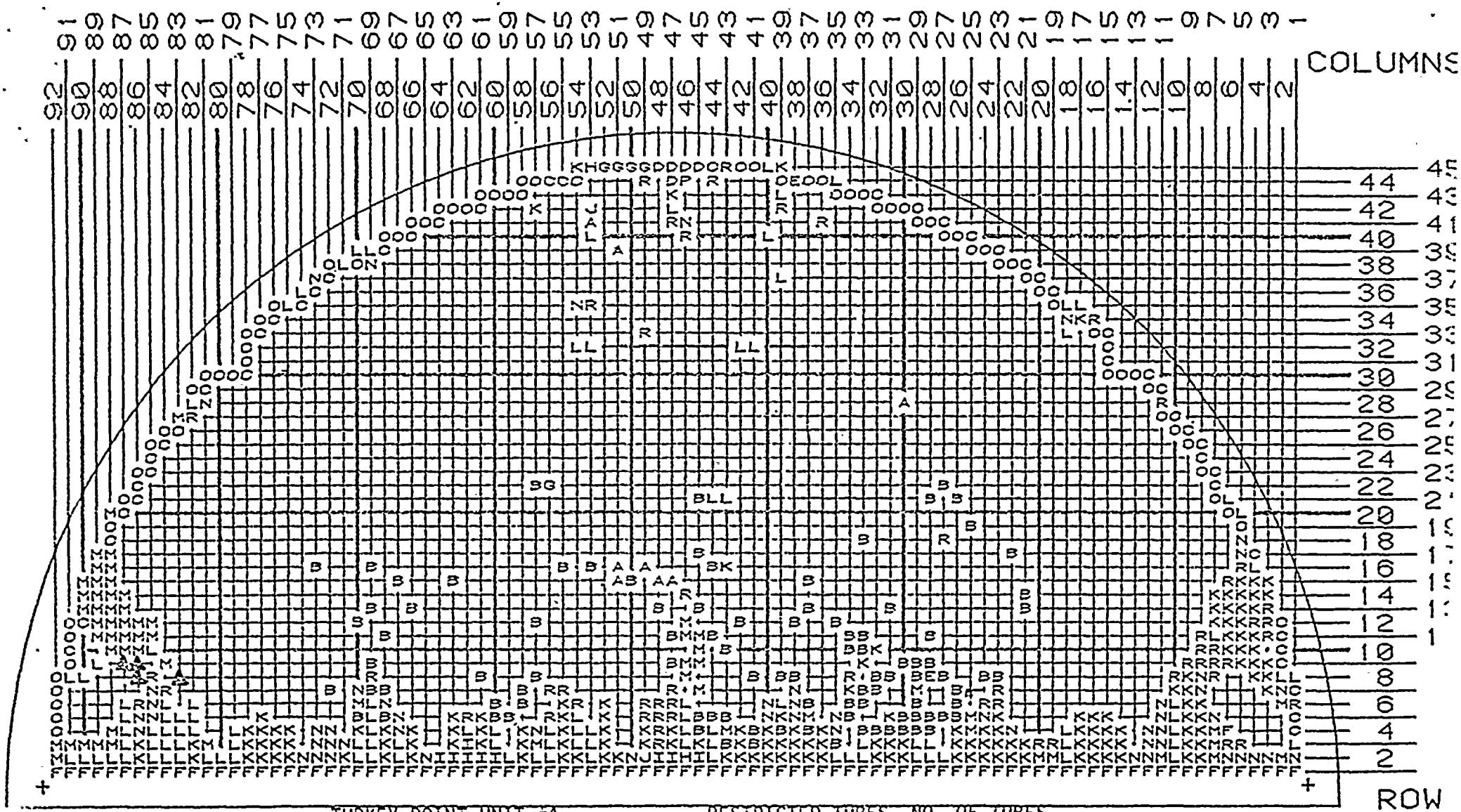
RESTRICTED TUBES	NO. OF TUBES
X=.540 PROBE	2
▲=.610 PROBE	11
○=.650 PROBE	62

URE 14

SERIES 44

FLA-C

8	9/74, TUBES PLUGGED	I	9	4/77, TUBES PLUGGED
96	6/75, TUBES PLUGGED	J	2	7/77, BARE HOLE HL, E/P OUTLET
2	1/76, TUBES PLUGGED	K	157	7/77, TUBES PLUGGED
5	5/76, TUBES PLUGGED	L	118	2/78, TUBES PLUGGED
2	9/76, TUBES PLUGGED	M	62	8/78, TUBES PLUGGED
93	11/76, TUBES PLUGGED	N	54	4/79, TUBES PLUGGED
5	1/77, TUBES PLUGGED	P	1	8/78, EP 5/76, MR HL
2	3/77, TUBES PLUGGED	R	56	5/80, MECH PLUGGED



← MANWAY

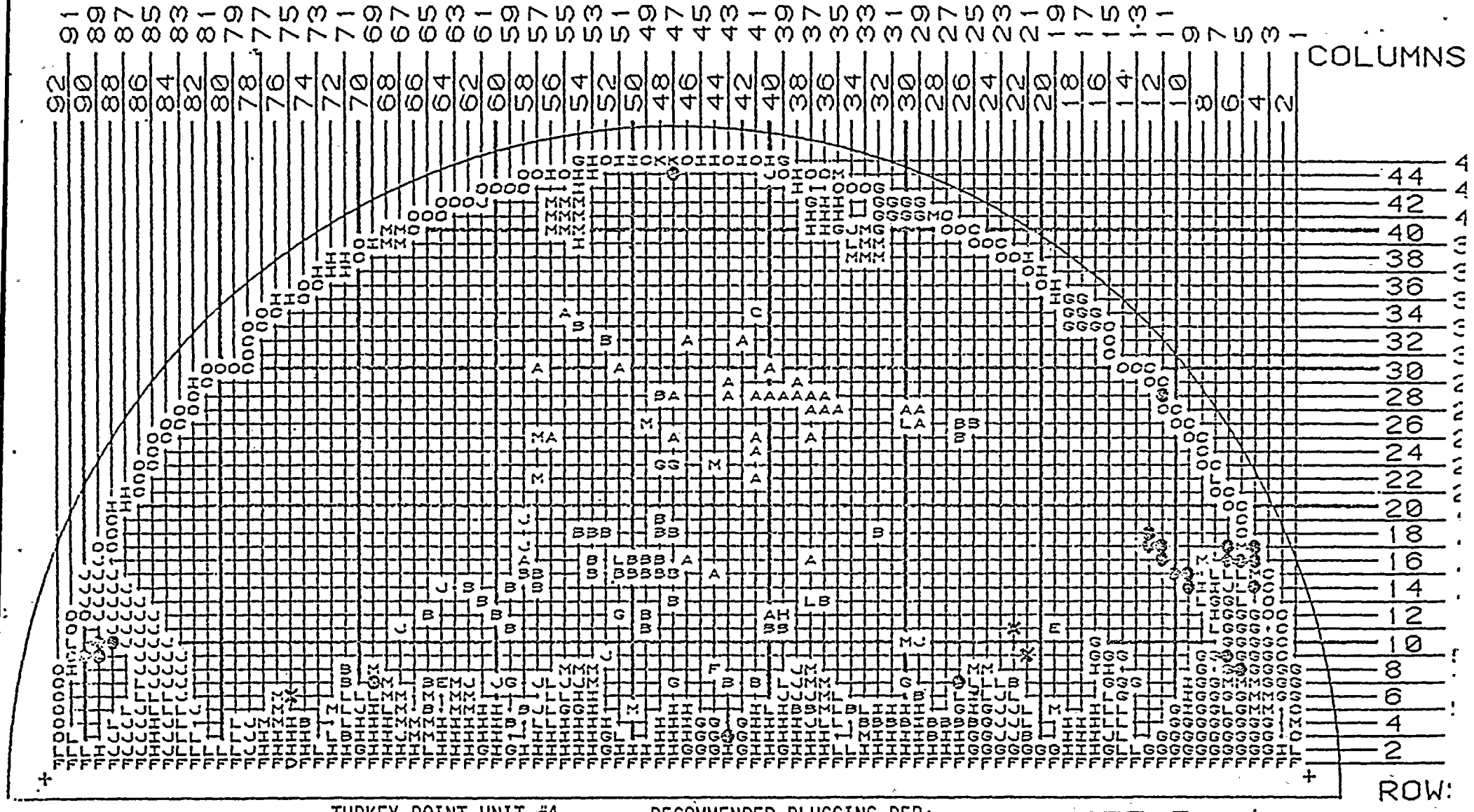
TURKEY POINT UNIT #4
GAUGING RESULTS NOV. 1980
STEAM GENERATOR C OUTLET

RESTRICTED TUBES	NO. OF TUBES
X = .540 PROBE	None
▲ = .610 PROBE	4
⊙ = .650 PROBE	Not Tested

NOZZLE →

FIGURE 15

33	9/74; TUBES PLUGGED	H	1	7/77; WELD REPAIR HL, E/P CL	SERIES 44
63	6/75; TUBES PLUGGED	I	169	2/78; TUBES PLUGGED	
1	DATE NOT KNOWN; TUBES PLUGGED	J	86	8/78; TUBES PLUGGED	FLA-A
1	SHOP WELD	K	2	SHOP WELD, HL MISDRILLED	
2	5/76; TUBES PLUGGED	L	79	4/79; TUBES PLUGGED	
92	11/76; TUBES PLUGGED	M	72	5/80; MECH PLUGGED	
132	7/77; TUBES PLUGGED				



← MANWAY

TURKEY POINT UNIT #4
STEAM GENERATOR A
NOVEMBER, 1980

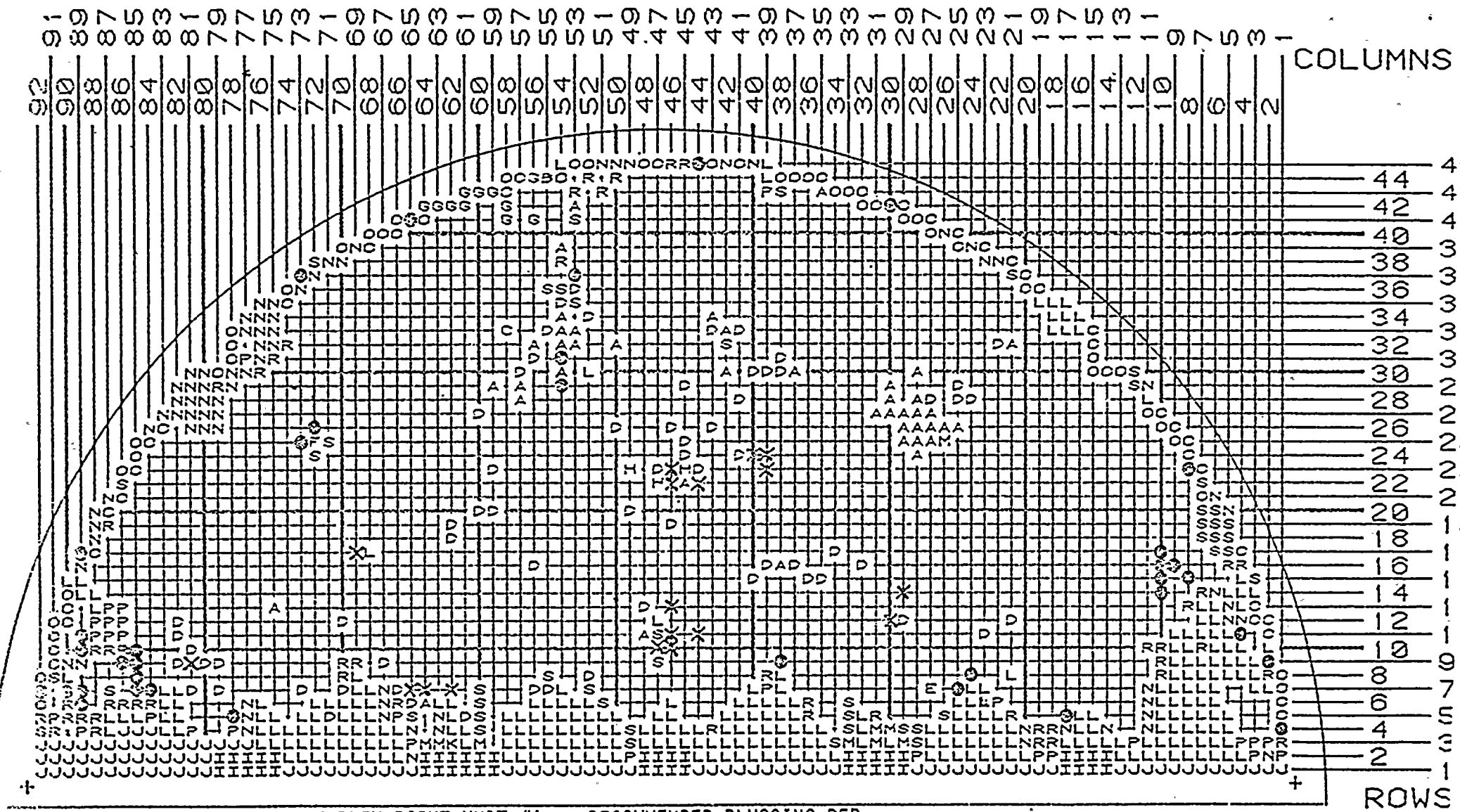
RECOMMENDED PLUGGING PER:
⊙ , = Gauging Results (24 tubes)
X = Reg. Guide 1.83 (3 tubes)

NOZZLE →

42	8/74; TUBES PLUGGED	J	188	11/76; TUBES PLUGGED
1	8/75; TUBE PLUGGED	K	1	7/77; WELD REPAIR
1	8/75; BARE HOLE PLUG HL-E/P CL	L	324	7/77; TUBES PLUGGED
66	8/75; TUBES PLUGGED	M	9	10/77; TUBES PLUGGED
1	SHOP WELD	N	79	2/78; TUBES PLUGGED
1	8/75; BARE HOLE PLUGS--HL,CL	P	28	8/78; TUBES PLUGGED
11	8/75; TUBES PLUGGED	R	52	4/79; TUBES PLUGGED
3	5/76; TUBES PLUGGED	S	48	5/80; MECH PLUGGED
48	8/76; TUBES PLUGGED			

SERIES 44

FLA-B



← MANWAY

TURKEY POINT UNIT #4
STEAM GENERATOR B
NOVEMBER, 1980

RECOMMENDED PLUGGING PER:
⊙ = Gauging Results (37 tubes)
X = Reg. Guide 1.83 (18 tubes)

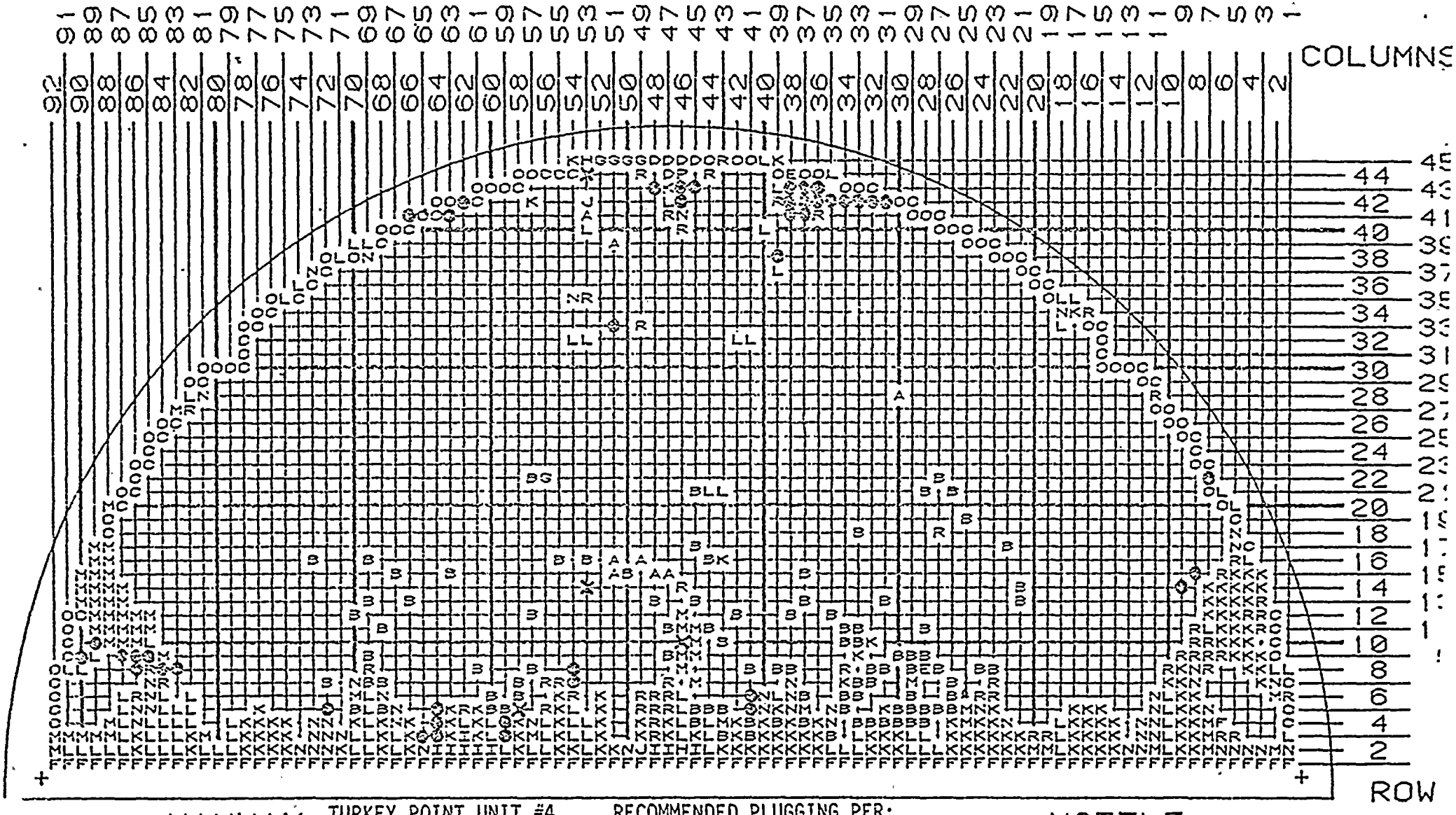
NOZZLE →

FIGURE 17

8	9/[illegible], TUBES PLUGGED	I	9	4/77, TUBES PLUGGED	
96	6/75, TUBES PLUGGED	J	2	7/77, BARE HOLE HL, E/P OUTLET	
2	1/76, TUBES PLUGGED	K	157	7/77, TUBES PLUGGED	
5	5/76, TUBES PLUGGED	L	110	2/78, TUBES PLUGGED	
2	9/76, TUBES PLUGGED	M	62	8/78, TUBES PLUGGED	
93	11/76, TUBES PLUGGED	N	54	4/79, TUBES PLUGGED	
5	1/77, TUBES PLUGGED	P	1	8/78, EP 5/76, WR HL	
2	3/77, TUBES PLUGGED	R	56	5/80, MECH PLUGGED	

SERIES 44

FLA-C



← MANWAY

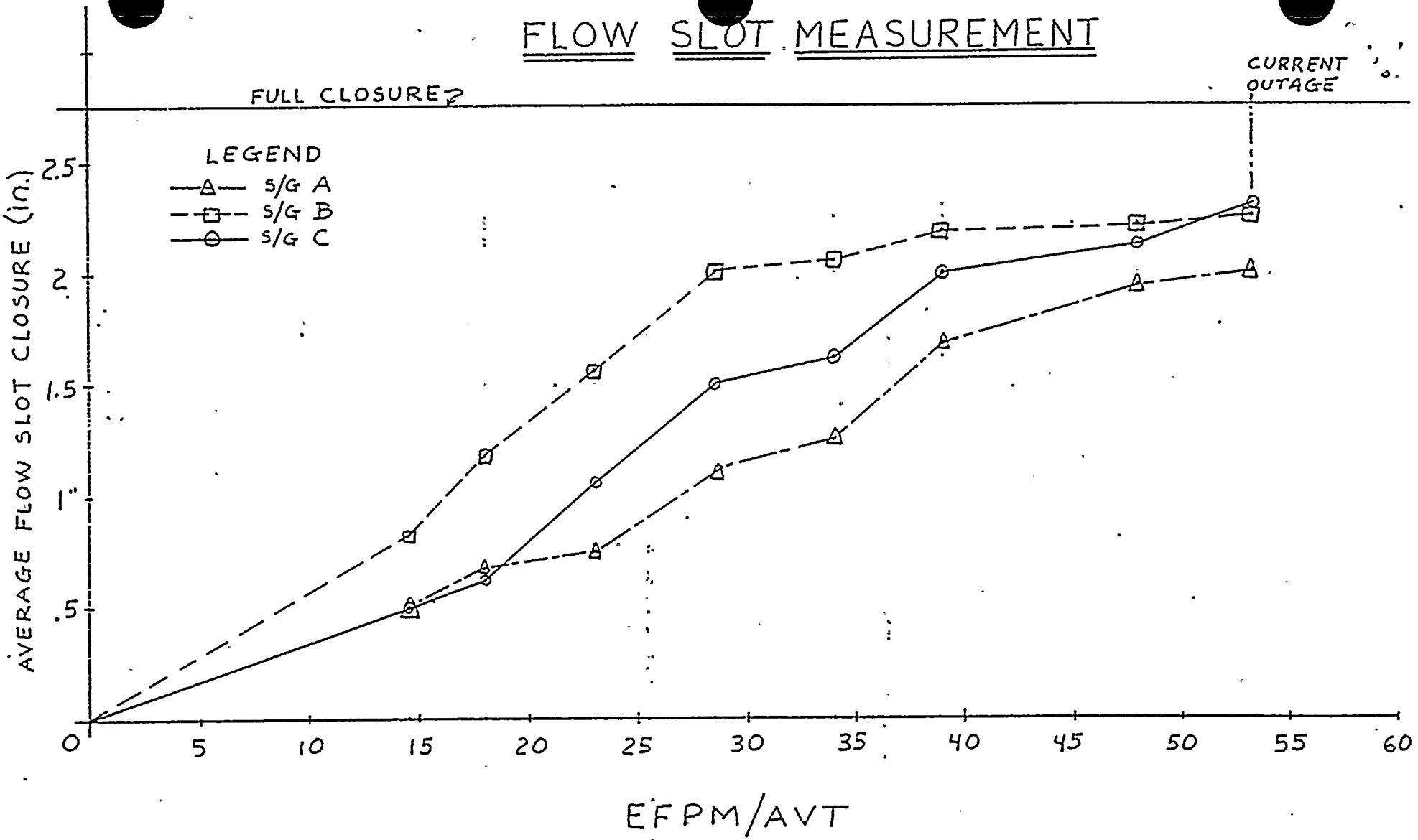
TURKEY POINT UNIT #4
STEAM GENERATOR C
NOVEMBER, 1980

RECOMMENDED PLUGGING PER:
⊙ = Gauging Results (44 tubes)
X = Reg. Guide 1.83 (4 tubes)

NOZZLE →

Fig. 18

FLOW SLOT MEASUREMENT



STATE OF FLORIDA)
) ss.
COUNTY OF DADE)

A. D. Schmidt, being first duly sworn, deposes and says:

That he is Vice President of Florida Power & Light Company, the herein;

That he has executed the foregoing document; that the statements made in this said document are true and correct to the best of his knowledge, information, and belief, and that he is authorized to execute the document on behalf of said

A. D. Schmidt

Subscribed and sworn to before me this 18 day of December, 1980

Cheryl I. Fredricks
NOTARY PUBLIC, in and for the County of Dade, State of Florida

My commission expires: Notary Public, State of Florida at Large My Commission Expires October 30, 1983 Bonded thru Maynard Bonding Agency