Westinghouse Non-Proprietary Class 3

SG-SGDA-05-24
Revision 1

June 2005

Condition Monitoring and Operational Assessment: GL-95-05 Alternate Repair Criterion End of Cycle 6 90 Day Report Watts Bar Unit 1

Prepared for the
Tennessee Valley Authority

WESTINGHOUSE NON-PROPRIETARY CLASS 3

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Condition Monitoring and Operational Assessment: GL-95-05 Alternate Repair Criterion End of Cycle 6 90 Day Report Watts Bar Unit 1

Author's Name	Signature / Date	For Pages
Thomas P. Magee	*Official Record Electronically Approved in EDMS*	All

Verifier's Name	Signature / Date	For Pages
David J. Ayres	*Official Record Electronically Approved in EDMS*	All

Manager Name	Signature / Date	For Pages
Earl P. Morgan	*Official Record Electronically Approved in EDMS*	All

Westinghouse Electric Company LLC
P.O. Box 355
Pittsburgh, PA 15230-0355

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GLOSSARY OF ACRONYMS

BOC - Beginning of operation cycle. The current inspection is just prior to BOC-7.

EOC - End of operation cycle. The current inspection is at EOC-6. The end of the next cycle is EOC-7.

POD - Probability of detection. This value is set equal to 0.60 for the GL-95-05 predictive analysis for the condition of the steam generators at the end of the next cycle.

ODSCC - Outside diameter stress corrosion cracking.

SG - Steam Generator identifier. Specifically SG 1, SG 2, SG 3 and SG 4.

TSP - Tube support plate. The Generic letter 95-05 Alternate Repair Criterion applies to ODSCC in the tubes at the TSPs.

NODP – Normal Operating Differential Pressure

FDB – Flow Distribution Baffle. This is the H01 tube support plate for Watts Bar Unit 1.

1.0 INTRODUCTION

Watts Bar Unit 1 completed the Cycle 6 of operation and subsequent steam generator tube inspection in February 2005. Axial ODSCC has been confirmed within the TSP regions of the steam generators and is a current degradation mechanism at Watts Bar Unit 1. The alternate repair criterion (ARC) defined in NRC Generic Letter 95-05 (Reference 1) is implemented at Watts Bar Unit 1. This report provides a condition monitoring assessment that demonstrates that the GL-95-05 acceptance criteria were satisfied at the end of operational Cycle 6 (EOC-6), and an operational assessment that demonstrates that the GL-95-05 acceptance criteria will continue to be satisfied throughout operational Cycle 7. A Watts Bar specific voltage growth rate was used in the EOC-7 prediction.

The operation cycle just completed, Cycle 6, was 482 Effective Full Power Days (EFPD). The next cycle, Cycle 7 is estimated to be 518 EFPD (Reference 2).

2.0 SUMMARY AND CONCLUSIONS

Bobbin voltage indications of ODSCC at the tube support plates were detected and measured in all four steam generators. Based on this voltage distribution, using the methodology of References 1 and 3, a Condition Monitoring evaluation including the computation of the probability of tube burst (POB) and the amount of leakage predicted for steam line break conditions at EOC-6 was performed. The acceptance criteria on POB and leakage are satisfied with significant margin.

The change in voltage from the previous inspection was determined by historical review for each indication detected. The apparent voltage growth rate during Cycle 6 was based on the historic review of 931 DSI indications identified during the Watts Bar Unit 1 EOC-6 inspection. An operational assessment prediction of the POB and leakage at steam line break conditions at EOC-7 was performed using a site specific bounding growth rate. The results indicate that the acceptance criteria on POB and leakage at EOC-7 will be satisfied with acceptable margin. Therefore the Reference 1 acceptance criteria will be satisfied throughout Cycle 7.

3.0 EOC-6 INSPECTION RESULTS

3.1 VOLTAGE DISTRIBUTIONS AT EOC-6

Summaries of eddy current signal voltage distributions at the drilled support plates, for each steam generator, are shown in Table 3-1 through Table 3-4. Also shown are the number of indications in each voltage range detected at EOC-6 and the number of indications removed from service due to tube repairs for any reason. The number of indications that remain in service for Cycle 7 is the difference between the number of indications detected and the number of indications removed from service. No tubes were unplugged with the intent to return them to service after inspection.

Appendix A contains a listing of all DSI indications and their repair status. All DSI indications with an EOC-6 voltage greater to or equal to 1 volt were subject to Plus Point inspections. Plugging repaired indications confirmed as being present by the Plus Point inspection.

The summary of all four-steam generators shows the following:

- A total of 940 TSP regions were identified as having ODSCC bobbin signal indications (DSIs) during the inspection.
- None of these indications were located within intersections that are excluded from the voltage-based repair criteria (as noted in Section 1.b.1 of Reference 1 as intersections with degradation that may collapse or deform as a result of combined loss-of-coolant and seismic events). These intersections were identified in Reference 4. None of these 940 indications were associated with a dent signal greater than 5 volts, copper deposits, or mixed residuals of sufficient magnitude to cause a 1.0 volt ODSCC indication to be missed or misread
- Of the 940 TSP regions, 149 had DSI indications above 1 volt.
- All indication with voltages greater than or equal to 1 volt, were subjected to an inspection with a Plus Point probe. Indications that confirmed during the Plus Point inspection were removed from service by plugging.
- Of the 149 TSP regions with indications above 1 volt, 104 were part of a tube that was repaired by plugging. 11 of these TSP regions were part of a tube that was plugged for reasons other than MRPC-confirmed ODSCC at that particular support plate. An additional 13 of these TSP regions were each part of a tube that was preventively plugged.
- A total of 82 of the 940 TSP regions were removed from service for reasons other than ODSCC at the support plates

Figure 3-1 through Figure 3-12 illustrates the voltage distribution in each steam generator. Figure 3-1 through Figure 3-4 show the detected voltage distribution compared to the predicted distribution which was developed in the previous 90-day report, Reference 5. Figure 3-5 through Figure 3-8 show the distribution of repaired indications, and Figure 3-9 through Figure 3-12 show the distribution of indications that remain in service for the next operating cycle.

Table 3-1: Inspection Results for SG 1 EOC-6

Voltage Bin	Number of Indications	MRPC Confirmed	MRPC Tested But Not Confirmed	Not MRPC Tested	Plugged	Returned to Service	In-Service MRPC Confirmed or not Tested
0.2	13			13	1	12	12
0.3	13	1	3	9		13	10
0.4	32	1	7	24	2	30	23
0.5	42	1	8	33	5	37	30
0.6	54	3	14	37	4	50	36
0.7	46	3	11	32	7	39	32
0.8	20	2	3	15	1	19	16
0.9	31	2	4	25	4	27	23
1	9	1	1	7	1	8	7
1.1	19	12	7		12	7	
1.2	20	12	8		20		
1.3	7	5	2		7		
1.4	7	4	3		7		
1.5	4	3	1		4		
1.6	1	1			1		
1.7	1	1			1		
1.9	2	2			2		
2	2	1	1		2		
2.15	1	1			1		
2.39	1	1			1		
2.62	1	1			1		
2.81	1	1			1		
3.1	1	1			1		
3.31	1	1			1		
3.66	1	1			1		
Total	330	62	73	195	88	242	189

Average voltage = 0.741 volts

Table 3-2: Inspection Results for SG 2 EOC-6

Voltage Bin	Number of Indications	MRPC Confirmed	MRPC Tested But Not Confirmed	Not MRPC Tested	Plugged	Returned to Service	In-Service MRPC Confirmed or not Tested
0.2	3			3		3	3
0.3	14	1	2	11	1	13	11
0.4	25	4	5	16	1	24	19
0.5	34	6	4	24	3	31	28
0.6	22	5	5	12	1	21	16
0.7	19	3	10	6	1	18	8
0.8	21	5	8	8	2	19	11
0.9	11	2	3	6	1	10	7
1	16	4	6	6	1	15	9
1.1	6	6			6		
1.2	8	6	2		6	2	
1.3	4	1	3		1	3	
1.4	4	1	3		2	2	
1.6	2		2			2	
1.69	1	1			1		
1.92	1	1			1		
3.43	1	1			1		
6.32	1	1			1		
Total	193	48	53	92	30	163	112

Average voltage = 0.701 volts

Table 3-3: Inspection Results for SG 3 EOC-6

Voltage Bin	Number of Indications	MRPC Confirmed	MRPC Tested But Not Confirmed	Not MRPC Tested	Plugged	Returned to Service	In-Service MRPC Confirmed or not Tested
0.2	5		3	2		5	2
0.3	18		1	17		18	17
0.4	19	1	3	15		19	16
0.5	27	1	5	21	3	24	19
0.6	32	1	12	19	2	30	18
0.7	19	1	1	17	2	17	16
0.8	28	2	11	15	3	25	15
0.9	13		3	10	1	12	9
1	10	1	2	7	2	8	6
1.1	12	3	9		4	8	
1.2	4		4			4	
1.3	3		3		1	2	
1.4	1	1			1		
1.6	1		1			1	
1.7	3		3			3	
1.77	1		1			1	
1.87	1		1			1	
2.16	1		1		1		
2.36	1	1			1		
2.51	1	1			1		
2.99	1	1			1		
Total	201	14	64	123	23	178	118

Average voltage = 0.691 volts

Table 3-4: Inspection Results for SG 4 EOC-6

Voltage Bin	Number of Indications	MRPC Confirmed	MRPC Tested But Not Confirmed	Not MRPC Tested	Plugged	Returned to Service	In-Service MRPC Confirmed or not Tested
0.2	5			5	1	4	4
0.3	22	1	3	18	5	17	14
0.4	30		7	23	2	28	22
0.5	38		8	30	4	34	26
0.6	38		9	29	5	33	24
0.7	28	3	3	22	4	24	22
0.8	16	1	1	14	2	14	13
0.9	11	1		10	1	10	10
1	7	1	2	4		7	5
1.1	6	2	4		4	2	
1.2	2		2		1	1	
1.3	5	2	3		2	3	
1.4	2		2		1	1	
1.5	2	1	1		1	1	
1.78	1		1			1	
2.43	1		1		1		
2.57	1	1			1		
4.06	1	1			1		
Total	216	14	47	155	36	180	140

Average voltage = 0.615 volts

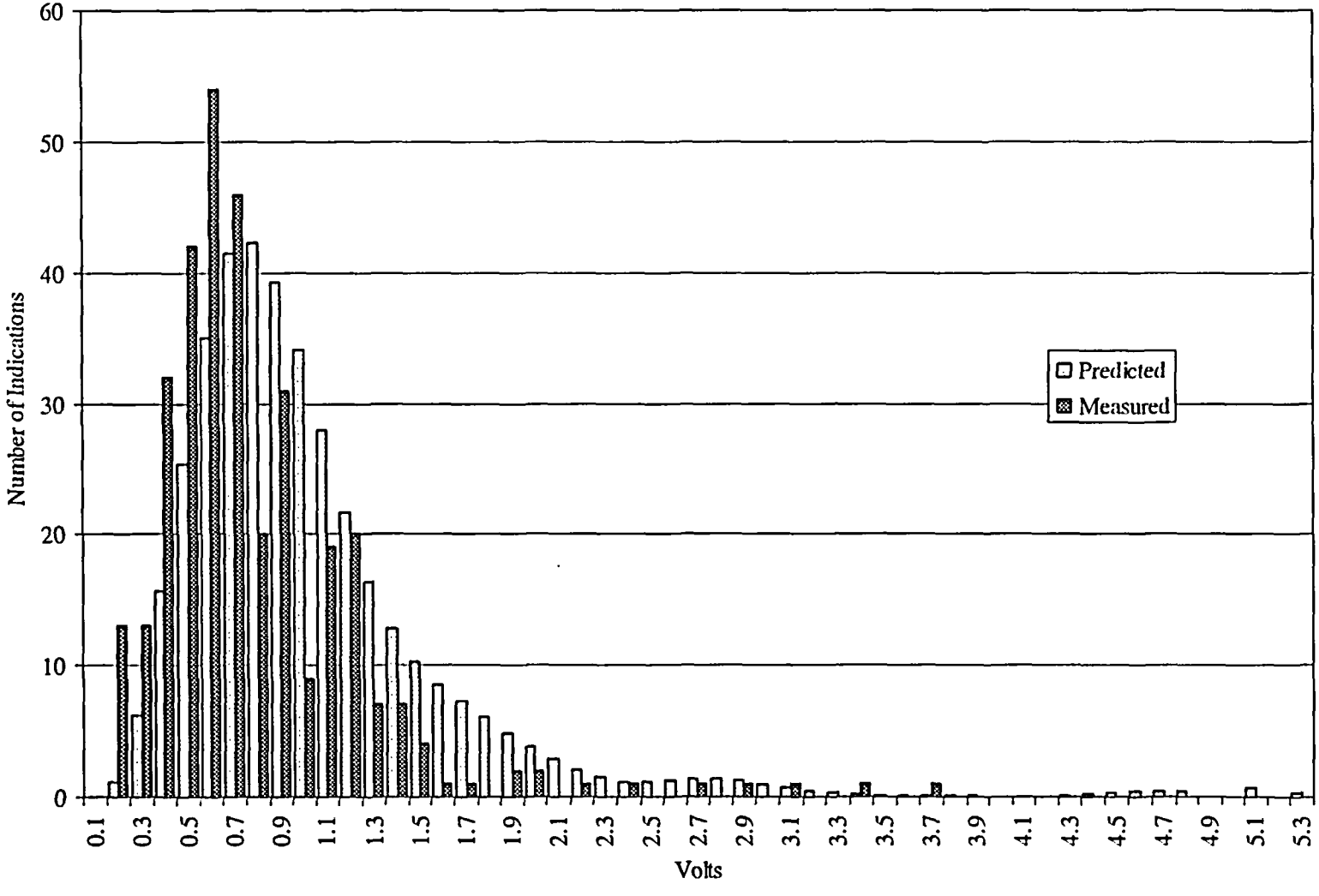

Figure 3-1: Watts Bar EOC-6 Voltage Distribution, SG 1

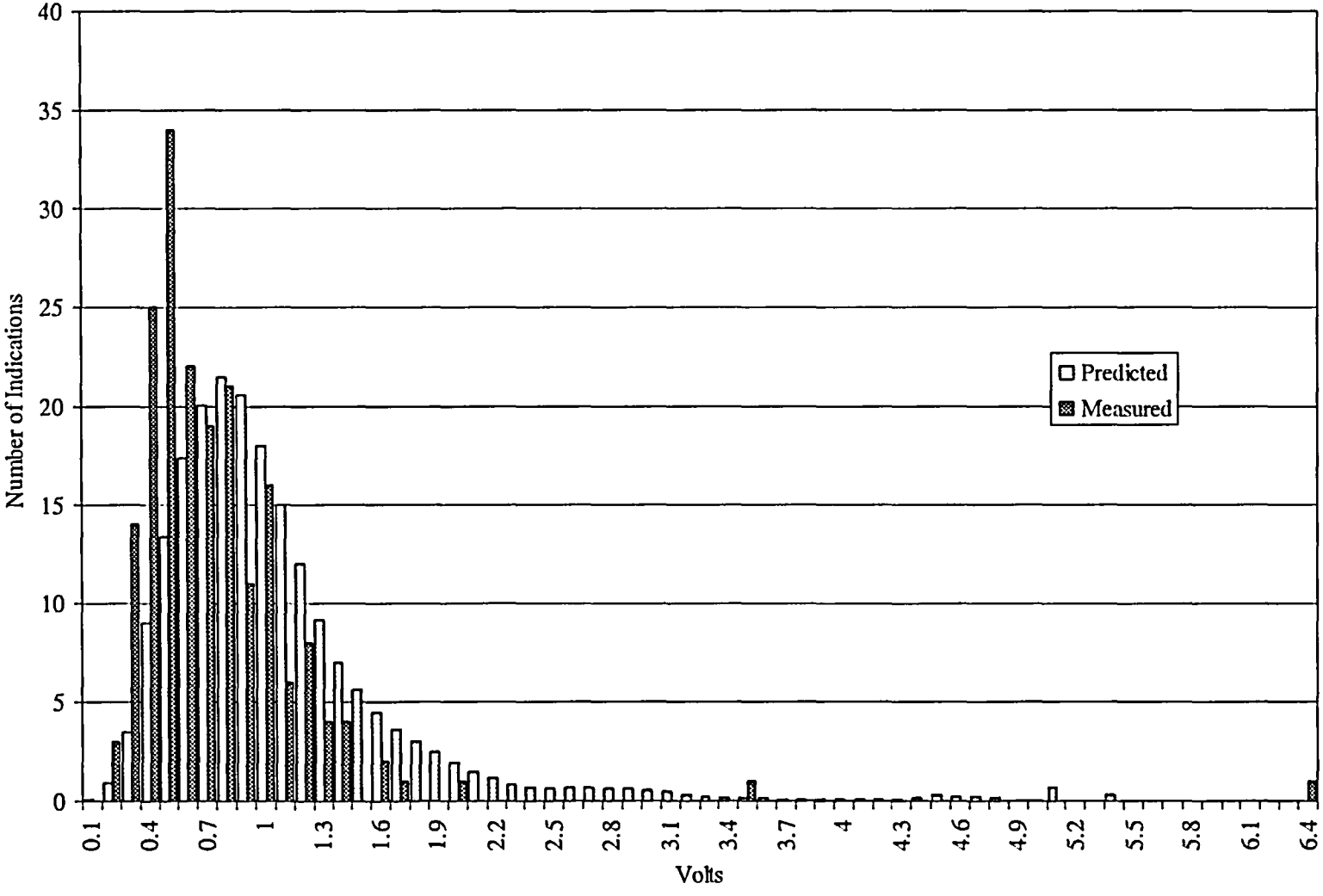

Figure 3-2: Watts Bar EOC-6 Voltage Distribution, SG 2

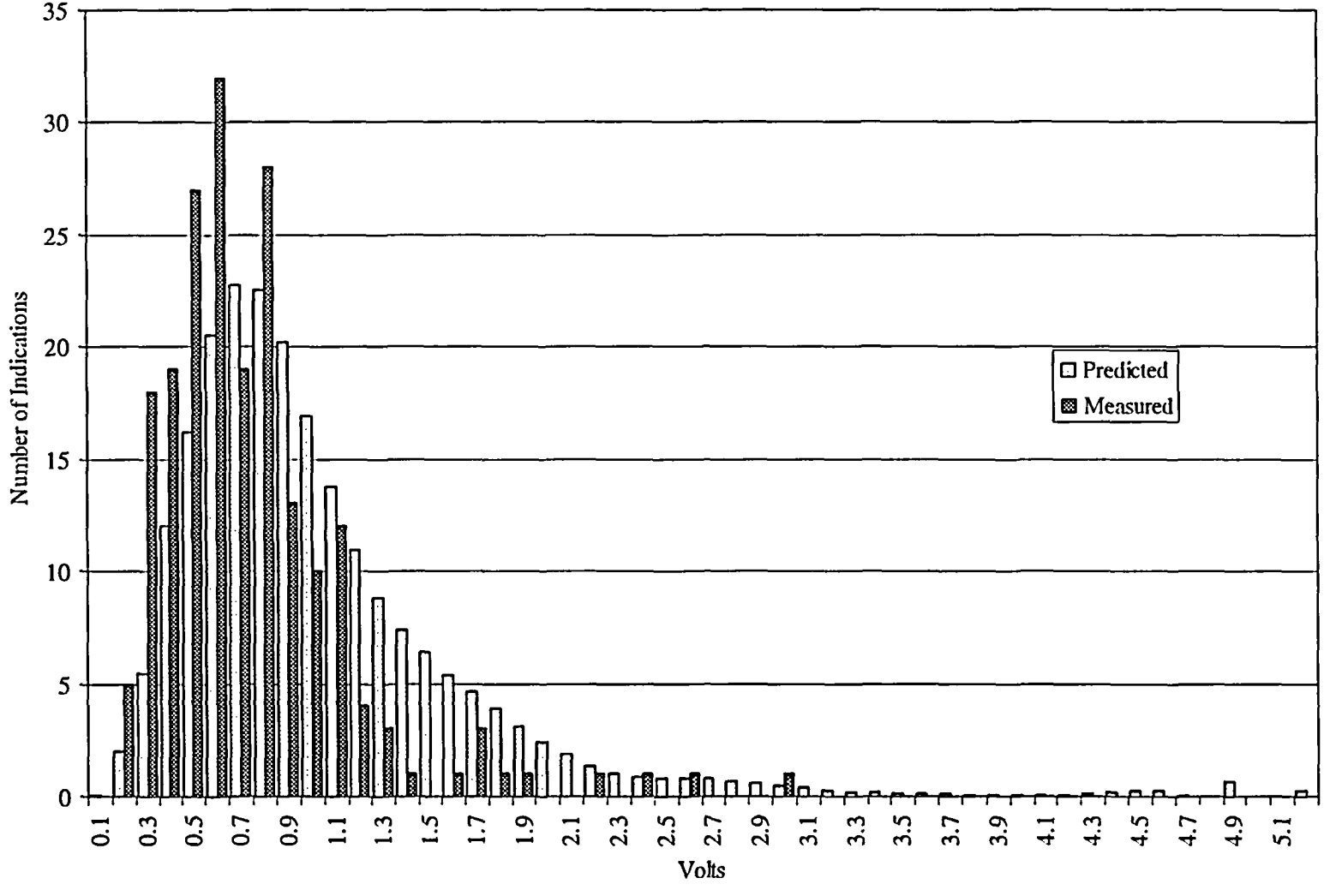

Figure 3-3: Watts Bar EOC-6 Voltage Distribution, SG 3

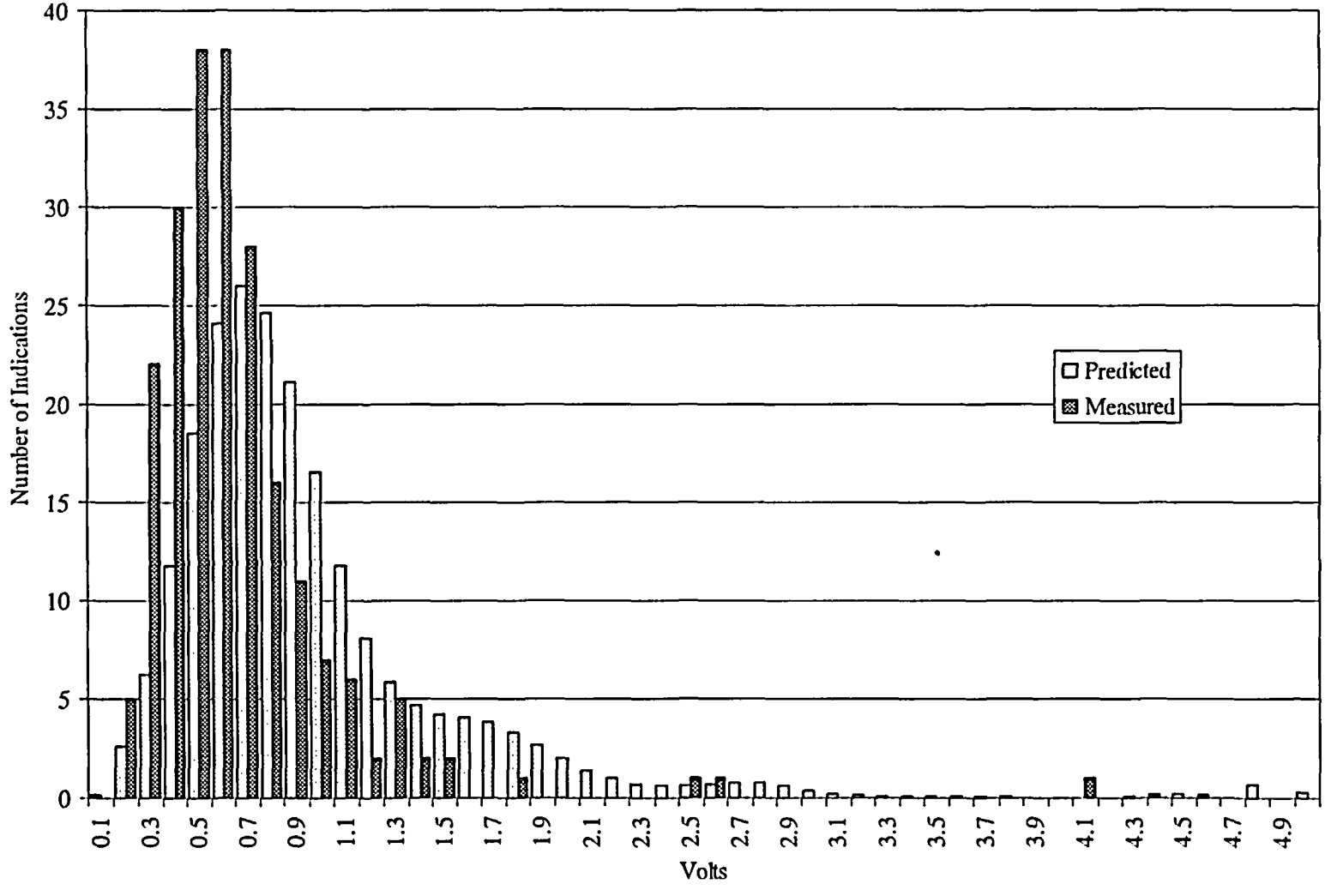

Figure 3-4: Watts Bar EOC-6 Voltage Distribution, SG 4

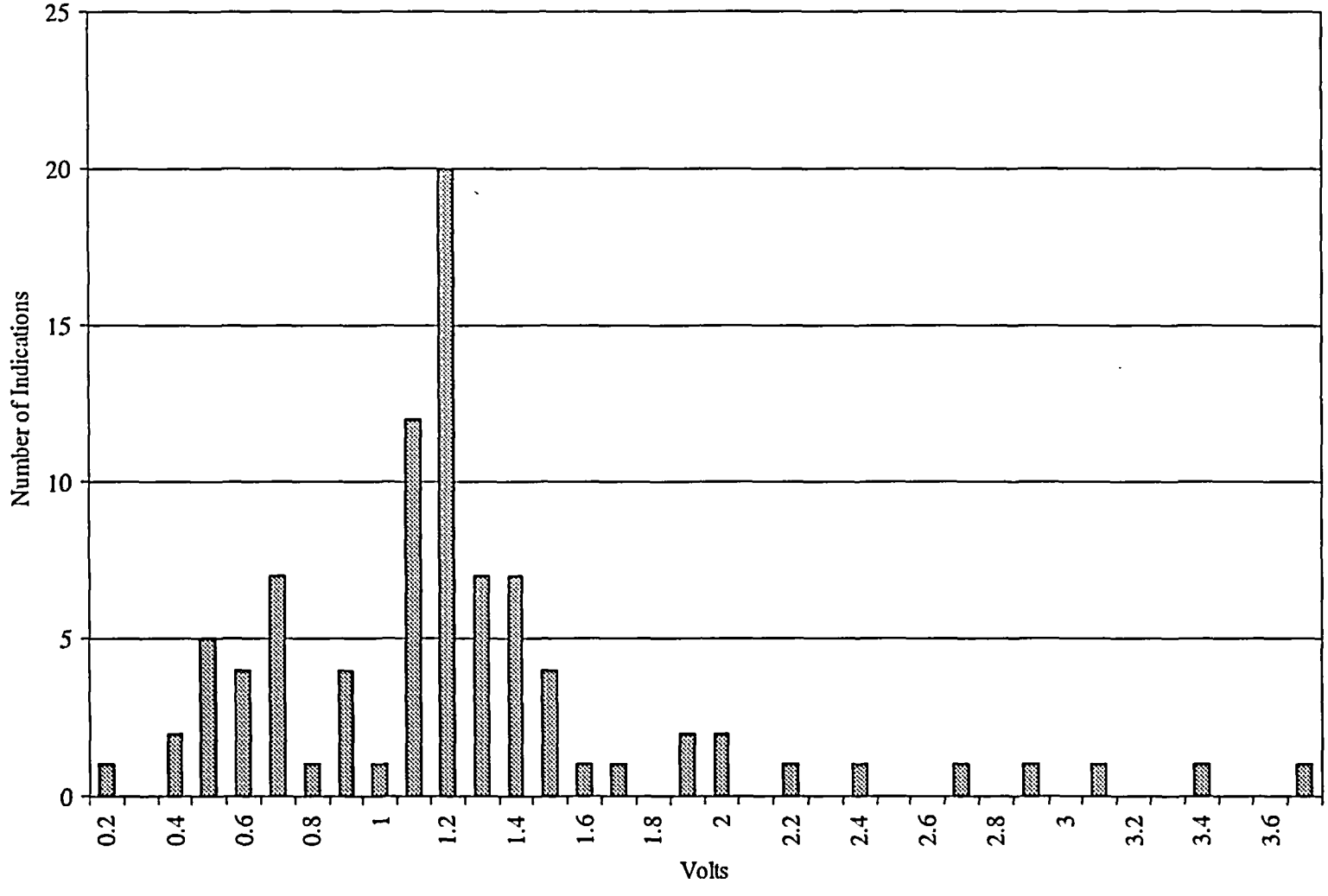

Figure 3-5: Watts Bar EOC-6 Repaired Indications, SG 1

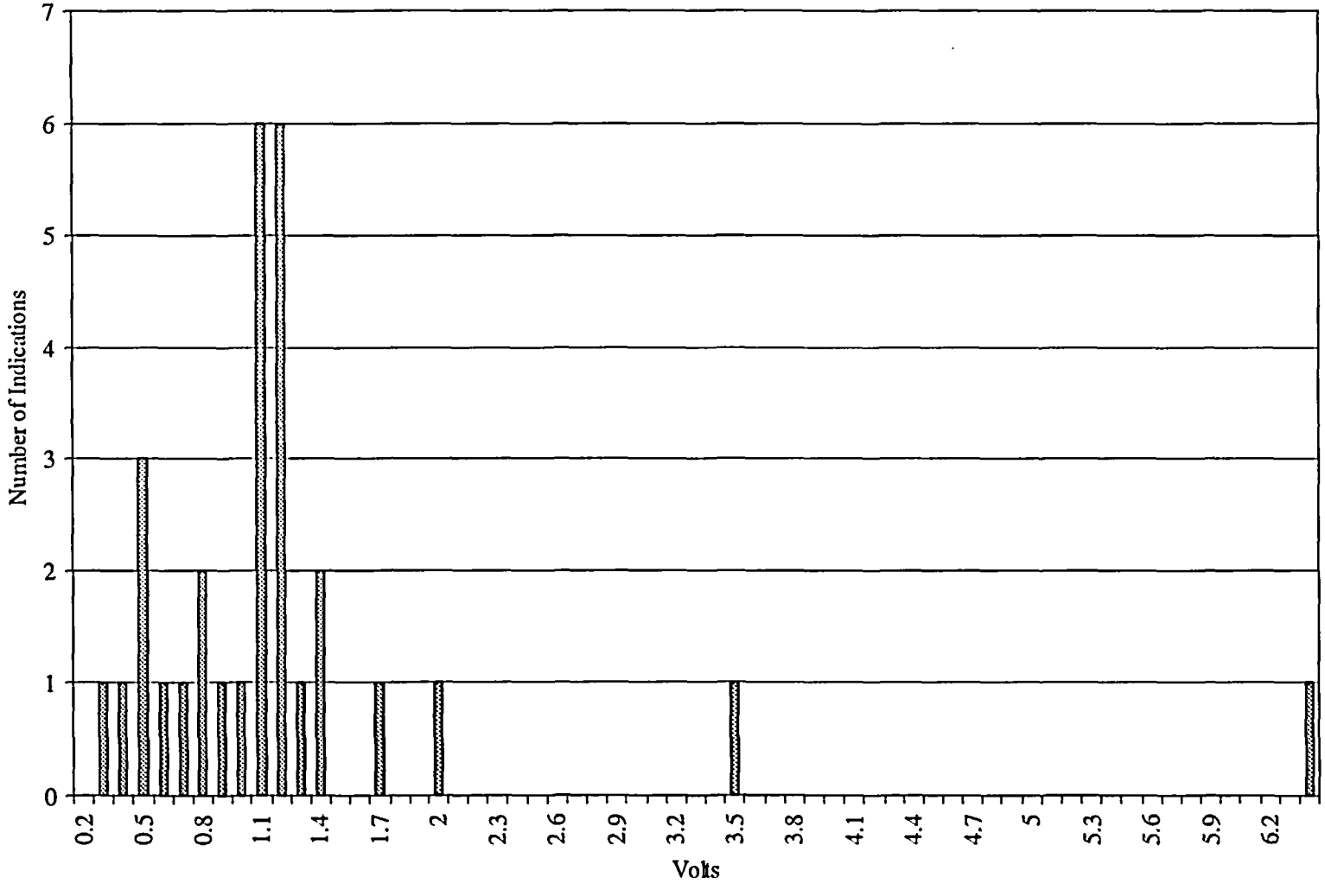

Figure 3-6: Watts Bar EOC-6 Repaired Indications, SG 2

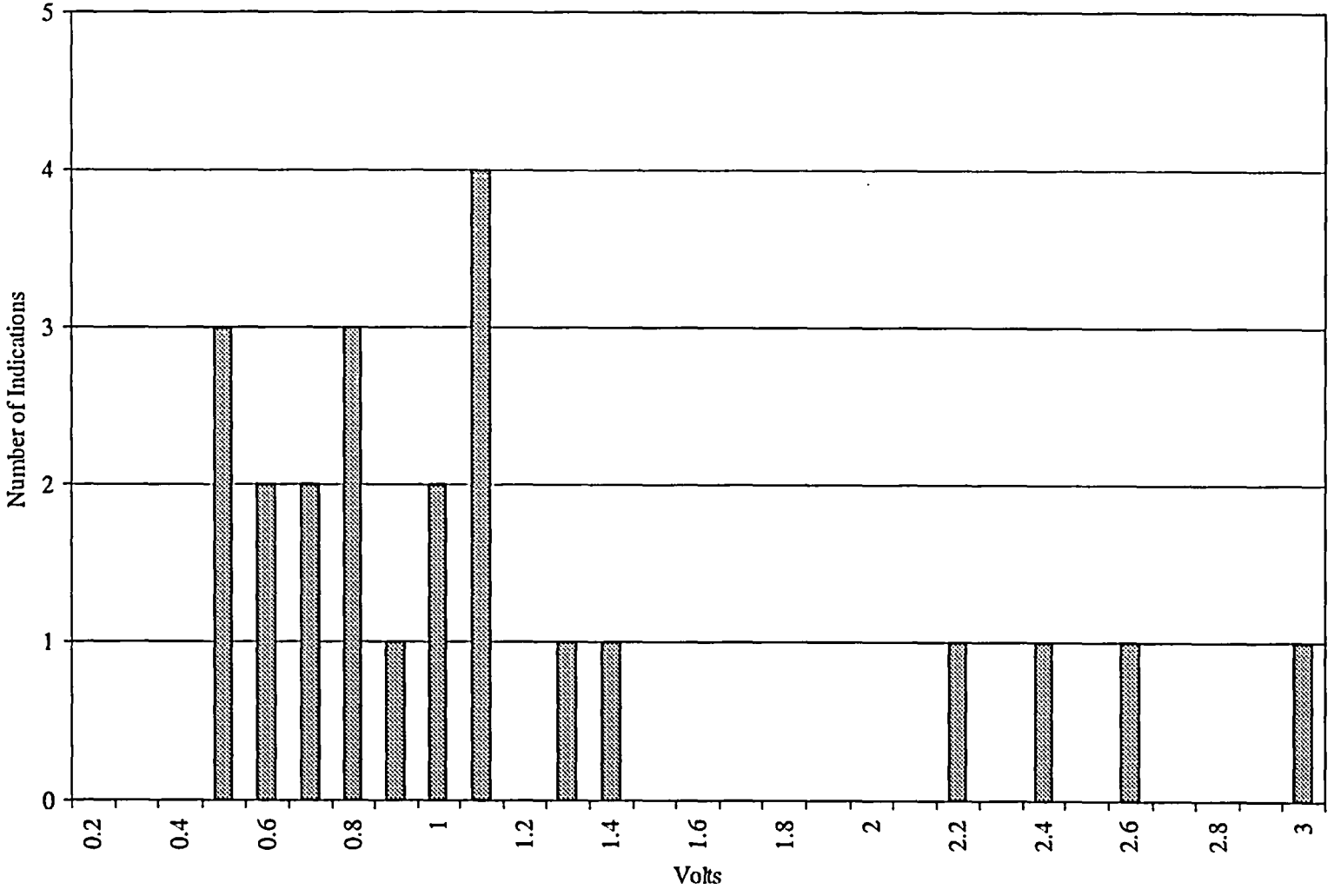

Figure 3-7: Watts Bar EOC-6 Repaired Indications, SG 3

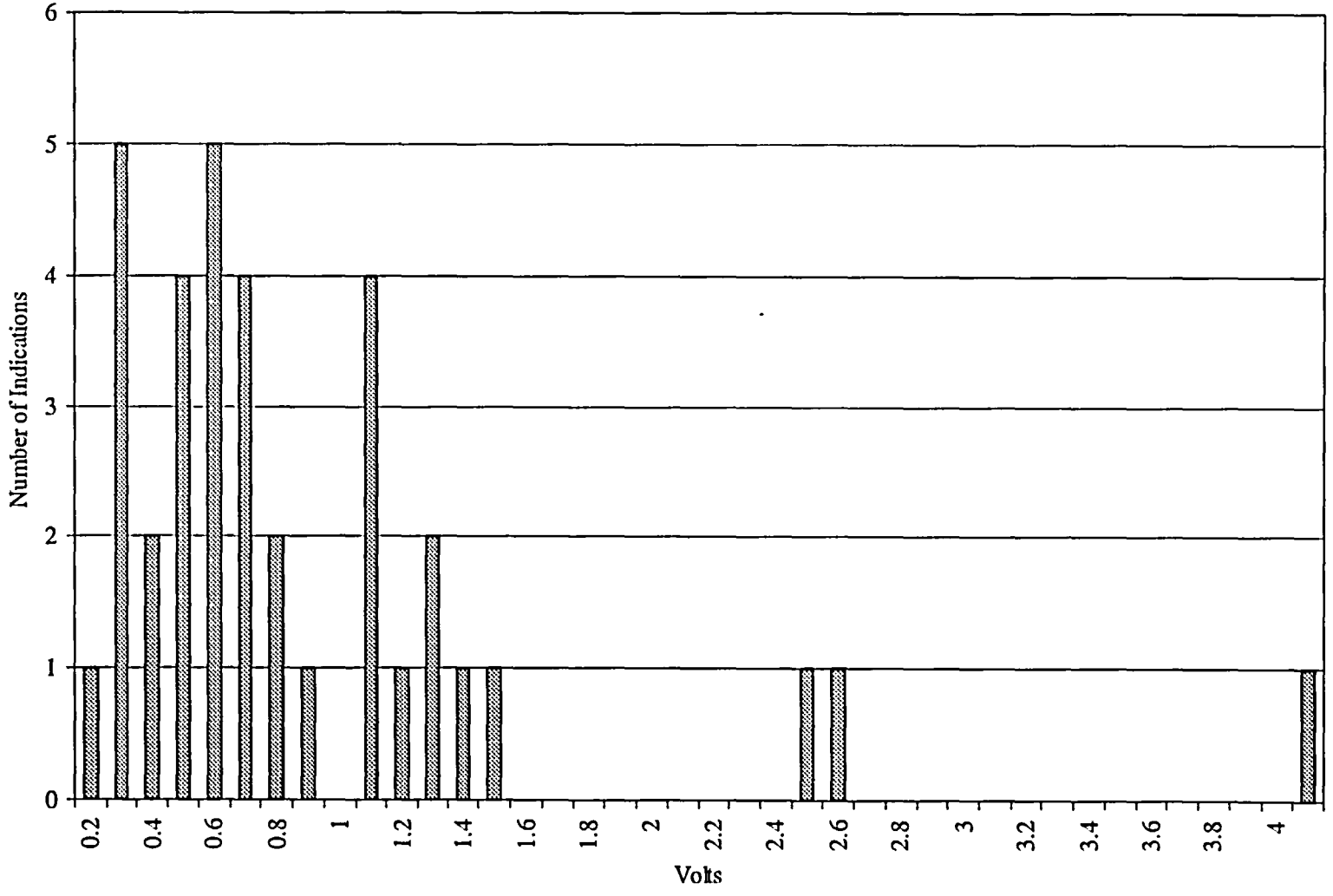

Figure 3-8: Watts Bar EOC-6 Repaired Indications, SG 4

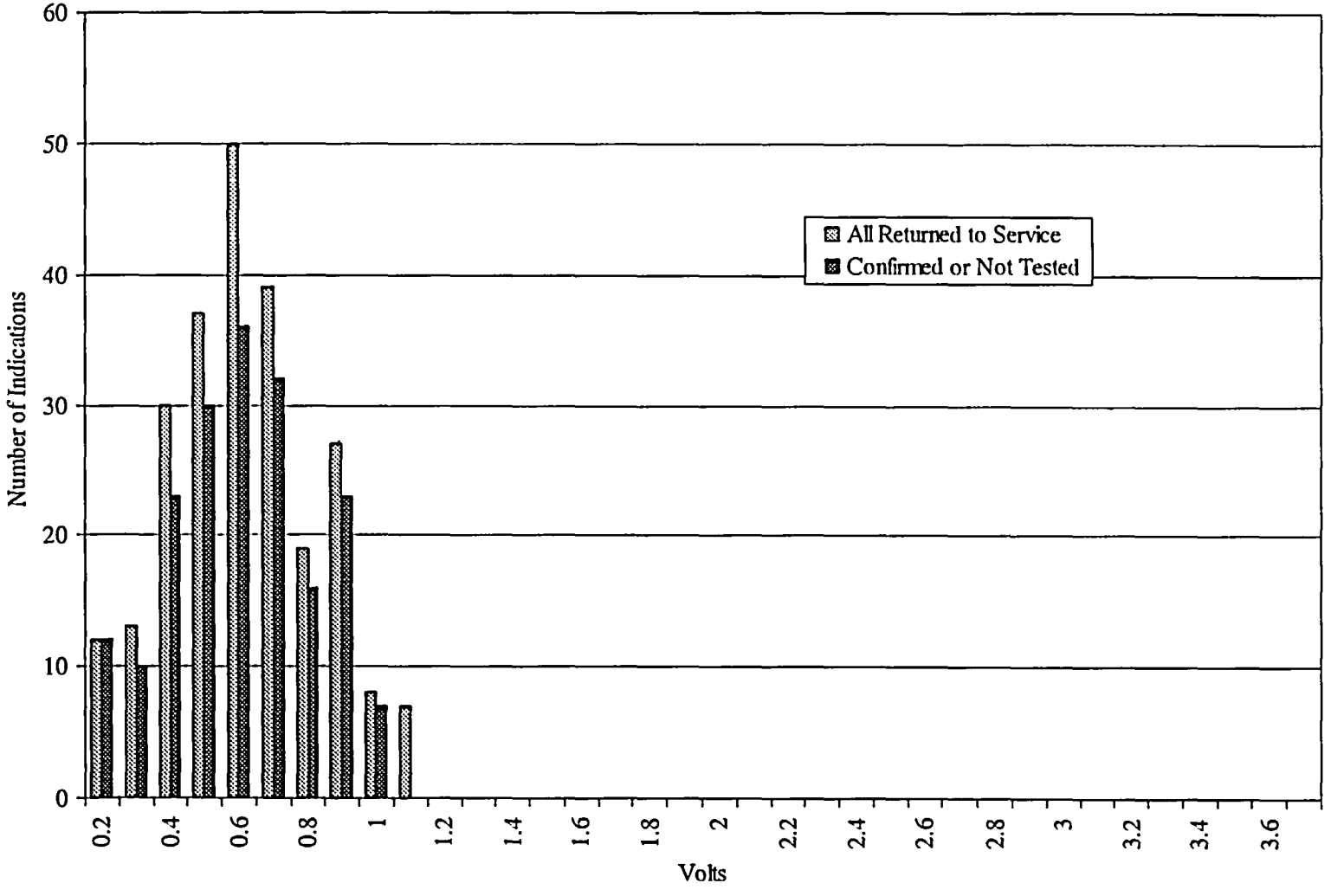

Figure 3-9: Watts Bar EOC-6 Indications Returned to Service, SG 1

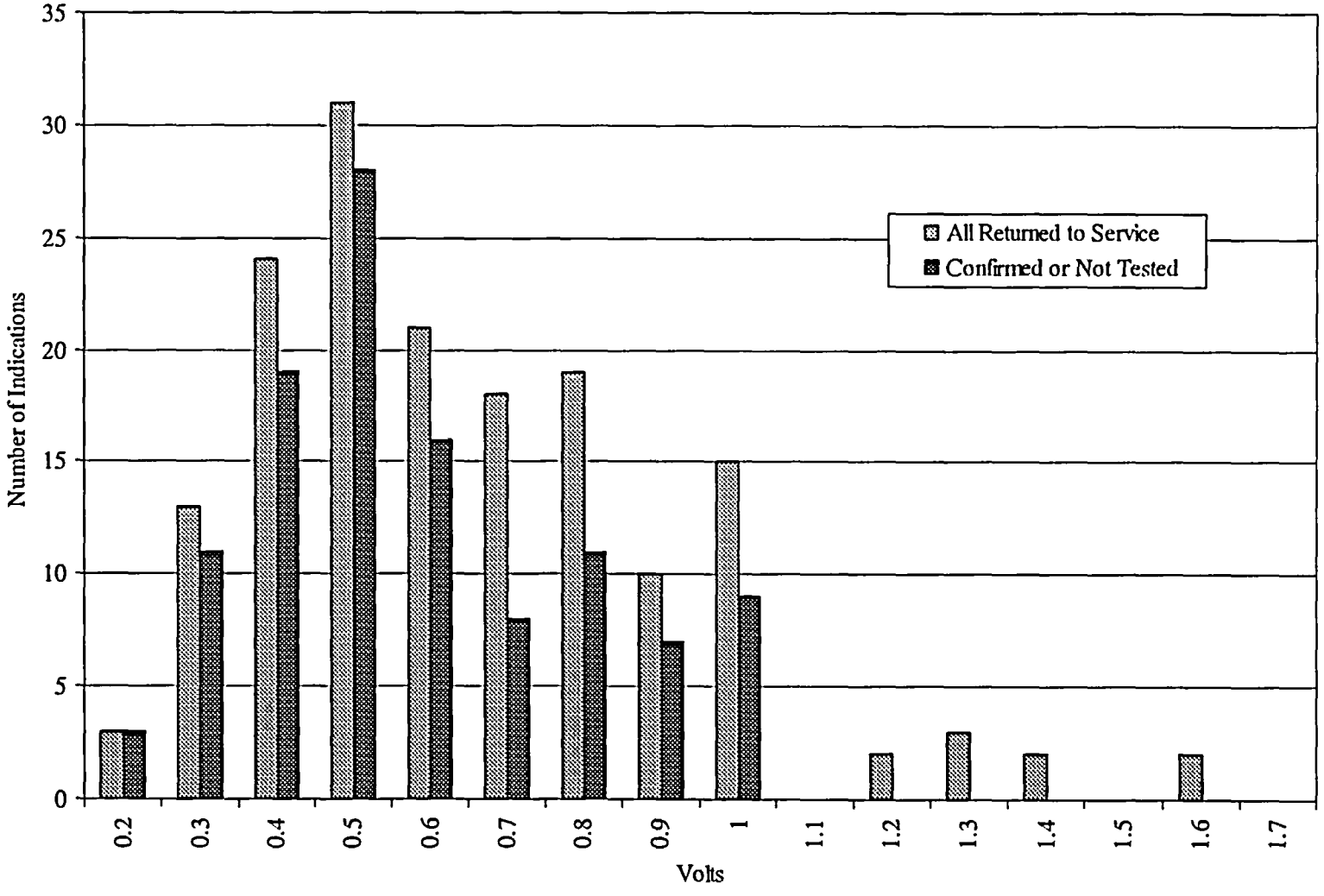

Figure 3-10: Watts Bar EOC-6 Indications Returned to Service, SG 2

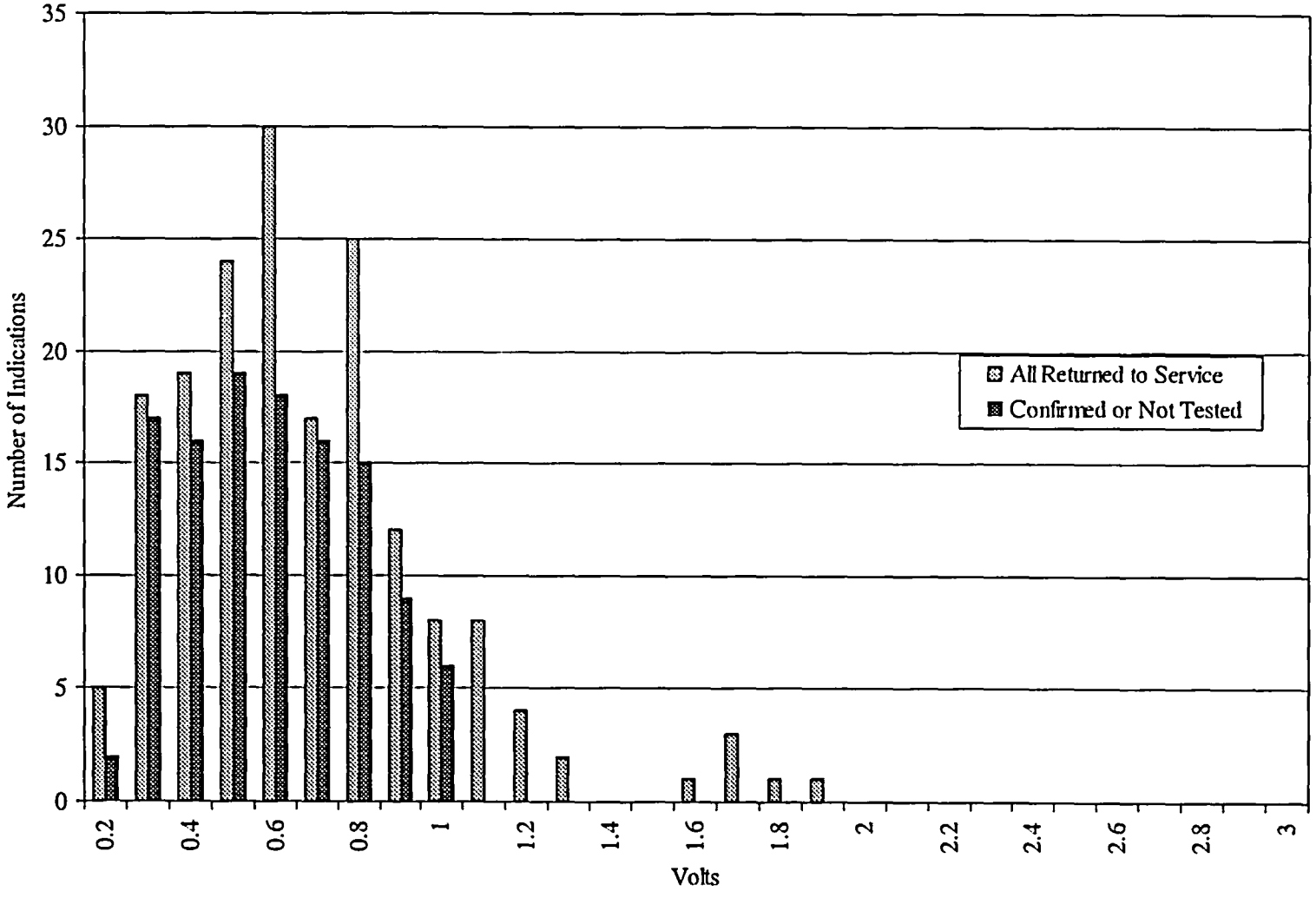

Figure 3-11: Watts Bar EOC-6 Indications Returned to Service, SG 3

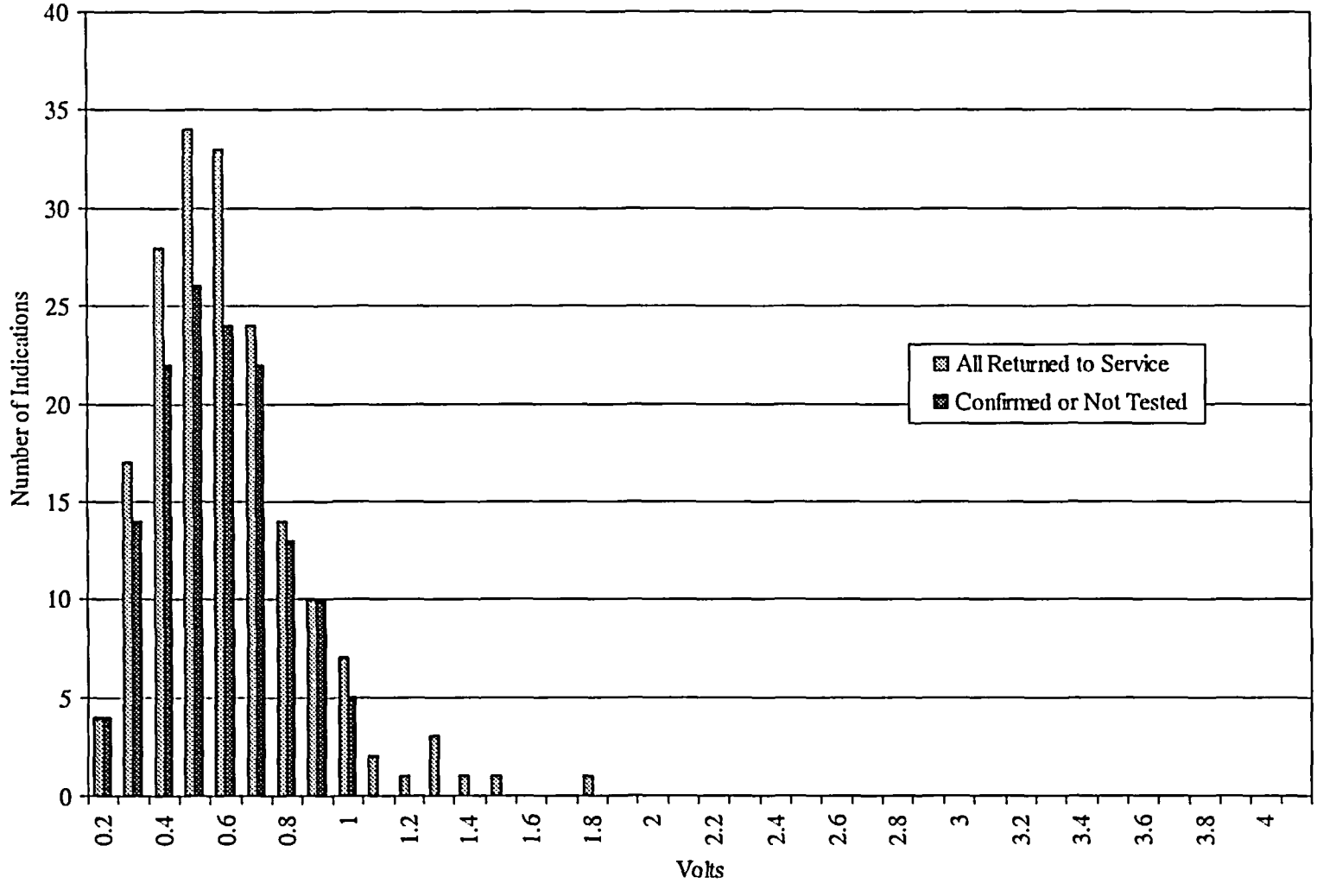

Figure 3-12: Watts Bar EOC-6 Indications Returned to Service, SG 4

3.2 VOLTAGE GROWTH RATES FOR CYCLE 6

Voltage growth was determined by the difference between the EOC-6 and EOC-5 voltages for each indication. The EOC-5 voltages were determined by historical reviews of the prior cycle data base and were established using the same techniques as used to analyze the EOC-6 data. The voltage change is for the 482 EFPD cycle length of Cycle 6. The voltage at EOC-5 is provided for indications detected at EOC-6 in Appendix A.

The procedure for computing the voltage change and binning the values is described in Reference 3. Negative voltage changes are included in the 0 change bin. For cases where an EOC-6 indication did not have a corresponding EOC-5 indication, that EOC-6 indication was not included in the growth rate determination. Voltage change distributions for each steam generator are included in Table 3-5 through Table 3-8. Since there were less than 200 voltage growth rate data points for all of the steam generators except for SG 1, a bounding EOC-6 specific growth rate distribution was used as defined in Table 3-9. A comparison of the steam generator specific growth rates and the EOC-6 bounding growth rate is shown in Figure 3-13 and the tail end is shown in detail in Figure 3-14.

Figure 3-15 presents a comparison of the bounding growth rates from Cycle 5 with that from Cycle 6. The data has been normalized to a 1 EFPY basis (365.25 EFPD). Figure 3-16 provides a detailed view of the tail of the curve. From these figures it is not clear which growth rate provides the more conservative results, thus separate analyses were performed using the Cycle 5 and Cycle 6 growth rates. The Operational Assessment results presented in Section 6.0 indicate that the Cycle 6 growth rate provides greater conservatism.

Figure 3-17 presents a plot of the voltage growth as a function of the BOC voltage. A regression line of the data is also included. The R^2 value for the regression (0.0365) indicates that growth is not dependent on BOC voltage.

Indications were found in five FDB intersections. These FDB indications are summarized in Table 3-10. Two of the FDB indications were left in service. The average growth rate in these FDB regions were slightly less than that seen in steam generators 1 and 2.

Table 3-5: Voltage Changes from EOC-5 to EOC-6, SG 1

SG 1		
Change in Volts	**Number of Indications**	**Cumulative Distribution**
0	116	0.35258
0.1	69	0.56231
0.2	43	0.69301
0.3	31	0.78723
0.4	26	0.86626
0.5	13	0.90578
0.6	11	0.93921
0.7	2	0.94529
0.8	5	0.96049
0.9		0.96049
1	2	0.96657
1.1	2	0.97264
1.2		0.97264
1.3	1	0.97568
1.4	1	0.97872
1.5	1	0.98176
1.7	1	0.9848
1.8	1	0.98784
1.9		0.98784
2	1	0.99088
2.5	2	0.99696
2.6		0.99696
2.9	1	1
3.3		1
5.7		1
Total	329	

Average change = growth / EOC-5 volts = 26%

Table 3-6: Voltage Changes from EOC-5 to EOC-6, SG 2

SG 2		
Change in Volts	**Number of Indications**	**Cumulative Distribution**
0	58	0.30526
0.1	43	0.53158
0.2	31	0.69474
0.3	20	0.8
0.4	17	0.88947
0.5	7	0.92632
0.6	2	0.93684
0.7	6	0.96842
0.8	1	0.97368
0.9	1	0.97895
1	2	0.98947
1.1		0.98947
1.2		0.98947
1.3		0.98947
1.4		0.98947
1.5		0.98947
1.7		0.98947
1.8		0.98947
1.9		0.98947
2		0.98947
2.5		0.98947
2.6		0.98947
2.9	1	0.99474
3.3		0.99474
5.7	1	1
Total	190	

Average change = growth / EOC-5 volts = 27%

Table 3-7: Voltage Changes from EOC-5 to EOC-6, SG 3

SG 3		
Change in Volts	**Number of Indications**	**Cumulative Distribution**
0	82	0.41837
0.1	35	0.59694
0.2	29	0.7449
0.3	22	0.85714
0.4	11	0.91327
0.5	7	0.94898
0.6	3	0.96429
0.7		0.96429
0.8	3	0.97959
0.9		0.97959
1		0.97959
1.1		0.97959
1.2		0.97959
1.3		0.97959
1.4	1	0.98469
1.5		0.98469
1.7	1	0.9898
1.8		0.9898
1.9	1	0.9949
2		0.9949
2.5		0.9949
2.6	1	1
2.9		1
3.3		1
5.7		1
Total	196	

Average change = growth / EOC-5 volts = 14%

Table 3-8: Voltage Changes from EOC-5 to EOC-6, SG 4

SG 4		
Change in Volts	**Number of Indications**	**Cumulative Distribution**
0	95	0.43981
0.1	47	0.65741
0.2	27	0.78241
0.3	18	0.86574
0.4	10	0.91204
0.5	5	0.93519
0.6	6	0.96296
0.7	3	0.97685
0.8	1	0.98148
0.9		0.98148
1	1	0.98611
1.1		0.98611
1.2	1	0.99074
1.3		0.99074
1.4		0.99074
1.5		0.99074
1.7		0.99074
1.8		0.99074
1.9	1	0.99537
2		0.99537
2.5		0.99537
2.6		0.99537
2.9		0.99537
3.3	1	1
5.7		1
Total	216	

Average change = growth / EOC-5 volts = 9%

Table 3-9: Voltage Changes from EOC-5 to EOC-6, Bound of All SGs

Change in Volts	Bounding Cumulative Distribution
0	0.30526
0.1	0.53158
0.2	0.69301
0.3	0.78723
0.4	0.86626
0.5	0.90578
0.6	0.93684
0.7	0.94529
0.8	0.96049
0.9	0.96049
1	0.96657
1.1	0.97264
1.2	0.97264
1.3	0.97568
1.4	0.97872
1.5	0.98176
1.7	0.9848
1.8	0.98784
1.9	0.98784
2	0.98947
2.5	0.98947
2.6	0.98947
2.9	0.99474
3.3	0.99474
5.7	1

Table 3-10: Indications at FDBs

SG	Row	Column	Support	Plugged	EOC6 Volts	EOC5 Volts	Change in Volts
1	8	75	H01	Yes	0.31	0.19	0.12
2	18	79	H01	Yes	0.46	0.29	0.17
2	27	85	H01		0.38	0.19	0.19
2	38	77	H01	Yes	0.27	0.22	0.05
3	14	86	H01		0.55	0.69	-0.14

Average change = growth / EOC-5 volts = 25%

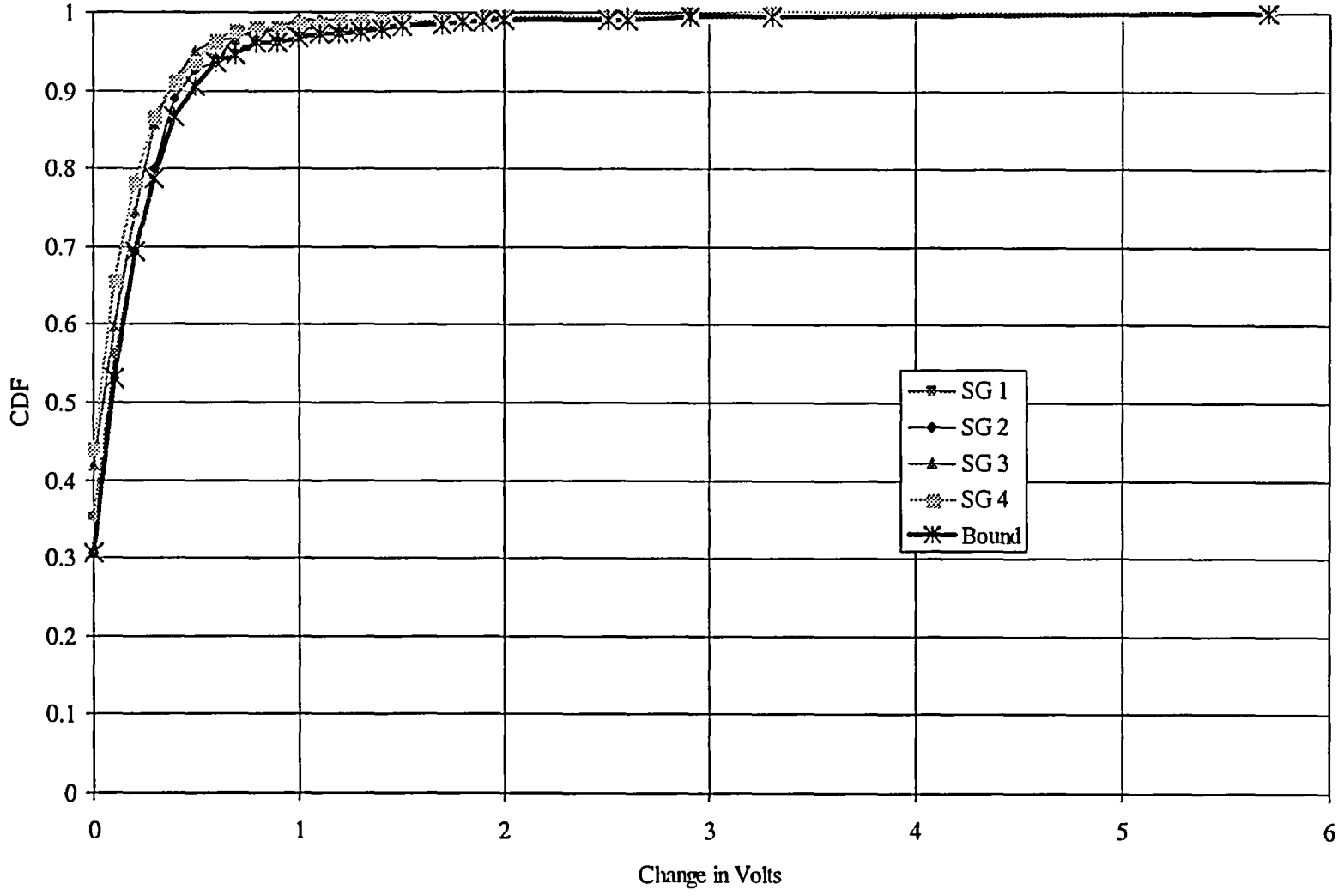

Figure 3-13: Watts Bar Voltage Growth per Cycle 6

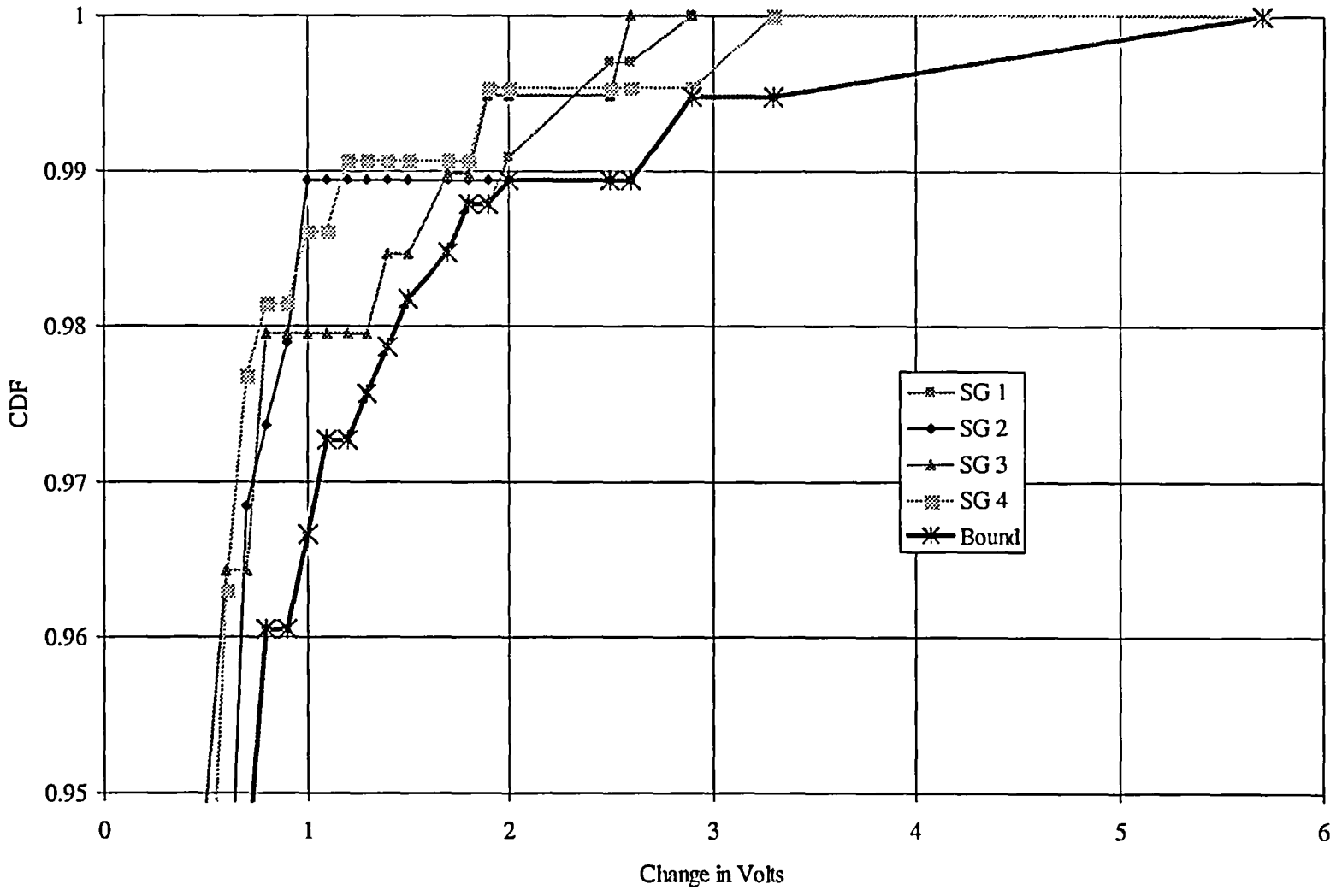

Figure 3-14: Watts Bar Voltage Growth Detail

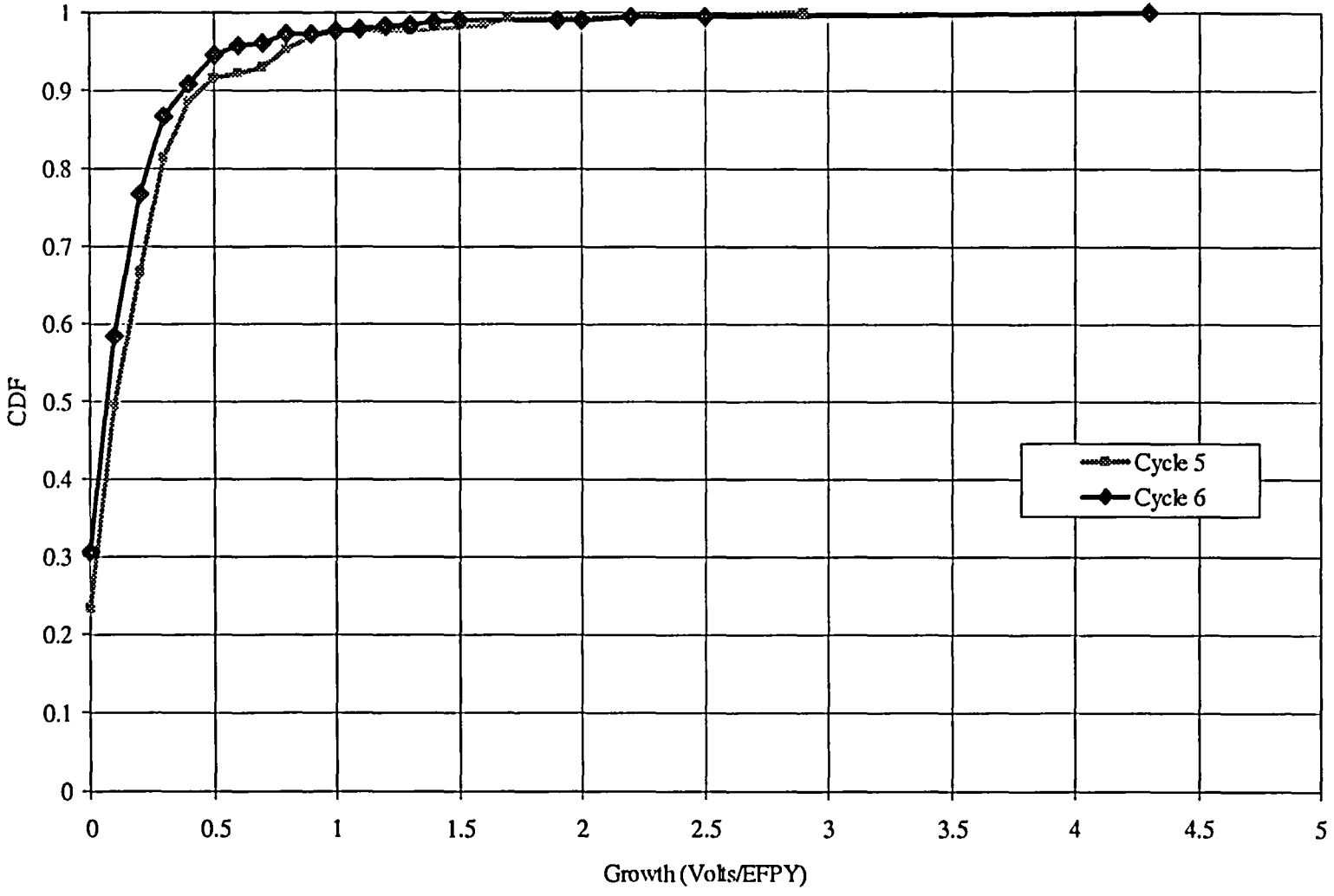

Figure 3-15: Cycle 5 and Cycle 6 Bounding Growth Rates, per EFPY

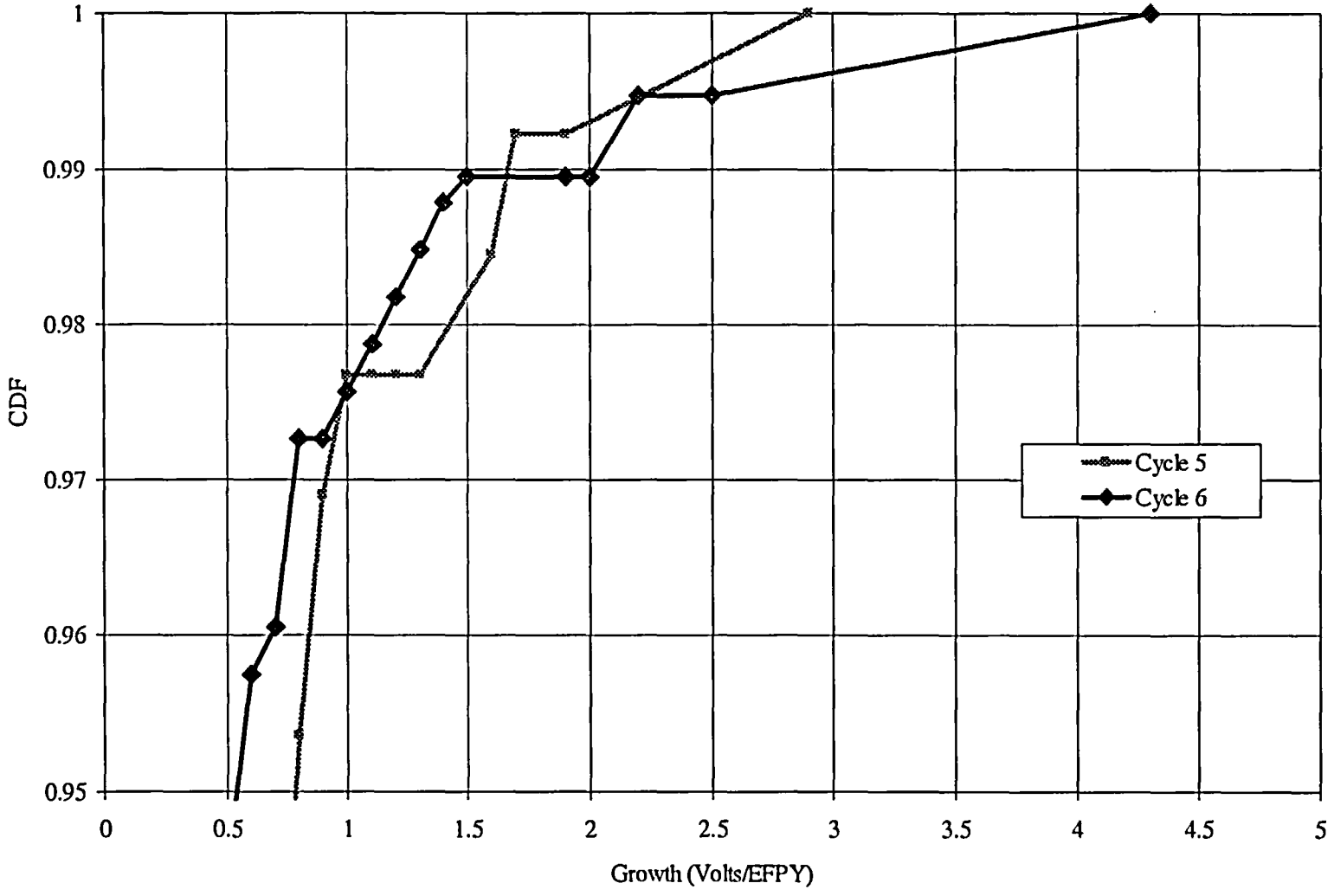

Figure 3-16: Cycle 5 and Cycle 6 Bounding Growth Rates, per EFPY, Detail View

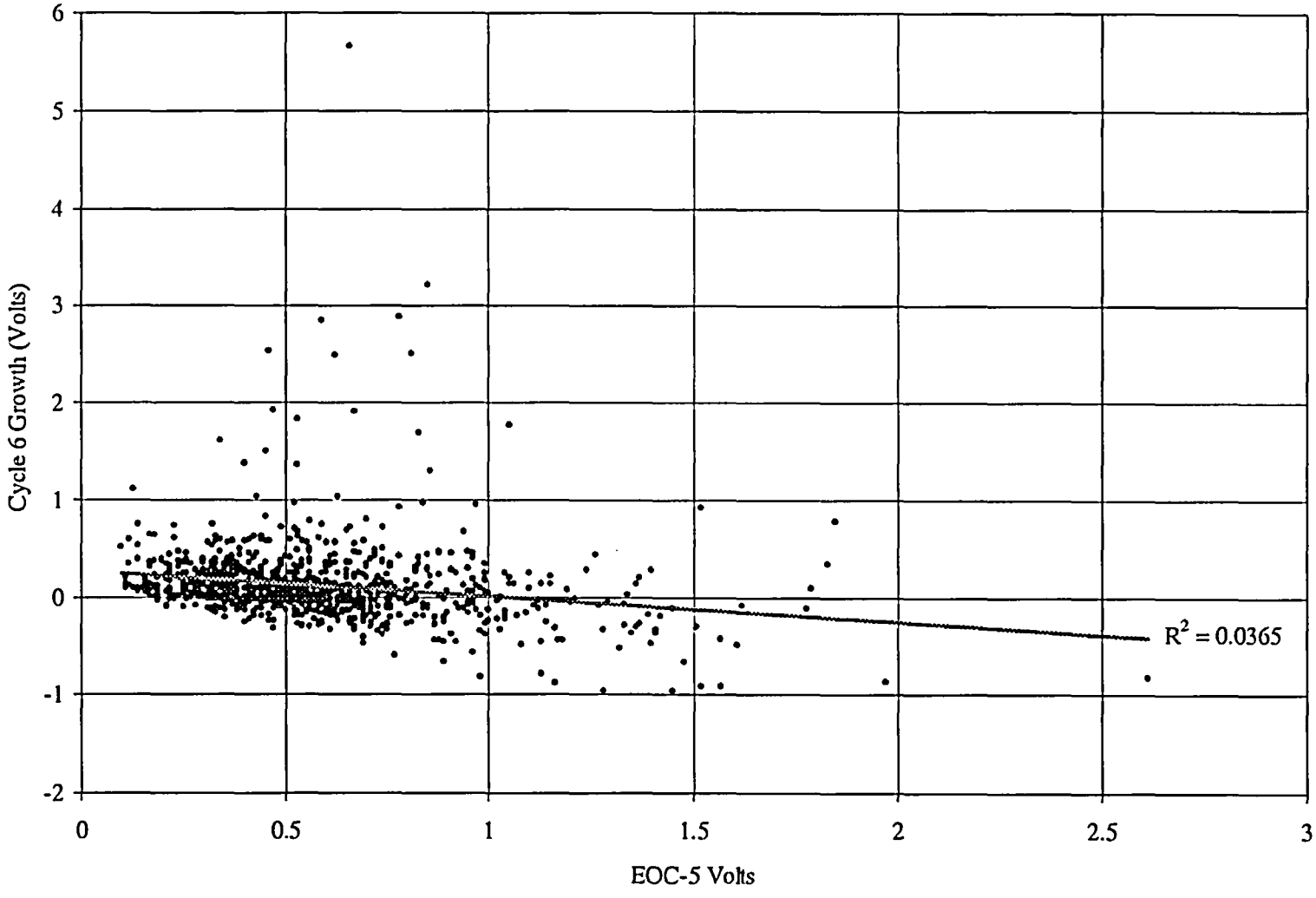

Figure 3-17: Growth as a Function of BOC Voltage

4.0 ANALYSIS METHODS AND DATA BASE FOR ARC CORRELATIONS

A Monte Carlo based computer program was used to perform the calculations prescribed in GL 95-05 (Reference 1). The methodology for predicting the EOC voltage distribution and computing the probability of burst and leakage at accident conditions is based on the Westinghouse Topical Report, WCAP-14277, Revision 1 (Reference 3) supplemented by recent changes in the leakage computation process, discussed in Reference 9 as amended in Reference 10. The EOC voltage distribution, probability of burst and the leakage are computed using the Cyclesim3.1 program, Reference 11.

The predictions for EOC-6 recorded in Reference 5 used the tube burst and leakage correlations of Addendum 5 to EPRI Report NP-7480-L modified according to References 9 and 10. Both the condition monitoring assessment for EOC-6 and the operational assessment predicting the EOC-7 voltage distribution are performed using the Addendum 6 database (Reference 6). Since Watts Bar Unit 1 can take credit for PORV actuation, the condition monitoring and operational assessments are performed using the leakage correlation for 2405 psi (Reference 2). The specific parameters used in the correlations are provided in Sections 4.1 through 4.4.

4.1 TUBE MATERIAL PROPERTIES

The tube material properties are provided in Reference 3 (Table 4-1) for 3/4-inch diameter tubes at 650°F. The parameters used in the analysis are the flow stress mean of 71.565 ksi and the flow stress standard deviation of 3.567 ksi.

4.2 BURST CORRELATION

The burst pressure, P_b, is normalized to a material with a flow stress of 71.565 ksi, which is the mean of the 3/4-inch tube data appropriate for Watts Bar Unit 1. The correlation parameters are taken from Reference 6.

Table 4-1: Burst Correlation

$P_b = a_0 + a_1$ Log(Volts)		
Parameter	**Addendum 5 Database**	**Addendum 6 Database**
Intercept, a_0	7.4605	7.4403
Slope, a_1	-2.9572	-2.9679
Standard error	0.9009	0.9101
Mean of log(V)	0.3994	0.4018
SS log(V)	37.2648	37.3292
Number data points	98	100
Structural Limit (2405 psi)	5.67 V	5.65 V

4.3 LEAK RATE CORRELATION

The leak rate correlation as a function of indication voltage is taken from Reference 6. The steam line break pressure is given as 2355 psi in Reference 2. Therefore the leak correlation for pressure of 2405 psi from Reference 6 is used for the leakage predictions.

The leak rate criterion is given in terms of gallons per minute condensed at room temperature.

Table 4-2: Leak Rate Correlation

Log(Q) = $b_3 + b_4$ Log(Volts)		
Parameter	**Addendum 5 Database**	**Addendum 6 Database**
b_3	-1.8708	-1.7849
b_4	2.9767	2.8990
Standard error	0.5979	0.5904
Mean log(V)	0.9210	0.9051
SS log(V)	3.1348	3.4733
Number data pairs	48	50

4.4 PROBABILITY OF LEAK CORRELATION

The probability of leak as a function of indication voltage is taken from Reference 6. In the Monte Carlo analysis leakage is quantified only if the indication is computed to be a leaker, based on the probability of leak correlation.

Table 4-3: Probability of Leak Correlation

$Pr(Leak) = 1/\{1+ \exp[-b_1 - b_2 Log(Volts)]\}$		
Parameter	**Addendum 5 Database**	**Addendum 6 Database**
Logistic intercept, b_1	-4.8270	-4.4637
Logistic slope, b_2	8.4488	8.0947
Intercept Variance, V_{11}	1.1623	0.9392
Covariance, V_{12}	-1.7094	-1.4115
Slope of Variance, V_{22}	2.8755	2.4739
Number of Data	125	127

4.5 NDE UNCERTAINTIES

The NDE uncertainties applied for the EOC-6 and EOC-7 voltage projections are the same as used in the previous 90-day report, Reference 5, and described in Reference 3. The probe wear uncertainty has a standard deviation of 7% about a mean of zero and has a cutoff at 15% based on implementation of the probe wear standard. The analyst variability uncertainty has a standard deviation of 10.3% about a mean of zero with no cutoff. These NDE uncertainty distributions are used in the Monte Carlo analysis to predict the burst probabilities and accident leak rates at EOC-6, and EOC-7. The voltages reported were adjusted to account for differences between the laboratory standard and the standard used in the field.

4.6 UPPER VOLTAGE REPAIR LIMIT

The upper voltage repair limit is based on the structural limit in Table 4-1 of 5.65 volts for accident pressure of 2405 psi. It must be reduced by considering the projected voltage growth during the next cycle and NDE uncertainty. The maximum average percentage growth rate for any steam generator is seen from Table 3-6 (SG 2) to be 27% per 482 day Cycle 6. According to Reference 1, the minimum growth adjustment is 30% per EFPY (42.5% per cycle for the anticipated 518 EFPD Cycle 7). Therefore the specific maximum value of 42.5% x (518/482) = 46% and 20% for NDE uncertainty will be used to estimate the voltage repair limit. This results in an upper voltage repair limit of 5.65 / (1 + 0.46 + 0.20) = 3.40 volts. No indications equal to or greater than this voltage were left in service.

The limiting free span burst pressure is three times NODP. Reference 2 notes an RCS pressure of 2235 psig and steam pressure of 934 psig, making 3NODP=3903 psi. The upper voltage repair limit for FDB intersections is based on the structural limit from Figure 6-2 of Reference 6 of 3.29 volts for a free span burst pressure of 3903 psi. It must be reduced by considering the projected voltage growth during the next cycle and NDE uncertainty. The average percentage growth rate for the FDBs, from Table 3-10, is 25% during the 482 day Cycle 6. According to Reference 1, the minimum growth adjustment is 30% per EFPY (42.5% per cycle for the anticipated 518 EFPD Cycle 7). Therefore the specific maximum value of 42.5% x (518/482) = 46% and 20% for NDE uncertainty will be used to estimate the voltage repair limit. This results in an upper voltage repair limit of 3.29 / (1 + 0.46 + 0.20) = 1.98 volts. No FDB indications equal to or greater than this voltage were left in service.

4.7 PROBE WEAR

An alternate probe wear criteria approved by the NRC (Reference 8) was applied during the EOC-6 inspection. When a probe does not pass the 15% wear limit, this alternate criteria requires that only tubes with indications above 75% of the repair limit inspected since the last successful probe wear check be reinspected with a good probe. As the repair limit for Watts Bar is 1 volt, all tubes containing indications for which the worn probe voltage is above 0.75 volts are to be inspected with a new probe. A total of 55 indications with a bobbin voltage above 0.75 volts were found in the calibration groups that failed probe wear check (these indications were called as "RPW"), and the tubes containing those indications were reinspected with a new probe. Figure 4-1 shows the worn probe voltages plotted against the new probe voltages for all four SGs. Seven indications had their voltage increase above the repair limit when reinspected with a good probe.

Figure 4-2 shows the voltage measured by the retest of indications that were less than 0.75 volts measured by the worn probe. This figure shows that none of the indications measured to be less than 0.75 volts by the worn probe measured over the repair criterion of 1.0 volts on the retest, i.e., no pluggable tubes were missed due to probe wear considerations. This observation supports the criterion that says that these indications did not need retesting.

The indications found in the current inspection that were tested with a worn probe in the previous (2003) inspection were identified. Of the 223 indications found in the current inspection that were tested with a worn probe in the previous inspection, 32 were 1 volt or greater. The ratio of indications greater than 1 volt to the total number of indications in the current inspection is 149 to 940 which is essentially the same ratio, indicating that there is no significant effect of probe wear on the population of indications.

As required by Reference 8, the number of new indications detected in the present inspection in tubes that were inspected with a worn probe in the last inspection was also determined. Out of a total of 377 new indications reported in the current inspection, 106 were in tubes inspected with a worn probe during the last inspection. During a recent review of the data from the last inspection, an analyst was able to assign a voltage to 104 of these 106 indications, which indicates that tubes inspected with worn probes during the last inspection do not contain a

disproportionately larger number of new indications. Thus, the requirements specified in Reference 8 for applying the alternate probe wear criteria are met.

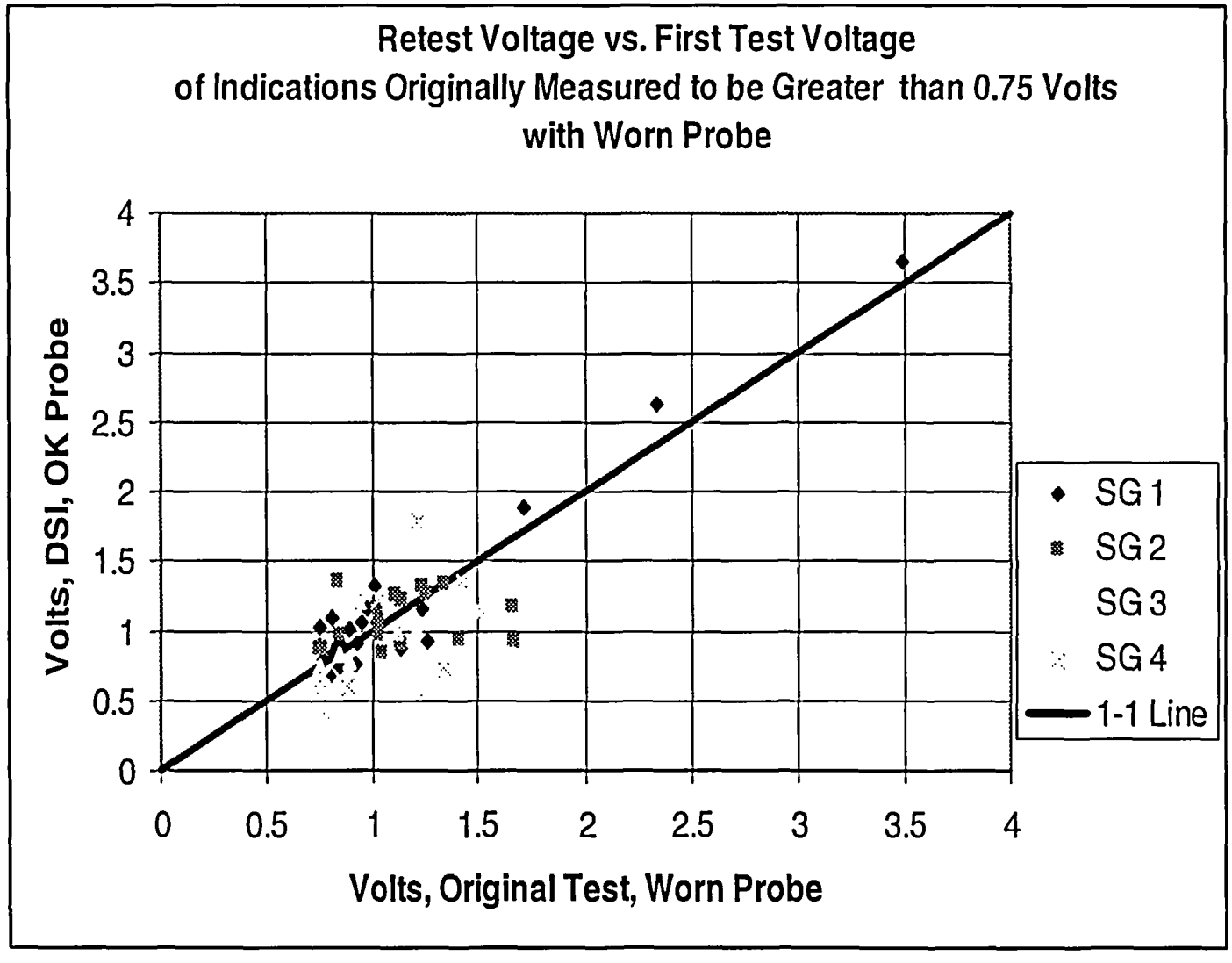

Figure 4-1: Retest Voltage vs. First Test Voltage of Indications Originally Measured to be Greater than 0.75 Volts with Worn Probe

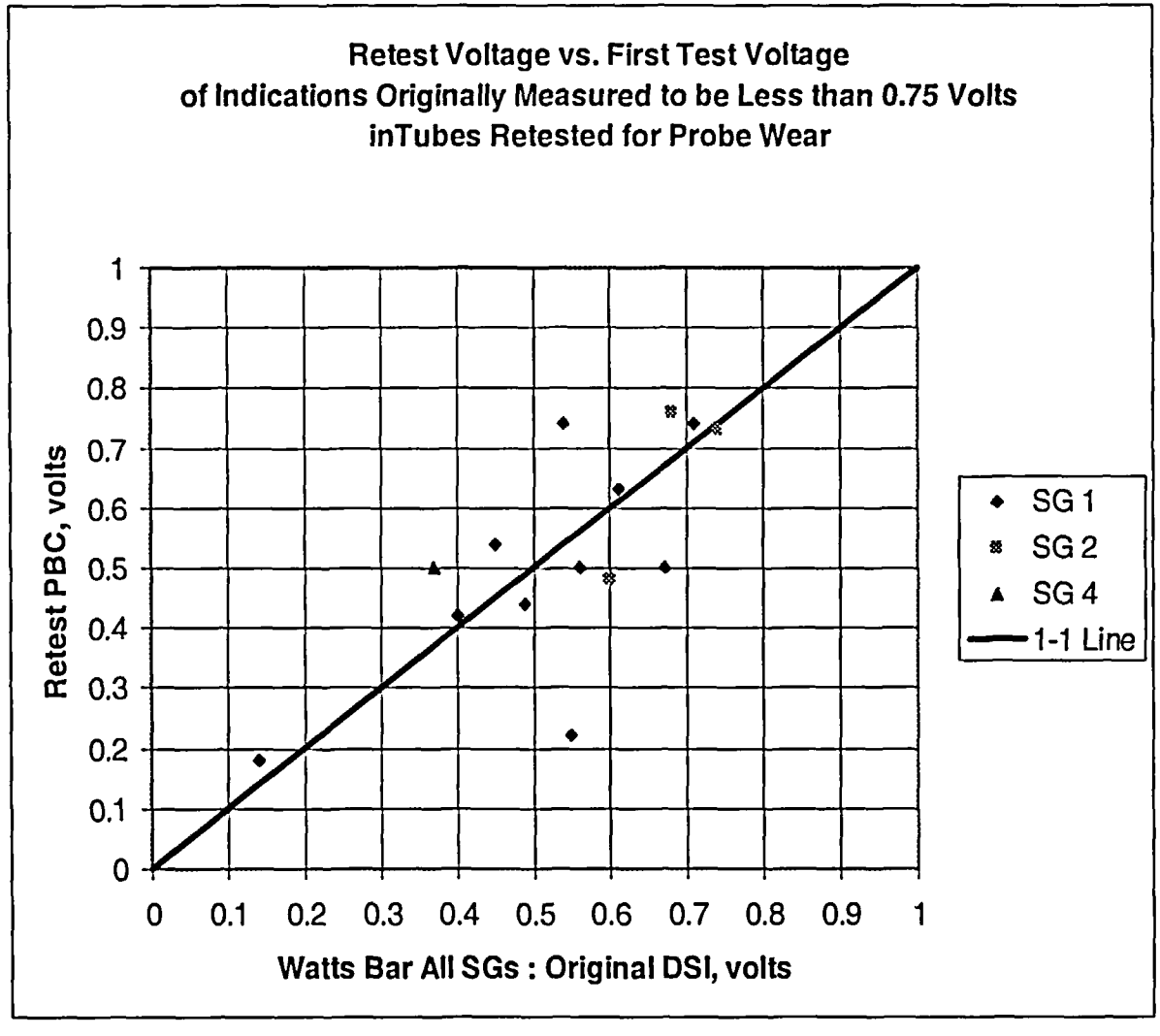

Figure 4-2: Retest Voltage vs. First Test Voltage of Indications Originally Measured to be Less than 0.75 Volts in Tubes Retested for Probe Wear

5.0 CONDITION MONITORING: TUBE LEAK RATE AND BURST PROBABILITIES AT EOC-6

5.1 ANALYSIS APPROACH

The measured EOC-6 voltage distributions of Table 3-1 through Table 3-4 for each steam generator are used as the basis for the leak rate and burst probability predictions for EOC-6. The voltage distributions developed for the computation of POB and leakage consider NDE uncertainty on the measured values, but consider no voltage growth. The resulting voltage distributions used for computation of the probability of burst and leakage are given in Figure 5-1 through Figure 5-4.

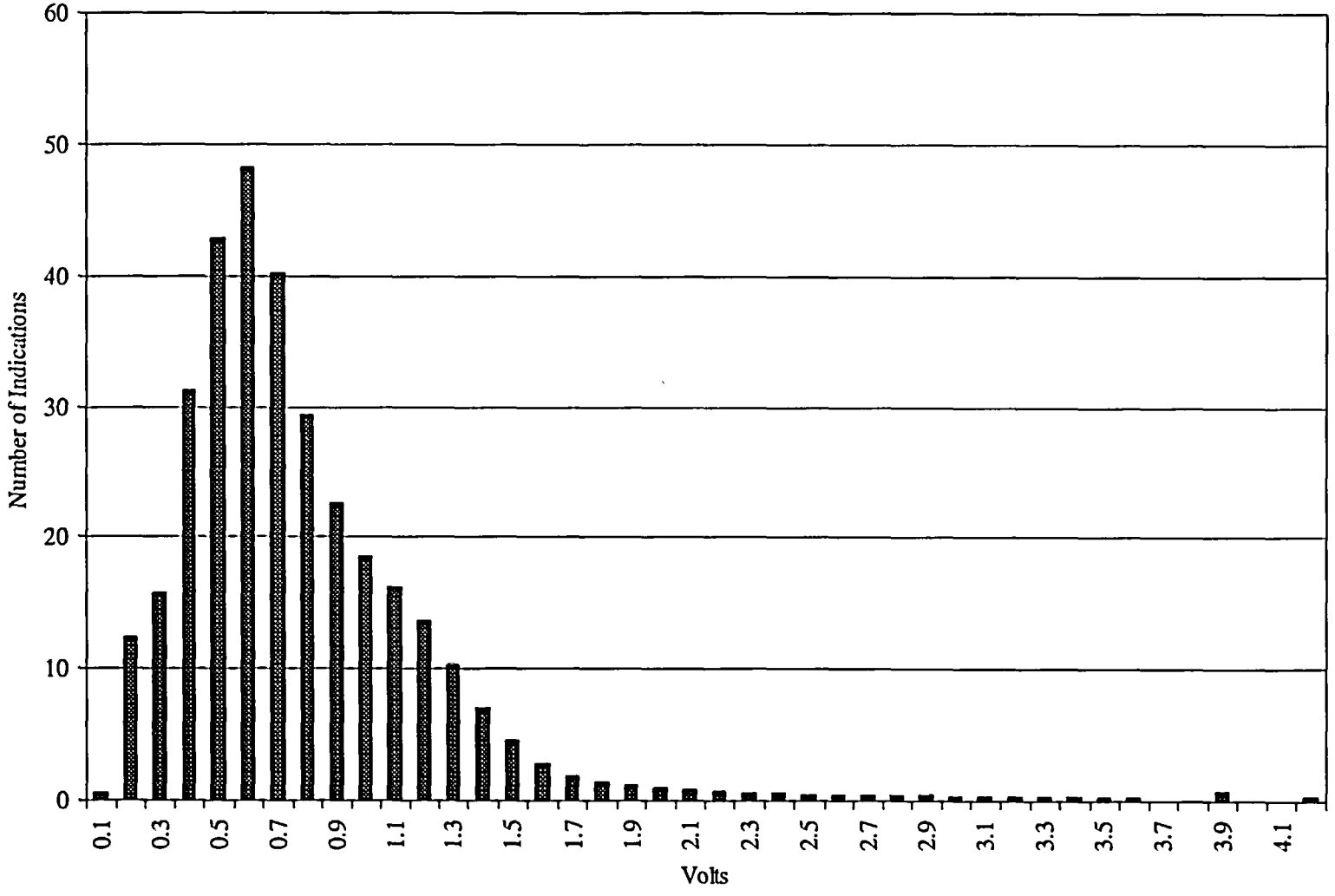

Figure 5-1: Voltage Distribution with NDE Uncertainty, SG 1

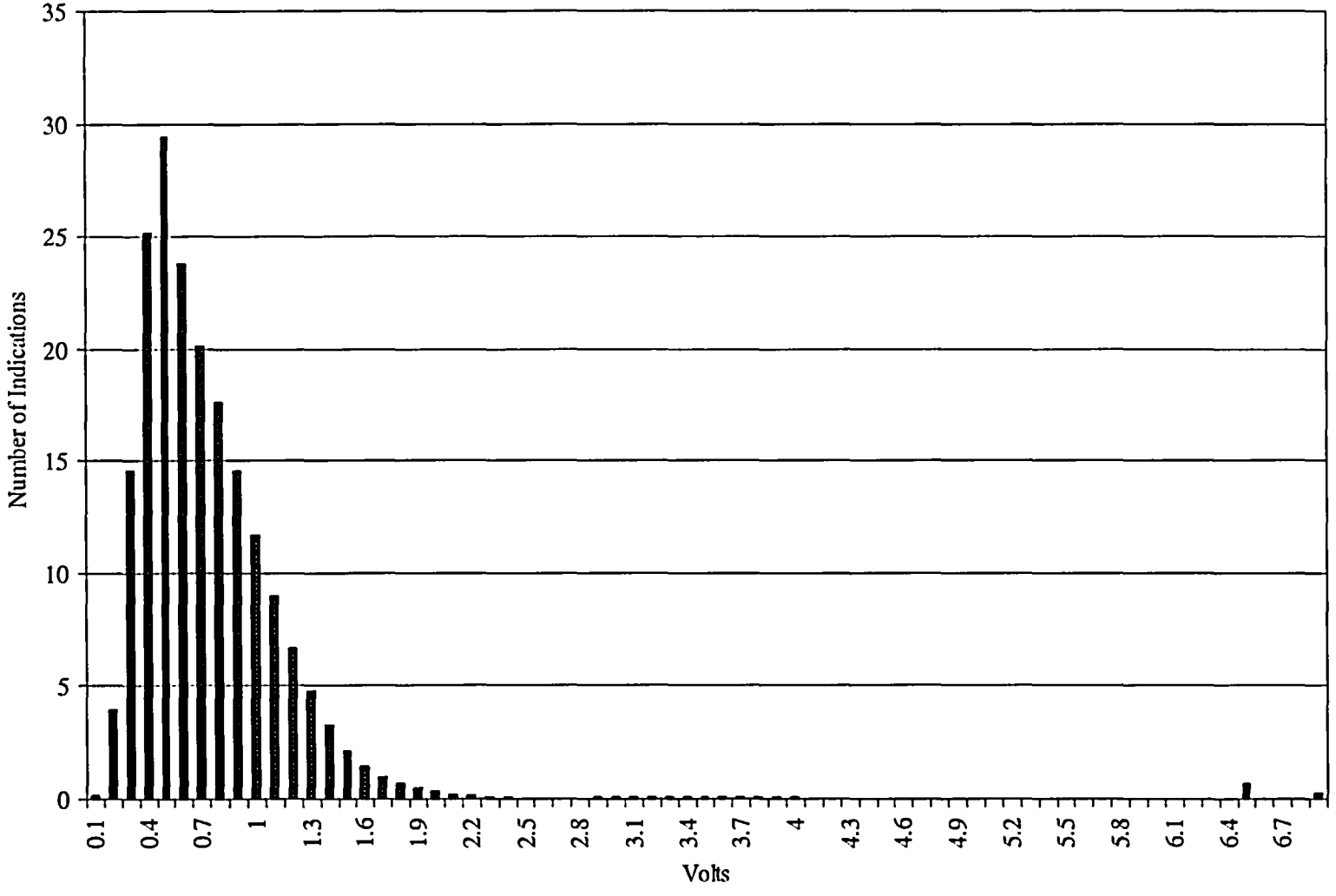

Figure 5-2: Voltage Distribution with NDE Uncertainty, SG 2

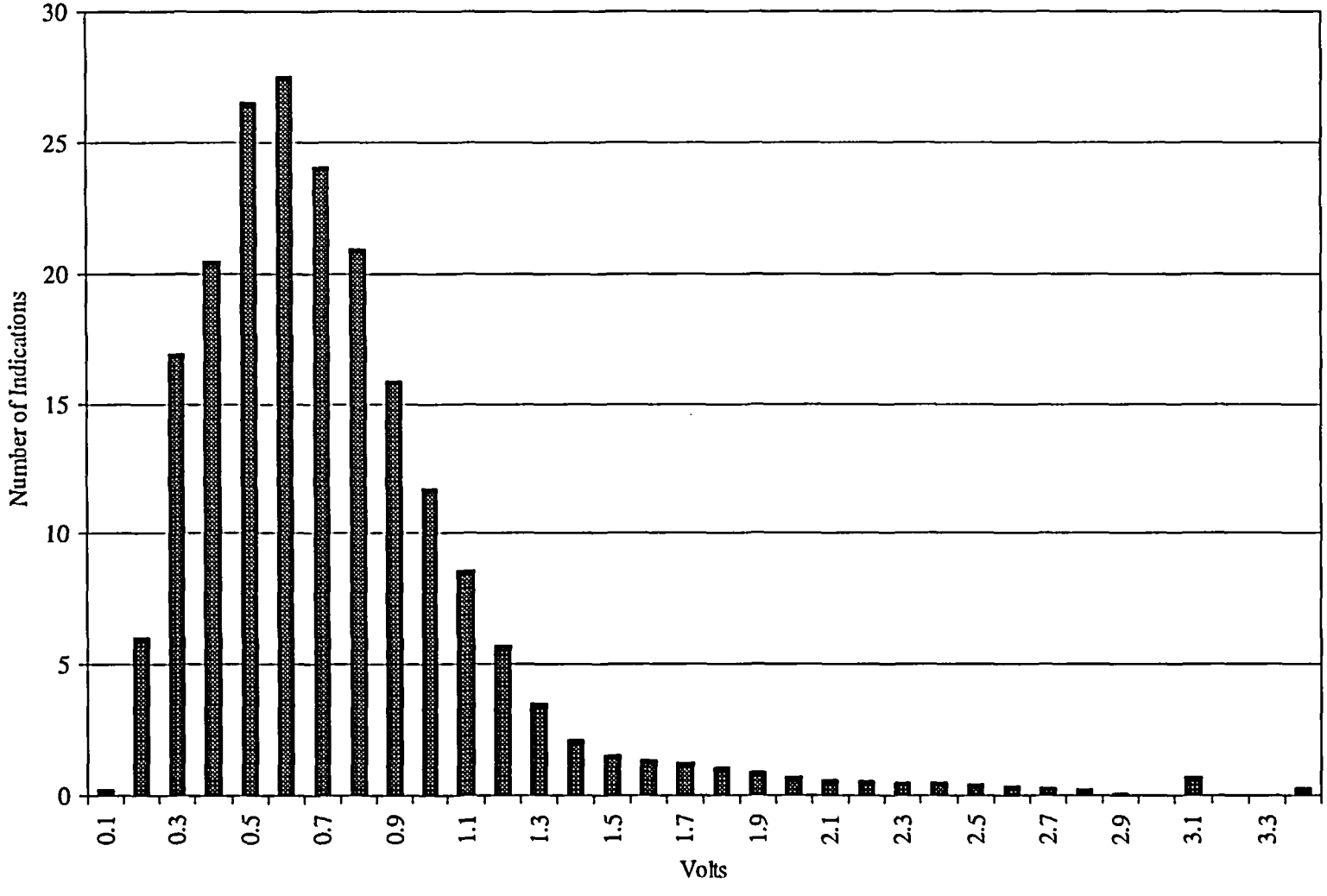

Figure 5-3: Voltage Distribution with NDE Uncertainty, SG 3

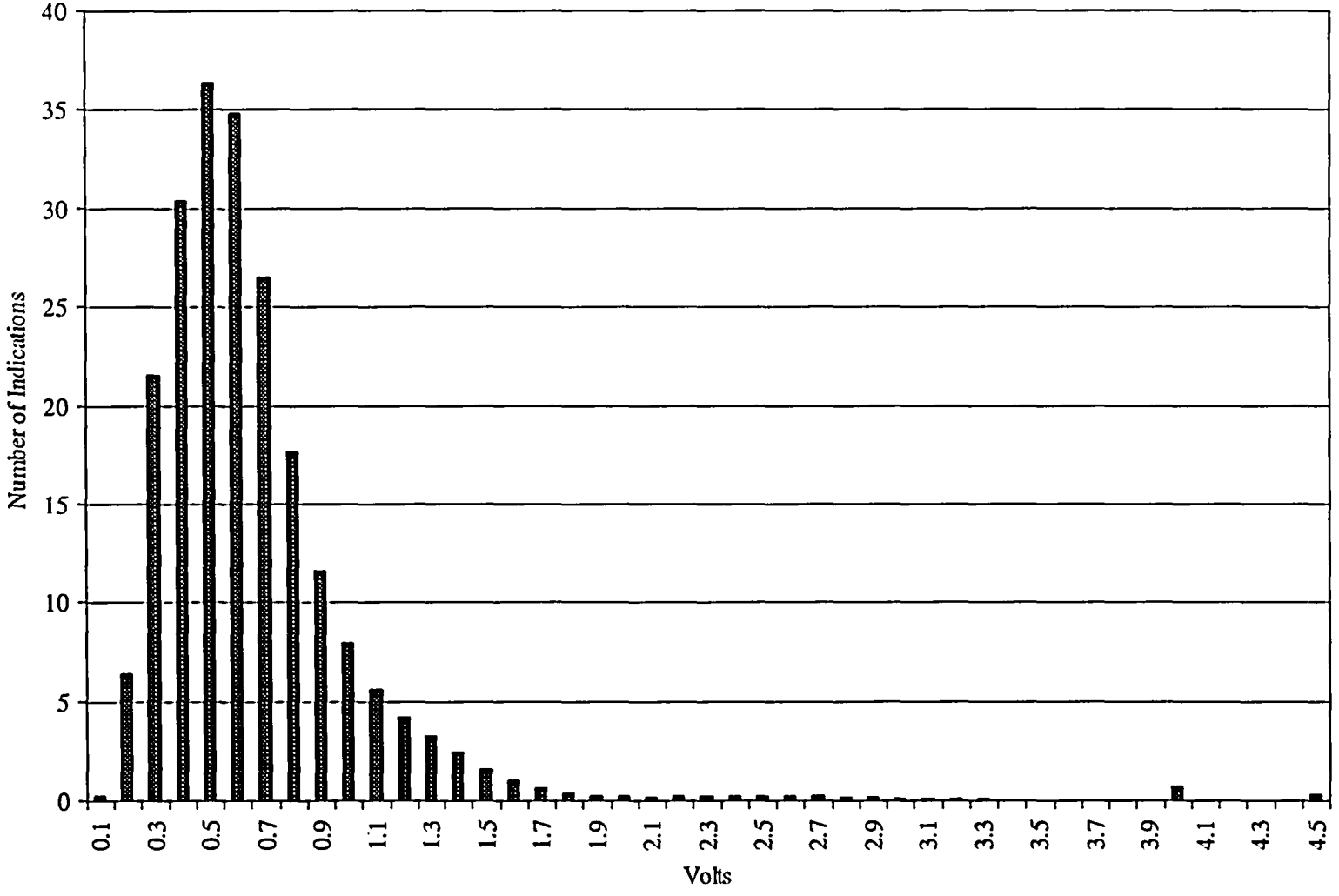

Figure 5-4: Voltage Distribution with NDE Uncertainty, SG 4

5.2 EOC-6 BURST PROBABILITIES AND LEAK RATES

The Monte Carlo analysis results for each of the steam generators based on the measured voltage distribution at EOC-6 are shown in Table 5-1. The analysis program inputs and outputs are detailed in Reference 7. One-million Monte Carlo trials were performed for each steam generator. The leakage rate is the 95th percentile evaluated at 95% confidence. The burst probability is 95% confidence based on the number of trials.

Table 5-2 presents the predicted results from Reference 5. Since the Reference 5 analysis used Addendum 5 parameters, Table 5-1 includes the results using the Addendum 5 parameters as well.

Table 5-1: Analysis Results for EOC-6 Voltage Distributions with NDE Uncertainty

SG	Number of Monte Carlo Trials	Number of Indications	Maximum Volts Measured	Using Parameters from Addendum	Burst Probability 95% conf.	95/95 SLB Leak Rate, gpm
1	1,000,000	330	3.66	5	5.21×10^{-4}	0.0521
				6	7.48×10^{-4}	0.0593
2	1,000,000	193	6.32	5	2.54×10^{-3}	0.175
				6	3.03×10^{-3}	0.180
3	1,000,000	201	2.99	5	1.92×10^{-4}	0.0168
				6	2.62×10^{-4}	0.0203
4	1,000,000	216	4.06	5	3.86×10^{-4}	0.0371
				6	4.78×10^{-4}	0.0410

Table 5-2: Predicted Results

SG	Number of Monte Carlo Trials	Number of Indications	Maximum Volts Predicted	Using Parameters from Addendum	Burst Probability 95% conf.	95/95 SLB Leak Rate, gpm
1	250,000	380.7	5.3	5	2.34×10^{-3}	0.175
2	250,000	200	5.4	5	1.98×10^{-3}	0.143
3	250,000	218.7	5.2	5	1.63×10^{-3}	0.124
4	250,000	212	5.0	5	1.10×10^{-3}	0.099

5.3 COMPARISON WITH ACCEPTANCE CRITERIA AND PREDICTION

All steam generators are well below the burst acceptance criterion of 1.0×10^{-2}, and the Watts Bar Unit 1 leakage criterion of 3 gpm per steam generator (Reference 12). The acceptance criteria on POB and leakage are satisfied with significant margin.

The predicted values of the probability of burst and leakage were conservative because they were based on a very conservative industry voltage growth rate in Reference 5. The use of Addendum 6 parameters instead of Addendum 5 parameters had a minor influence on the results. The number of indications was closely predicted. The identification of a 6.32 volt indication at the H03 support of tube R5C101 in SG 2 contributed significantly to the under prediction of leak rate and burst probability in SG 2.

6.0 OPERATIONAL ASSESSMENT: TUBE LEAK RATE AND BURST PROBABILITIES AT EOC-7

6.1 ANALYSIS APPROACH

The BOC-7 voltage distributions are developed, within the Cyclesim3.1 program, from the measured EOC-6 distribution by considering the POD and the indications that are removed from service. The EOC-7 voltage distribution is developed considering the NDE uncertainties and voltage growth during the cycle. The latest burst and leakage correlations, Reference 6, are used for the EOC-7 predictions. The burst probabilities and leak rates are computed using the computed EOC-7 voltage predictions to address the acceptance criteria at the end of the cycle.

6.2 POD

The POD used is the NRC accepted value of 0.6 for all voltages (Reference 1). The beginning of Cycle 7 (BOC-7) voltage distributions are shown in Table 6-1.

Table 6-1: BOC-7 Voltage Distributions

	BOC-7 Voltage Distributions			
Volts	SG 1	SG 2	SG 3	SG 4
0.1	0	0	0	0
0.2	20.67	5	8.33	7.33
0.3	21.67	22.33	30	31.67
0.4	51.33	40.67	31.67	48
0.5	65	53.67	42	59.33
0.6	86	35.67	51.33	58.33
0.7	69.67	30.67	29.67	42.67
0.8	32.33	33	43.67	24.67
0.9	47.67	17.33	20.67	17.33
1	14	25.67	14.67	11.67
1.1	19.67	4	16	6
1.2	13.33	7.33	6.67	2.33
1.3	4.67	5.67	4	6.33
1.4	4.67	4.67	0.67	2.33
1.5	2.67	0	0	2.33
1.6	0.67	3.33	1.67	0
1.7	0.67	0.67	5	0
1.8	0	0	1.67	1.67
1.9	1.33	0.67	1.67	0
2	1.33	0	0	0
2.1	0	0	0	0
2.2	0.67	0	0.67	0

Table 6-1: BOC-7 Voltage Distributions

	BOC-7 Voltage Distributions			
Volts	SG 1	SG 2	SG 3	SG 4
2.3	0	0	0	0
2.4	0.67	0	0.67	0.67
2.5	0	0	0.67	0
2.6	0.67	0	0	0.67
2.7	0	0	0	0
2.8	0.67	0	0	0
2.9	0	0	0	0
3	0	0	0.67	0
3.1	0.67	0	0	0
3.2	0	0	0	0
3.3	0.67	0	0	0
3.4	0	0.67	0	0
3.5	0	0	0	0
3.6	0	0	0	0
3.7	0.67	0	0	0
3.8	0	0	0	0
3.9	0	0	0	0
4	0	0	0	0
4.1	0	0	0	0.67
4.2	0	0	0	0
4.3	0	0	0	0
4.4	0	0	0	0
4.5	0	0	0	0
4.6	0	0	0	0
4.7	0	0	0	0
4.8	0	0	0	0
4.9	0	0	0	0
5	0	0	0	0
5.1	0	0	0	0
5.2	0	0	0	0
5.3	0	0	0	0
5.4	0	0	0	0
5.5	0	0	0	0
5.6	0	0	0	0
5.7	0	0	0	0
5.8	0	0	0	0

Table 6-1: BOC-7 Voltage Distributions

Volts	BOC-7 Voltage Distributions			
	SG 1	SG 2	SG 3	SG 4
5.9	0	0	0	0
6	0	0	0	0
6.1	0	0	0	0
6.2	0	0	0	0
6.3	0	0.67	0	0
6.4	0	0	0	0
Total	462.0	291.7	312.1	324.0

6.3 VOLTAGE GROWTH RATES FOR CYCLE 7

Both the Cycle 5 and Cycle 6 bounding voltage growth rates, shown in Figure 3-15 and Figure 3-16, were considered for the Cycle 7 analysis.

6.4 PREDICTION OF VOLTAGE DISTRIBUTIONS AT EOC-7

The prediction of the EOC-7 voltage distributions is based on the BOC-7 indications and the composite growth rate. The length of Cycle 7 is established at 518 effective full power days (EFPD), Reference 2. The EOC-7 predicted voltage distributions (using both the Cycle 5 and Cycle 6 growth rates) are shown in Table 6-2 and in Figure 6-1 through Figure 6-4. The voltage distributions predicted using both growth rates are similar, with the predictions using the Cycle 6 growth rates populated with somewhat greater frequency in the lower voltages and with higher tail-end voltages. The analysis inputs and outputs are detailed in Reference 7.

Table 6-2: Predicted EOC-7 Voltage Distributions

Volts	Cycle 5 Growth Rate				Cycle 6 Growth Rate			
	SG 1	SG 2	SG 3	SG 4	SG 1	SG 2	SG 3	SG 4
0.1	0.23	0.06	0.09	0.08	0.3	0.07	0.12	0.11
0.2	4.59	1.5	2.33	2.17	6.03	1.97	3.06	2.85
0.3	9.19	6.2	7.84	8.5	11.26	7.94	9.96	10.88
0.4	17.91	13.61	13.56	17.08	21.91	16.8	16.33	20.91
0.5	29.57	21.19	20.19	26.25	35.3	25.2	23.87	31.16
0.6	40.71	26.19	26.24	33.51	46.74	29.78	30.03	38.36
0.7	47.04	28.75	30.24	36.83	52.06	31.31	32.84	39.92
0.8	48.86	29.44	31.36	35.99	51.36	30.49	32.88	36.78
0.9	46.5	28.53	30.51	32.62	46.84	28.04	30.64	31.37
1	41.87	25.62	27.7	27.63	39.95	24.52	26.89	25.36
1.1	35.46	21.62	23.55	21.91	32.82	20.52	22.31	19.64

Table 6-2: Predicted EOC-7 Voltage Distributions

	Cycle 5 Growth Rate				Cycle 6 Growth Rate			
Volts	SG 1	SG 2	SG 3	SG 4	SG 1	SG 2	SG 3	SG 4
1.2	28.41	17.48	19.18	16.53	26.05	16.52	17.81	14.89
1.3	22.1	13.77	14.97	12.22	20.31	12.78	13.64	11.16
1.4	16.75	10.88	11.5	9.27	15.23	9.78	10.2	8.36
1.5	12.95	8.73	8.86	7.37	11.16	7.48	7.54	6.22
1.6	10.27	7.13	7.1	6.19	8.19	5.7	5.65	4.64
1.7	8.39	5.75	5.88	5.28	6.02	4.22	4.43	3.47
1.8	6.83	4.56	4.89	4.34	4.42	3.09	3.52	2.57
1.9	5.38	3.53	4.08	3.35	3.28	2.34	2.9	1.94
2	4.11	2.67	3.33	2.44	2.58	1.8	2.41	1.55
2.1	3.04	1.97	2.64	1.69	2.13	1.41	1.99	1.28
2.2	2.22	1.42	2.05	1.14	1.84	1.13	1.69	1.11
2.3	1.63	0.99	1.55	0.79	1.62	0.94	1.46	1
2.4	1.26	0.68	1.16	0.59	1.46	0.8	1.25	0.9
2.5	1.07	0.53	0.95	0.55	1.29	0.67	1.06	0.8
2.6	1.08	0.56	0.92	0.69	1.13	0.53	0.89	0.67
2.7	1.16	0.71	0.96	0.91	0.94	0.41	0.73	0.53
2.8	1.36	0.79	0.98	1.03	0.77	0.31	0.58	0.4
2.9	1.45	0.74	0.97	1.01	0.62	0.24	0.46	0.3
3	1.36	0.61	0.9	0.85	0.51	0.18	0.36	0.22
3.1	1.13	0.51	0.76	0.63	0.43	0.14	0.27	0.16
3.2	0.89	0.43	0.61	0.43	0.36	0.11	0.21	0.12
3.3	0.71	0.34	0.47	0.29	0.4	0.12	0.2	0.12
3.4	0.57	0.26	0.34	0.2	0.4	0.19	0.26	0.21
3.5	0.45	0.2	0.25	0.15	0.48	0.27	0.27	0.29
3.6	0.36	0.15	0.17	0.11	0.55	0.32	0.29	0.34
3.7	0.29	0.12	0.12	0.09	0.59	0.27	0.3	0.34
3.8	0.23	0.1	0.09	0.08	0.52	0.23	0.25	0.28
3.9	0.19	0.08	0.07	0.07	0.4	0.2	0.22	0.2
4	0.16	0.06	0.06	0.06	0.32	0.17	0.17	0.15
4.1	0.13	0.05	0.05	0.06	0.24	0.13	0.12	0.12
4.2	0.11	0.04	0.04	0.06	0.18	0.09	0.09	0.1
4.3	0.23	0.07	0.09	0.11	0.14	0.07	0.06	0.08
4.4	0.26	0.19	0.23	0.28	0.1	0.05	0.04	0.07
4.5	0.42	0.32	0.27	0.4	0.08	0.04	0.02	0.06
4.6	0.55	0.38	0.33	0.48	0.06	0.03	0.02	0.05
4.7	0.63	0.32	0.35	0.46	0.04	0.02	0.01	0.04

Table 6-2: Predicted EOC-7 Voltage Distributions

	Cycle 5 Growth Rate				Cycle 6 Growth Rate			
Volts	SG 1	SG 2	SG 3	SG 4	SG 1	SG 2	SG 3	SG 4
4.8	0.53	0.26	0.27	0.22	0.03	0.01	0.01	0.04
4.9	0.39	0.23	0	0	0.02	0.01	0.01	0.03
5	0.04	0.18	0.7	0.7	0.02	0.01	0.01	0.02
5.1	0	0.12	0	0	0.01	0	0.01	0.02
5.2	0.7	0	0	0	0.01	0	0	0.02
5.3	0	0	0.3	0.3	0.01	0	0	0.01
5.4	0.3	0	0	0	0.01	0	0	0.01
5.5	0	0	0	0	0.01	0	0	0.01
5.6	0	0	0	0	0	0	0	0.01
5.7	0	0	0	0	0	0	0	0.01
5.8	0	0	0	0	0	0	0	0
5.9	0	0.7	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
6.1	0	0	0	0	0	0	0	0
6.2	0	0	0	0	0.01	0	0	0
6.3	0	0	0	0	0.11	0.04	0.05	0.05
6.4	0	0	0	0	0.14	0.23	0.15	0.17
6.5	0	0	0	0	0.27	0.32	0.18	0.25
6.6	0	0	0	0	0.36	0.27	0.22	0.24
6.7	0	0	0	0	0.4	0.28	0.04	0
6.8	0	0	0	0	0.17	0.06	0	0.7
6.9	0	0	0	0	0	0	0.7	0
7	0	0.3	0	0	0.7	0.7	0	0
7.1	0	0	0	0	0	0	0	0.3
7.2	0	0	0	0	0.3	0	0.3	0
7.3	0	0	0	0	0	0	0	0
7.4	0	0	0	0	0	0.3	0	0
7.5	0	0	0	0	0	0	0	0
Total	462.0	291.7	312.1	324.0	462.0	291.7	312.1	324.0

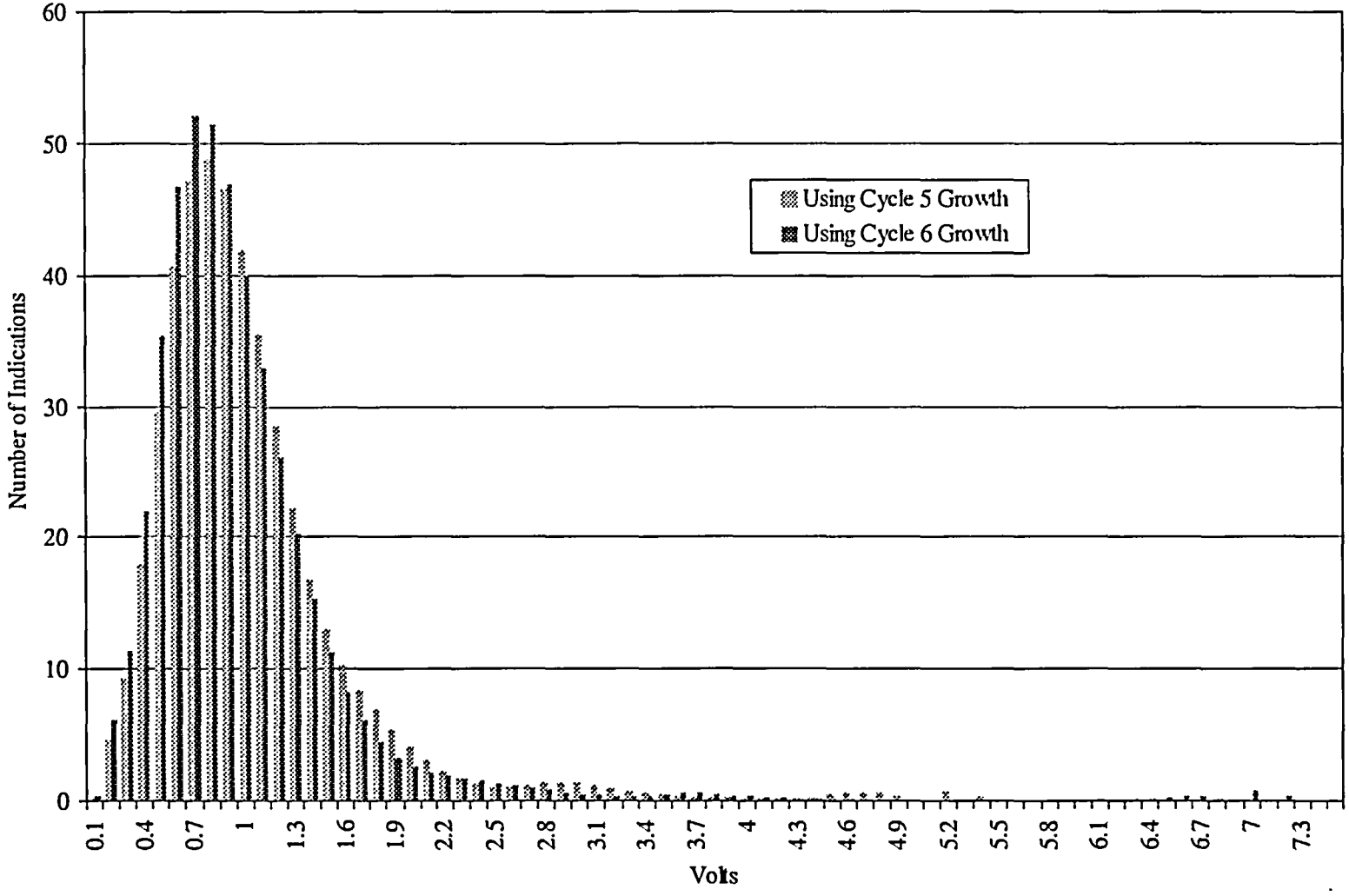

Figure 6-1: Predicted Voltage Distribution, SG 1

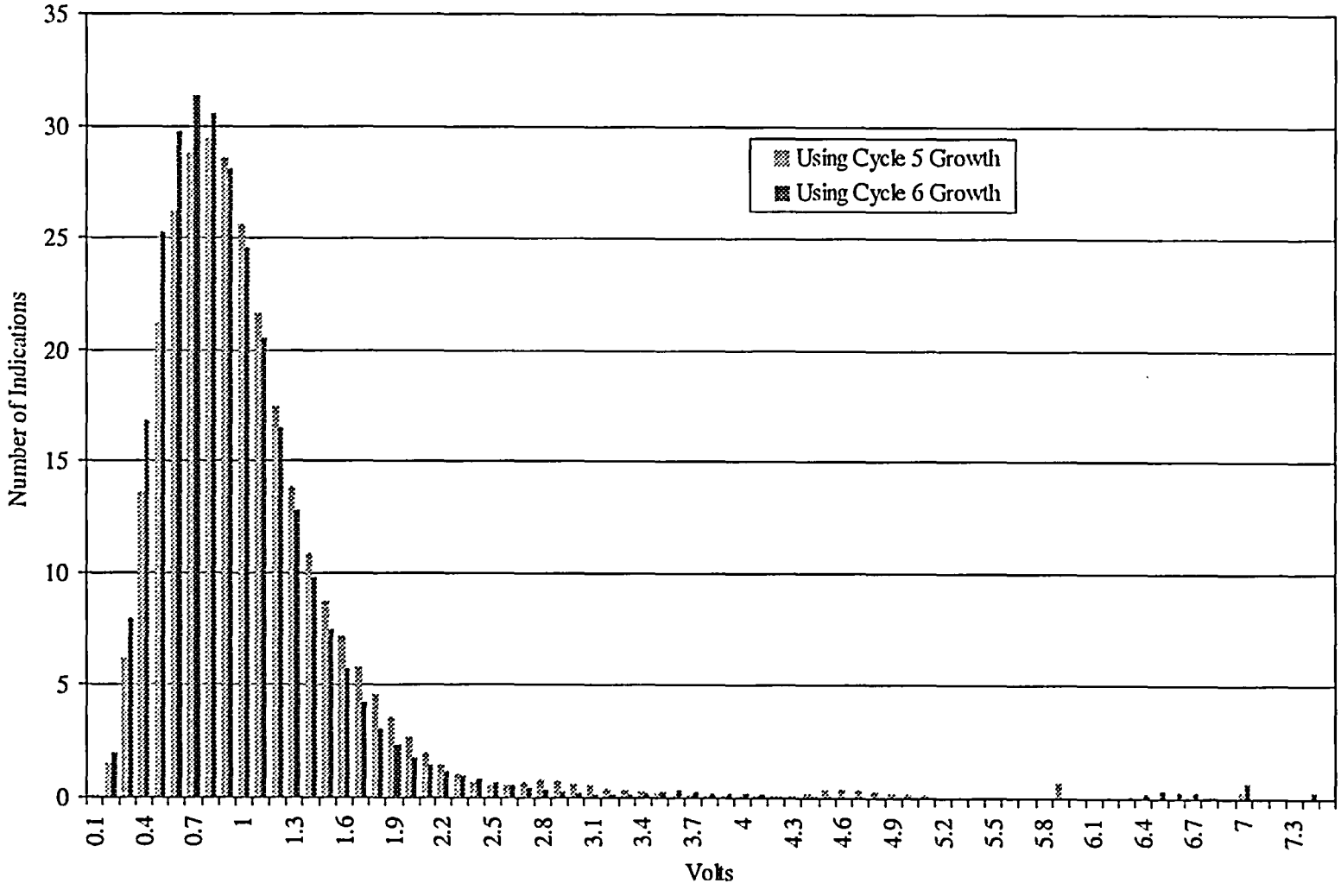

Figure 6-2: Predicted Voltage Distribution, SG 2

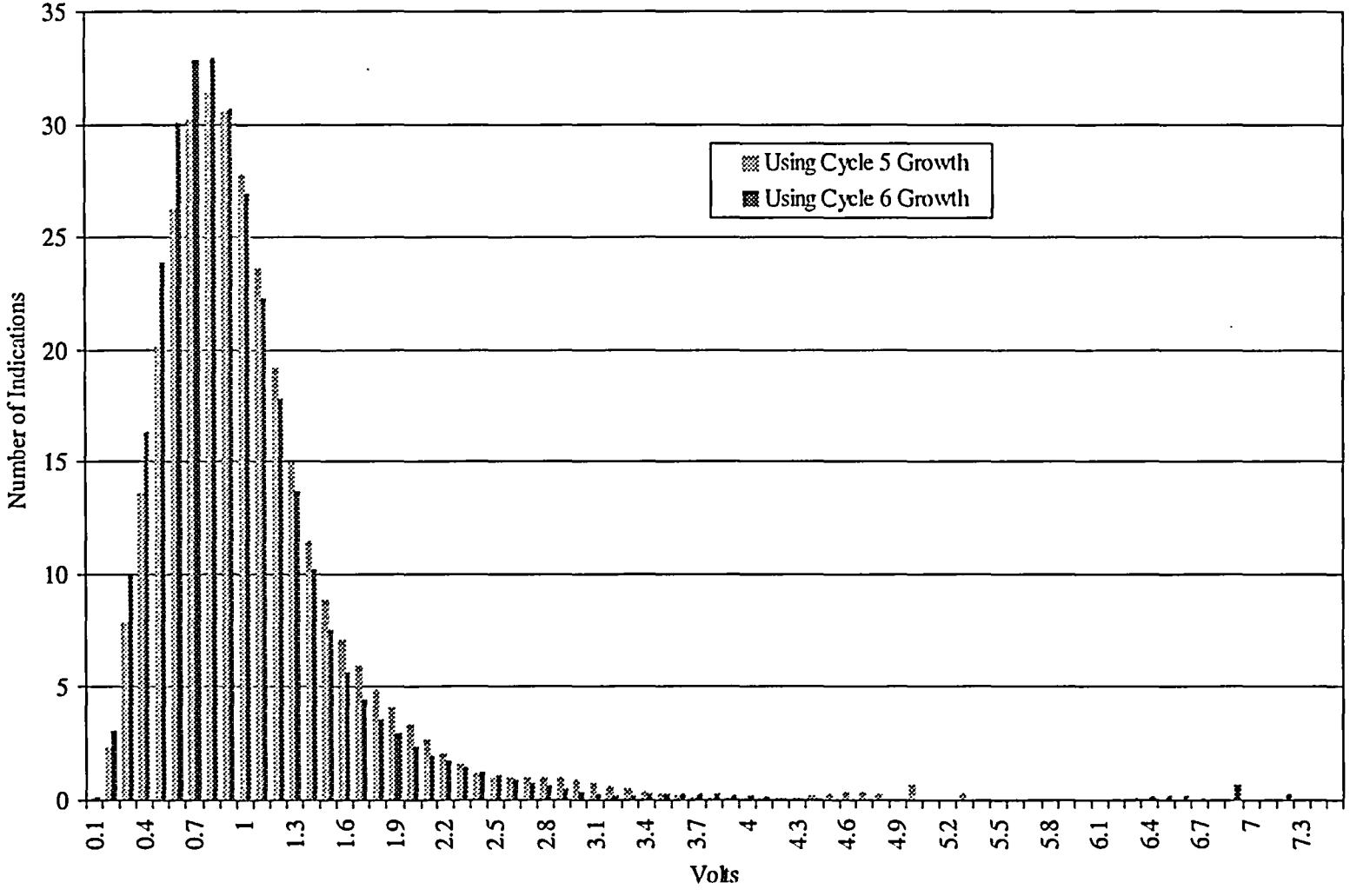

Figure 6-3: Predicted Voltage Distribution, SG 3

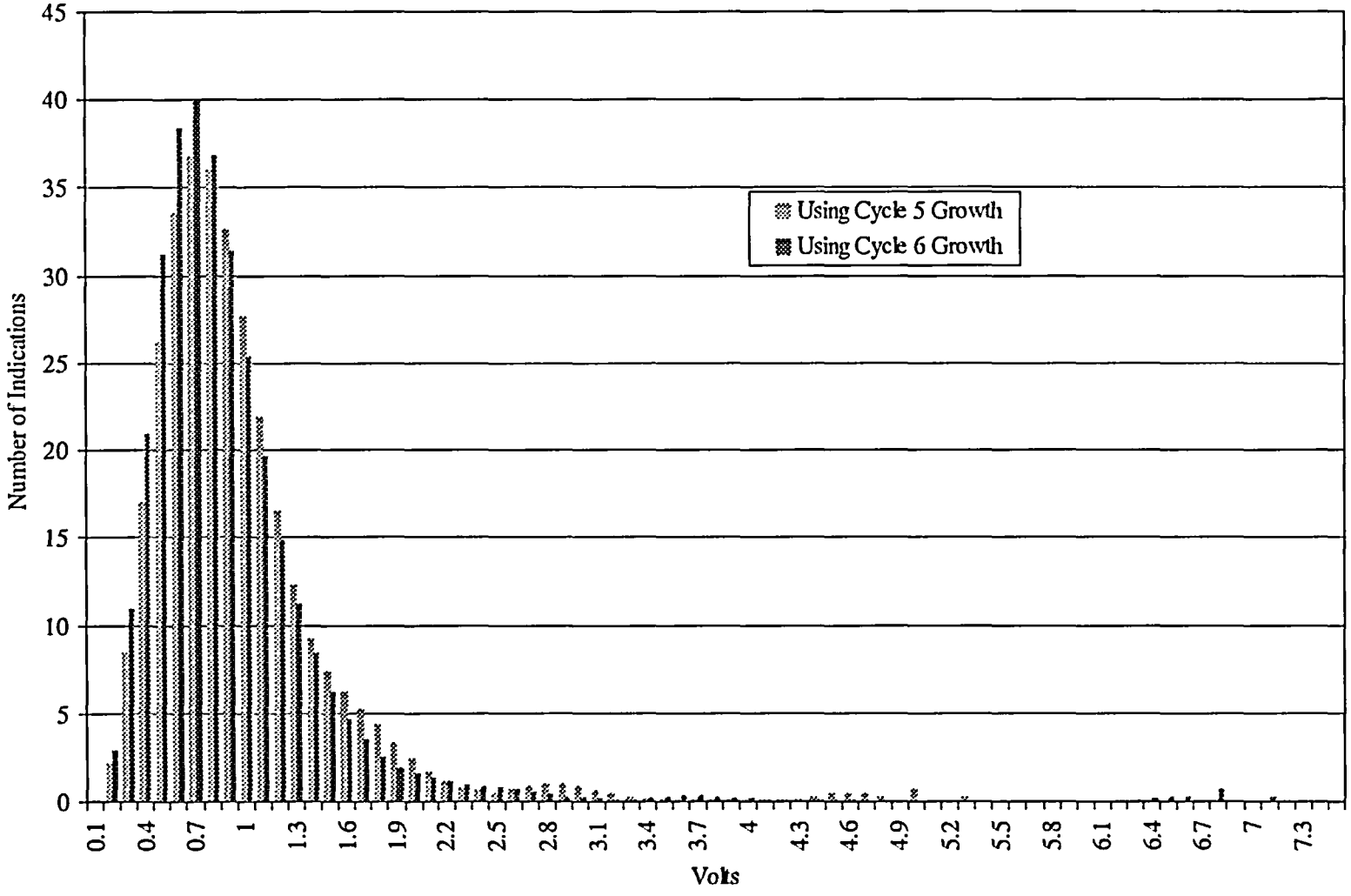

Figure 6-4: Predicted Voltage Distribution, SG 4

6.5 PREDICTION OF TUBE LEAK RATES AND BURST PROBABILITIES AT EOC-7

The Monte Carlo analysis results for predicted EOC-6 voltage distributions are shown in Table 6-3. One-million Monte Carlo trials were performed for each steam generator in this operational assessment. Both Cycle 5 and Cycle 6 growth rates were considered The leakage rate is the 95th percentile evaluated at 95% confidence. The burst probability is 95% confidence based on the number of trials. The analysis program inputs and outputs are detailed in Reference 7.

The predictions using the Cycle 6 growth rate distribution results in the larger values for both the burst probability and the bounding leak rate.

Table 6-3: EOC-7 Predicted Results

SG	Number of Monte Carlo Trials	Number of Indications	Predictions Made Using Growth Rate Cycle	Maximum Volts*	Burst Probability 95% Confidence	95/95 SLB Leak Rate (gpm)
1	1,000,000	462.0	5	5.4	4.10×10^{-3}	0.255
			6	7.2	8.65×10^{-3}	0.461
2	1,000,000	291.7	5	7.0	4.72×10^{-3}	0.268
			6	7.4	7.52×10^{-3}	0.409
3	1,000,000	312.1	5	5.3	2.61×10^{-3}	0.176
			6	7.2	5.74×10^{-3}	0.334
4	1,000,000	324.0	5	5.3	2.60×10^{-3}	0.178
			6	7.1	5.68×10^{-3}	0.334

* Voltage where tail is accumulated to 0.3 indications

6.6 COMPARISON WITH ACCEPTANCE CRITERIA

All steam generators are below the burst acceptance criterion of 1.0×10^{-2}, and the Watts Bar Unit 1 leakage criterion of 3 gpm (Reference 12).

7.0 REFERENCES

1. NRC Generic Letter 95-05, "Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking," USNRC Office of Nuclear Reactor Regulation, August 3, 1995.

2. TVA Letter, C.R. Allen to M.H. Cothron, "Watts Bar Nuclear Plant (WBN)-U1C6 Steam Generator Tube Integrity Inspection," L29 050405800, March 15, 2005.

3. WCAP-14277, Revision 1, "SLB Leak Rate and Tube Burst Probability Analysis Methods for ODSCC at TSP Intersections," Westinghouse Nuclear Services Division, December 1996.

4. Letter from John W. Irons, Westinghouse, to J.E. Maddox and Michael J. Lorek, Tennessee Valley Authority, "Tennessee Valley Authority Watts Bar Nuclear Power Plant Unit 1 – Application for Implementation of Voltage Based Repair Criteria – Westinghouse Steam Generator Tubes Affected by ODSCC at TSPs," WAT-D-10709, January 12, 2000.

5. Westinghouse Report SG-SGDA-03-44, Rev.0, "Condition Monitoring and Operational Assessment: GL 95-05 Alternate Repair Criterion End of Cycle 5, 90 Day Report, Watts Bar Unit 1," December 2003.

6. EPRI Report NP-7480-L, Addendum 6, 2004 Database Update, "Steam Generator Outside Diameter Stress Corrosion Cracking at Tube Support Plates Database for Alternate Repair Limits," October 2004.

7. Westinghouse Calculation CN-CDME-05-11, Rev. 0, "Watts Bar EOC 6 GL 95-05 Analyses," June 2005.

8. Letter from B. W. Sheron, Nuclear Regulatory Commission, to A. Marion, Nuclear Energy Research Institute, February 9, 1996.

9. Letter from A. Marion, Nuclear Energy Research Institute, to B. Sheron, Nuclear Regulatory Commission, "Refining the Leak Rate Sampling Methodology for ODSCC ARC Applications (Generic Letter 95-05)," March 15, 2002.

10. Letter from W. Bateman, Nuclear Regulatory Commission, to A. Marion, Nuclear Energy Research Institute, "Refining the Leak Rate Sampling Methodology for Generic Letter 95-05 Voltage-Based Alternate Repair Criteria Application," March 27, 2002.

11. Westinghouse Letter LTR-SGDA-03-204, "Instructions for Running the Computer Code Cyclesim3.1," R. Keating, Westinghouse Nuclear Services Division, August 30, 2003.

12. Letter from Douglas V. Pickett, Nuclear Regulatory Commission, to Karl W. Singer, Tennessee Valley Authority, "Watts Bar Nuclear Power Plant, Unit 1 – Issuance of

Amendment Regarding Main Steamline Break Accident Leakage Rate (TAC MC0665)," March 10, 2005.

Appendix A

Indication List
Watts Bar Unit 1 GL-95-05
End of Cycle 6 Sorted by EOC-6 Voltage

Steam Generator 1						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
25	35	y	DSI	H02	3.66	0.78
8	43	y	DSI	H03	3.31	0.81
12	72	y	DSI	H02	3.1	0.62
8	62	y	DSI	H03	2.81	1.05
4	58	y	DSI	H03	2.62	1.85
12	71	y	DSI	H03	2.39	0.47
8	69	y	DSI	H03	2.15	0.86
4	27	y	DSI	H03	1.95	0.45
9	63	y	DSI	H03	1.95	0.34
40	86	y	DSI	H03	1.89	0.53
8	58	y	DSI	H03	1.81	0.84
5	11	y	DSI	H02	1.65	0.63
8	41	y	DSI	H03	1.6	0.94
6	66	y	DSI	H03	1.5	0.7
20	63	y	DSI	H05	1.48	0.52
8	64	y	DSI	H03	1.45	0.74
10	40	y	DSI	H03	1.45	0.43
5	17	y	DSI	H02	1.4	0.96
5	12	y	DSI	H02	1.38	0.66
3	102	y	DSI	H03	1.36	0.91
37	98	y	DSI	H02	1.36	0.96
4	47	y	DSI	H02	1.34	0.88
7	7	y	DSI	H03	1.34	0.59
5	48	y	DSI	H06	1.32	0.99
7	63	y	DSI	H03	1.28	0.85
7	19	y	DSI	H02	1.26	0.69
4	78	y	DSI	H02	1.24	0.95
6	94	y	DSI	H04	1.24	1.29
9	52	y	DSI	H02	1.23	0.83
17	36	y	DSI	H02	1.23	1.42
17	22	y	DSI	H02	1.21	0.67
5	10	y	DSI	H02	1.19	1.21
5	86	y	DSI	H04	1.19	0.91

Steam Generator 1						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
5	90	y	DSI	H02	1.19	1.06
7	8	y	DSI	H03	1.19	0.53
17	6	y	DSI	H03	1.19	1.05
4	23	y	DSI	H04	1.18	1.27
6	46	y	DSI	H03	1.18	0.58
5	78	y	DSI	H02	1.17	0.99
9	46	y	DSI	H03	1.17	0.62
4	63	y	DSI	H03	1.16	0.83
5	48	y	DSI	H03	1.16	0.92
8	19	y	DSI	H03	1.16	0.99
14	39	y	DSI	H04	1.16	0.72
6	11	y	DSI	H03	1.15	0.6
6	60	y	DSI	H03	1.14	0.72
13	7	y	DSI	H04	1.14	1.57
21	20	y	DSI	H04	1.14	0.96
5	19	y	DSI	H02	1.13	0.68
13	72	y	DSI	H02	1.13	0.82
10	65	y	DSI	H03	1.12	0.54
5	92	y	DSI	H04	1.1	0.55
3	61		DSI	H03	1.09	0.71
4	1		DSI	H02	1.09	0.97
8	8	y	DSI	H03	1.09	0.76
22	30	y	DSI	H03	1.09	0.74
6	8	y	DSI	H02	1.08	0.82
7	11		DSI	H02	1.07	0.98
32	63		DSI	H02	1.06	1.36
43	39		DSI	H08	1.06	1.14
5	77	y	DSI	H02	1.05	0.99
6	41	y	DSI	H03	1.05	0.62
7	12		DSI	H02	1.05	0.94
6	50	y	DSI	H03	1.04	1.41
7	50	y	DSI	H03	1.03	0.44
12	46	y	DSI	H02	1.03	0.7
5	55	y	DSI	H03	1.02	0.45
7	106		DSI	H05	1.01	0.7
10	65	y	DSI	H04	1.01	0.96
22	109	y	DSI	H02	1.01	0.53
8	46	y	DSI	H03	1	0.95
6	110		DSI	H05	0.97	0.61
9	5		DSI	H03	0.97	0.8
6	82		DSI	H02	0.95	0.96
5	53		DSI	H03	0.93	0.61

Steam Generator 1						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
7	16		DSI	H04	0.93	0.68
3	24		DSI	H03	0.91	0.33
3	67		DSI	H02	0.91	0.74
5	73		DSI	H03	0.91	0.54
11	38		DSI	H04	0.9	0.6
2	46		DSI	H03	0.89	0.89
3	63		DSI	H03	0.89	0.7
5	9		DSI	H03	0.89	1.04
6	11	y	DSI	H02	0.89	0.88
7	15		DSI	H02	0.89	0.96
3	57		DSI	C14	0.88	1.07
5	23		DSI	H02	0.88	0.63
15	103		DSI	H02	0.88	0.39
5	52		DSI	H03	0.87	0.89
5	94		DSI	H04	0.87	0.72
7	9		DSI	H02	0.87	0.95
8	47		DSI	H03	0.87	0.43
5	94		DSI	H02	0.86	0.77
8	53		DSI	H03	0.86	0.6
31	21		DSI	H03	0.86	0.41
34	24		DSI	H02	0.86	0.67
7	55		DSI	H03	0.85	0.49
8	108		DSI	H05	0.85	0.75
3	69		DSI	H02	0.84	0.53
3	102	y	DSI	H02	0.84	0.59
6	94	y	DSI	H02	0.84	0.97
8	51		DSI	H04	0.84	0.54
9	53		DSI	H03	0.84	0.72
5	24		DSI	H03	0.82	0.53
9	54		DSI	H05	0.82	0.94
9	57		DSI	H03	0.82	0.42
12	2	y	DSI	H02	0.82	1.48
41	64		DSI	H04	0.82	0.72
5	24		DSI	H02	0.81	0.82
6	82		DSI	H04	0.81	1.04
2	2		DSI	H02	0.8	0.74
5	47		DSI	H04	0.8	0.72
6	93		DSI	H02	0.8	1.32
11	33	y	DSI	H02	0.78	0.98
5	9		DSI	H02	0.77	0.84
13	91		DSI	H02	0.77	0.7
4	89		DSI	H03	0.76	0.37

Steam Generator 1						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
5	42		DSI	H03	0.76	0.52
5	53		DSI	H04	0.76	0.56
8	89		DSI	H04	0.75	0.57
3	72		DSI	H03	0.72	0.33
7	108		DSI	H04	0.72	0.6
18	65		DSI	H04	0.72	0.75
18	74		DSI	H06	0.72	0.38
19	81		DSI	H03	0.72	0.68
22	94		DSI	H03	0.72	0.44
3	57		DSI	H04	0.71	0.47
3	69		DSI	H03	0.71	0.63
6	37		DSI	H03	0.71	0.64
7	104		DSI	H04	0.71	0.59
5	18		DSI	H02	0.7	0.55
5	46		DSI	H03	0.7	0.66
6	101		DSI	H04	0.7	0.59
7	107		DSI	H05	0.7	0.24
3	59		DSI	H04	0.69	0.37
7	19	y	DSI	H04	0.69	0.53
7	108		DSI	H05	0.69	0.6
3	23		DSI	H02	0.68	0.59
5	7		DSI	H02	0.68	0.55
5	14		DSI	H03	0.68	0.58
6	3		DSI	H03	0.68	0.72
8	43	y	DSI	H04	0.68	0.32
8	109		DSI	H02	0.68	0.36
9	43		DSI	H03	0.68	0.42
3	45		DSI	H03	0.67	0.75
3	67		DSI	H03	0.67	0.69
5	55	y	DSI	H02	0.67	0.76
6	56		DSI	H03	0.67	0.35
10	30		DSI	H04	0.67	0.47
11	71		DSI	H03	0.67	0.71
12	50		DSI	H05	0.67	0.68
5	11	y	DSI	H03	0.66	0.87
5	27		DSI	H03	0.66	0.49
6	84		DSI	H02	0.66	0.41
10	65	y	DSI	H05	0.66	0.43
1	25		DSI	H03	0.65	0.68
8	112		DSI	H05	0.65	0.57
5	71		DSI	H03	0.64	0.4
6	94	y	DSI	H03	0.64	0.76

Steam Generator 1						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
1	6		DSI	H03	0.63	0.73
3	7		DSI	H03	0.63	0.89
6	75		DSI	H02	0.63	0.59
7	61		DSI	H03	0.63	0.47
9	47		DSI	H04	0.63	0.6
3	10		DSI	H06	0.62	0.67
6	63		DSI	H03	0.62	0.53
19	100		DSI	H02	0.62	0.52
36	100		DSI	H03	0.62	0.37
3	59		DSI	H02	0.61	0.64
3	61		DSI	H06	0.61	0.55
6	9		DSI	H02	0.61	0.24
7	11		DSI	H03	0.61	0.52
12	71	y	DSI	H02	0.61	0.46
21	79		DSI	H02	0.61	0.66
25	24		DSI	H02	0.61	0.38
42	69		DSI	H03	0.61	0.1
3	94		DSI	H04	0.6	0.27
8	25		DSI	H05	0.6	0.47
15	37		DSI	H04	0.6	0.68
1	59		DSI	H03	0.59	0.69
4	90		DSI	H02	0.59	0.63
6	41	y	DSI	H02	0.59	0.43
6	99		DSI	H05	0.59	0.49
7	65		DSI	H03	0.59	0.57
9	47		DSI	H02	0.59	0.36
12	66		DSI	H02	0.59	0.49
12	68		DSI	H02	0.59	0.33
3	51		DSI	H04	0.58	0.64
8	64	y	DSI	H04	0.58	0.51
10	66		DSI	H03	0.58	0.3
10	107		DSI	H04	0.58	0.49
38	85		DSI	H02	0.58	0.78
7	68		DSI	H03	0.57	0.48
10	18		DSI	H02	0.57	0.67
11	33	y	DSI	H03	0.57	0.58
11	44		DSI	H02	0.57	0.63
4	26		DSI	H02	0.56	0.31
4	109		DSI	H08	0.56	0.68
5	47		DSI	H03	0.56	0.36
5	92	y	DSI	H02	0.56	0.69
7	59		DSI	H02	0.56	0.44

Steam Generator 1						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
10	46		DSI	H03	0.56	0.63
29	20		DSI	H02	0.56	0.69
3	97		DSI	H03	0.55	0.46
7	15		DSI	H03	0.55	0.32
7	61		DSI	H07	0.55	0.48
7	61		DSI	H08	0.55	0.32
8	34		DSI	H02	0.55	0.53
13	67		DSI	H03	0.55	0.44
5	6		DSI	H03	0.54	0.71
7	15		DSI	H04	0.54	0.5
7	103		DSI	H03	0.54	0.71
3	19		DSI	H03	0.53	0.8
5	37		DSI	H02	0.53	0.36
7	76		DSI	H04	0.53	0.49
10	17		DSI	H05	0.53	0.61
22	12		DSI	H02	0.53	0.38
37	90		DSI	H03	0.53	0.45
42	39		DSI	H02	0.53	0.91
1	108		DSI	C10	0.52	0.43
2	16		DSI	H07	0.52	0.35
2	90		DSI	H03	0.52	0.37
5	58		DSI	H03	0.52	0.59
8	104		DSI	H05	0.52	0.46
4	50		DSI	H03	0.51	0.33
6	77		DSI	H07	0.51	0.47
7	18		DSI	H03	0.51	0.69
8	42		DSI	H03	0.51	0.57
8	91		DSI	H02	0.51	0.65
9	20		DSI	H05	0.51	0.44
5	92	y	DSI	H03	0.5	0.37
6	67		DSI	H03	0.5	0.7
7	4		DSI	H03	0.5	0.65
7	59		DSI	H04	0.5	0.59
8	81		DSI	H02	0.5	0.26
9	13		DSI	H04	0.5	0.69
2	87		DSI	H03	0.49	0.5
3	54		DSI	H07	0.49	0.4
5	77	y	DSI	H06	0.49	0.22
3	36		DSI	H05	0.48	0.32
5	44		DSI	H03	0.48	0.62
4	51		DSI	H04	0.47	0.56
6	65		DSI	H03	0.47	0.44

Steam Generator 1						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
10	44		DSI	H07	0.47	0.22
16	39		DSI	H03	0.47	0.38
1	58		DSI	H02	0.46	0.56
3	8		DSI	H03	0.46	0.61
4	22		DSI	H04	0.46	0.6
7	8	y	DSI	H02	0.46	0.48
9	48		DSI	H05	0.46	0.6
17	72		DSI	H05	0.46	0.61
4	8		DSI	C10	0.45	0.45
5	48	y	DSI	H07	0.45	0.41
10	69		DSI	H03	0.45	0.42
15	93		DSI	H02	0.45	0.25
32	70		DSI	H03	0.45	0.12
35	48		DSI	H02	0.45	0.35
2	111		DSI	H04	0.44	0.74
3	90		DSI	H02	0.44	0.47
5	1		DSI	H02	0.44	0.44
6	40		DSI	H03	0.44	0.44
7	108		DSI	H03	0.44	0.34
5	27		DSI	H08	0.43	0.66
5	76		DSI	H02	0.43	0.27
9	9		DSI	H02	0.43	0.36
11	101		DSI	H03	0.43	0.21
3	65		DSI	H03	0.42	0.47
5	72		DSI	H03	0.42	0.41
10	12		DSI	H04	0.42	0.57
46	86		DSI	H03	0.42	0.38
7	19	y	DSI	H05	0.41	0.4
16	39		DSI	H02	0.41	0.18
3	51		DSI	H02	0.4	0.52
5	15		DSI	H05	0.4	0.42
5	29		DSI	H04	0.4	0.45
8	89		DSI	H05	0.4	0.41
42	41		DSI	H03	0.4	INR
13	71		DSI	H03	0.39	0.35
17	54		DSI	H04	0.39	0.44
5	61		DSI	H03	0.38	0.53
8	52		DSI	H03	0.38	0.63
9	9		DSI	H05	0.38	0.48
41	94		DSI	H03	0.38	0.25
6	63		DSI	H06	0.37	0.73
16	65		DSI	H02	0.37	0.36

Steam Generator 1						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
20	93		DSI	H03	0.36	0.29
21	16		DSI	H03	0.36	0.41
39	74		DSI	H02	0.36	0.67
15	37		DSI	H05	0.35	0.59
18	55		DSI	C10	0.35	0.29
6	43		DSI	H03	0.34	0.29
7	49		DSI	H03	0.34	0.31
34	99		DSI	H02	0.34	0.4
11	69		DSI	H03	0.33	0.29
13	68		DSI	H03	0.33	0.26
1	31		DSI	H08	0.32	0.44
2	111		DSI	C10	0.32	0.37
4	28		DSI	H02	0.32	0.35
5	44		DSI	H02	0.32	0.36
6	104		DSI	H08	0.32	0.4
12	93		DSI	H02	0.32	0.35
5	12	y	DSI	H06	0.31	0.17
8	75	y	DSI	H01	0.31	0.19
9	45		DSI	H03	0.31	0.27
5	51		DSI	H03	0.3	0.11
17	64		DSI	H03	0.3	0.32
2	4		DSI	H03	0.29	0.58
23	99		DSI	H03	0.29	0.25
4	69		DSI	H02	0.28	0.35
46	41		DSI	H02	0.28	1.16
6	15		DSI	H02	0.27	0.69
18	56		DSI	H03	0.26	0.21
1	39		DSI	H03	0.25	0.22
6	69		DSI	H03	0.25	0.24
25	69		DSI	C10	0.25	0.26
3	45		DSI	H04	0.23	0.19
22	73		DSI	H04	0.22	0.47
4	29		DSI	H07	0.2	0.23
8	58	y	DSI	H04	0.19	0.19
17	64		DSI	H04	0.19	0.14
17	94		DSI	H04	0.19	0.22
19	36		DSI	H02	0.19	0.31
22	82		DSI	H03	0.19	0.18
39	84		DSI	H05	0.19	0.28
6	103		DSI	H03	0.18	0.17
31	18		DSI	H02	0.17	0.32
38	92		DSI	H02	0.15	0.19

Steam Generator 1						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
7	21		DSI	H08	0.14	0.4
7	62		DSI	H08	0.14	0.35
18	68		DSI	H02	0.13	0.21

(1) All indications greater than or equal to 1 volt at EOC-6 were subject to a Plus Point inspection. All indication confirmed by Plus Point inspection were repaired by plugging.

(2) Indications without an EOC5 Volts value were not used in the determination of growth rate.

INF = Indication Not Found

INR = Indication Not Reportable

Steam Generator 2						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
5	101	y	DSI	H03	6.32	0.66
11	44	y	DSI	H02	3.43	0.59
12	52	y	DSI	H02	1.92	0.97
10	112	y	DSI	H05	1.69	0.78
46	88		DSI	H02	1.54	1.62
4	114		DSI	H02	1.52	1.24
15	56		DSI	H03	1.35	1.1
14	68		DSI	H04	1.34	1.45
8	65	y	DSI	H04	1.33	0.88
48	41	y	DSI	H03	1.33	0.65
10	84		DSI	H03	1.28	1.15
5	41	y	DSI	H03	1.27	0.45
13	82		DSI	H03	1.25	1.05
9	64		DSI	H02	1.22	0.52
13	44	y	DSI	H02	1.2	0.72
6	113		DSI	H02	1.18	1.1
5	8	y	DSI	H03	1.15	1.2
8	56	y	DSI	H04	1.15	0.53
10	111	y	DSI	H03	1.14	0.67
2	49	y	DSI	H03	1.11	0.88
15	76		DSI	H03	1.11	0.82
18	110	y	DSI	H03	1.11	0.74
6	51	y	DSI	H03	1.09	0.74
1	59	y	DSI	H03	1.07	0.86
10	36	y	DSI	H03	1.07	0.76
6	103	y	DSI	H03	1.04	0.42
7	45	y	DSI	H03	1.03	0.61
41	49	y	DSI	H03	1.02	0.56
5	105	y	DSI	H03	1	0.99
7	63		DSI	H05	0.98	0.4
8	63		DSI	H04	0.98	1.02
13	104		DSI	H03	0.97	0.62
9	38		DSI	H02	0.95	0.6
11	56		DSI	H02	0.95	0.85
5	24		DSI	H04	0.94	0.82
16	75		DSI	H02	0.94	0.96
43	81		DSI	H03	0.94	0.56
1	42		DSI	H08	0.93	1.09
13	49		DSI	H02	0.93	0.73
18	41		DSI	H03	0.93	0.6
5	84		DSI	H03	0.91	0.69

Steam Generator 2						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
5	85		DSI	H03	0.91	0.51
7	4		DSI	H02	0.91	0.56
13	78		DSI	H04	0.91	0.6
11	98		DSI	H02	0.89	0.14
2	87	y	DSI	H02	0.88	0.81
7	67		DSI	H03	0.88	0.65
3	60		DSI	H03	0.87	0.8
9	41		DSI	H03	0.86	0.67
2	46		DSI	H03	0.84	0.32
8	64		DSI	H04	0.84	0.59
10	46		DSI	H02	0.84	0.52
12	37		DSI	H04	0.84	1.16
3	49		DSI	H03	0.83	0.72
45	81		DSI	H02	0.81	0.18
5	39		DSI	H03	0.8	0.77
6	45		DSI	H03	0.8	0.45
12	43	y	DSI	H03	0.8	0.17
3	68		DSI	H04	0.79	0.95
6	38		DSI	H03	0.79	0.98
48	44		DSI	H03	0.77	0.41
2	83		DSI	H02	0.76	0.78
3	23		DSI	H02	0.76	0.76
5	52		DSI	H03	0.76	0.73
10	53	y	DSI	H02	0.75	0.48
11	82		DSI	H03	0.74	0.64
5	37		DSI	H03	0.73	0.57
6	35		DSI	H04	0.73	0.84
9	99		DSI	H03	0.73	0.71
12	31		DSI	H04	0.73	0.66
13	67		DSI	H03	0.73	0.85
3	101		DSI	H03	0.72	0.52
8	42		DSI	H03	0.72	0.38
4	104		DSI	H03	0.71	0.66
10	78		DSI	H03	0.71	0.24
18	38		DSI	H05	0.71	0.55
11	39		DSI	H04	0.7	1.03
2	68		DSI	H02	0.68	0.35
4	113		DSI	H02	0.68	0.58
7	111		DSI	H03	0.68	0.3
9	64		DSI	H05	0.68	0.44
12	32	y	DSI	H02	0.68	0.5
7	13		DSI	H04	0.67	0.52

Steam Generator 2						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
15	66		DSI	H03	0.67	0.39
3	63		DSI	H03	0.66	0.65
6	114		DSI	H02	0.65	0.22
8	106		DSI	H04	0.65	0.51
11	52		DSI	H02	0.65	INR
3	113		DSI	H02	0.64	0.55
9	96		DSI	H03	0.64	0.37
8	69		DSI	H03	0.62	0.68
12	78		DSI	H02	0.62	0.35
23	101		DSI	H02	0.62	0.32
4	20		DSI	H03	0.61	0.58
5	36		DSI	H03	0.61	0.71
3	66		DSI	H04	0.6	0.5
10	42		DSI	H03	0.6	0.33
12	70		DSI	H04	0.6	0.47
16	37		DSI	H06	0.6	0.48
9	68		DSI	H05	0.59	0.63
2	108		DSI	H03	0.58	0.44
9	84		DSI	H03	0.58	0.87
10	49		DSI	H02	0.58	0.58
14	14		DSI	H05	0.58	0.56
10	45		DSI	H03	0.56	0.45
5	1		DSI	H02	0.55	0.41
5	61		DSI	H04	0.55	0.76
10	36	y	DSI	H02	0.55	0.73
12	66		DSI	H03	0.55	0.51
9	74		DSI	H06	0.54	0.24
13	72		DSI	H02	0.54	0.22
47	83		DSI	H02	0.54	0.32
7	12		DSI	H04	0.53	0.41
11	65		DSI	H02	0.53	0.31
2	73		DSI	H02	0.52	0.66
1	75		DSI	H03	0.51	0.32
45	82		DSI	H02	0.51	0.72
1	54		DSI	H03	0.49	0.37
2	53		DSI	H03	0.49	0.35
8	39		DSI	H02	0.49	0.35
16	40		DSI	H03	0.49	0.22
49	34		DSI	H02	0.49	0.48
1	45		DSI	H03	0.48	0.32
3	51		DSI	H03	0.48	0.41
6	104		DSI	H03	0.48	0.33

Steam Generator 2						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
8	38		DSI	H04	0.48	0.64
9	5		DSI	H02	0.48	0.75
32	84		DSI	H03	0.48	0.46
5	60		DSI	C10	0.46	0.46
9	41		DSI	H04	0.46	0.75
14	77	y	DSI	H07	0.46	0.24
18	79	y	DSI	H01	0.46	0.29
24	36		DSI	H02	0.46	0.36
32	88		DSI	H03	0.46	0.38
2	96		DSI	H02	0.45	0.71
4	55		DSI	H03	0.45	0.37
1	43		DSI	H03	0.44	0.38
10	43		DSI	H02	0.44	0.88
2	113		DSI	H03	0.43	0.38
11	36		DSI	H02	0.43	0.89
20	84		DSI	H01	0.43	INR
23	54		DSI	H08	0.43	0.24
2	45		DSI	H03	0.42	0.3
3	15		DSI	H02	0.42	0.62
6	11		DSI	H02	0.42	0.35
7	12		DSI	H03	0.42	0.87
9	44		DSI	H03	0.42	0.25
12	37		DSI	H03	0.42	0.46
4	50		DSI	H03	0.41	0.42
5	24		DSI	H03	0.41	0.71
28	91	y	DSI	H01	0.41	INF
6	45		DSI	H02	0.4	0.37
11	72		DSI	H04	0.39	0.31
8	78		DSI	C10	0.38	0.32
15	76		DSI	H04	0.38	0.48
18	109		DSI	H03	0.38	0.4
27	85		DSI	H01	0.38	0.19
1	78		DSI	C10	0.37	0.33
22	105		DSI	H03	0.37	0.33
13	52		DSI	H02	0.36	0.33
15	28		DSI	H02	0.36	0.29
38	69		DSI	C04	0.36	0.32
2	104		DSI	H03	0.35	0.35
5	9		DSI	H03	0.35	0.54
28	51		DSI	C04	0.35	0.4
9	7		DSI	H05	0.34	1.13
18	55		DSI	H05	0.34	0.33

Steam Generator 2						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
10	77	y	DSI	H05	0.33	0.29
37	49		DSI	H03	0.33	0.3
5	62		DSI	H07	0.32	0.58
9	88		DSI	H02	0.32	0.16
10	79		DSI	H05	0.31	0.43
11	100		DSI	H03	0.31	0.32
16	50		DSI	H02	0.31	0.33
18	43		DSI	H02	0.31	0.32
19	30		DSI	H03	0.31	0.59
7	69		DSI	H02	0.28	0.35
18	34		DSI	H02	0.27	0.27
38	77	y	DSI	H01	0.27	0.22
43	91		DSI	H06	0.26	0.18
48	76		DSI	H03	0.26	0.27
1	47		DSI	H03	0.25	0.16
4	36		DSI	H07	0.25	0.44
10	12		DSI	H02	0.25	0.56
13	69		DSI	H05	0.25	0.54
5	70		DSI	H03	0.23	0.12
9	78		DSI	H03	0.23	0.15
20	38		DSI	H05	0.23	0.34
22	89		DSI	H03	0.23	0.33
43	90		DSI	H02	0.21	0.13
2	66		DSI	H06	0.2	0.22
12	111		DSI	H03	0.16	0.33
28	104		DSI	H02	0.16	0.77

(1) All indications greater than or equal to 1 volt at EOC-6 were subject to a Plus Point inspection. All indication confirmed by Plus Point inspection were repaired by plugging.

(2) Indications without an EOC5 Volts value were not used in the determination of growth rate.

INF = Indication Not Found

INR = Indication Not Reportable

Steam Generator 3						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
14	100	y	DSI	H02	2.99	0.46
7	42	y	DSI	H03	2.51	0.83
9	48	y	DSI	H03	2.36	0.53
14	48	y	DSI	H02	2.16	1.83
29	87		DSI	H02	1.87	1.79
6	59		DSI	H04	1.77	0.4
48	67		DSI	H03	1.69	1.26
4	32		DSI	H02	1.67	1.4
11	85		DSI	H02	1.66	1.78
7	88		DSI	H02	1.57	1.37
10	44	y	DSI	H03	1.37	1.34
10	52	y	DSI	H04	1.26	1.19
11	90		DSI	H04	1.26	1.13
10	113		DSI	H02	1.21	1.39
6	77		DSI	H02	1.2	0.49
10	66		DSI	H02	1.14	0.85
4	87		DSI	H02	1.12	0.85
21	19		DSI	H02	1.11	1.61
22	90		DSI	H03	1.06	0.56
26	99		DSI	H04	1.06	0.32
6	53		DSI	H03	1.04	0.46
16	49		DSI	H04	1.04	1.33
17	88		DSI	H03	1.04	1
32	56	y	DSI	H03	1.04	0.56
6	58	y	DSI	H02	1.03	1.03
10	52	y	DSI	H05	1.03	1.11
11	96	y	DSI	H03	1.02	0.66
12	88		DSI	H03	1.02	0.61
34	57		DSI	H04	1.02	INF
7	109		DSI	H04	1.01	1.12
6	66	y	DSI	H03	1	0.41
14	62		DSI	H04	1	0.86
11	97		DSI	H02	0.98	1.35
25	98		DSI	H03	0.97	0.75
6	66	y	DSI	H04	0.96	0.9
25	14		DSI	H02	0.96	0.23
7	90		DSI	H05	0.95	1.28
6	48		DSI	H05	0.94	0.9
18	87		DSI	H02	0.94	0.37
10	97		DSI	H03	0.93	0.96
21	98		DSI	H02	0.89	0.75

Steam Generator 3						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
6	63	y	DSI	H03	0.88	0.54
10	83		DSI	H03	0.88	1.14
6	45		DSI	H02	0.87	0.74
10	36		DSI	H04	0.87	1
28	94		DSI	H02	0.86	0.49
7	18		DSI	H03	0.84	1.04
47	63		DSI	H02	0.84	0.73
8	64		DSI	H05	0.82	0.75
11	111		DSI	H05	0.82	0.39
5	78		DSI	H04	0.81	0.93
6	38		DSI	H02	0.81	0.75
6	77		DSI	H03	0.81	0.34
7	101		DSI	H05	0.8	1.02
16	67		DSI	H04	0.8	0.75
35	51		DSI	H05	0.8	0.56
8	64		DSI	H04	0.78	0.82
10	40		DSI	H03	0.78	0.68
6	68		DSI	H07	0.77	0.66
16	69		DSI	H05	0.77	0.79
22	23		DSI	H03	0.77	0.53
44	70		DSI	H06	0.77	0.56
3	66		DSI	H06	0.76	0.65
4	23		DSI	H02	0.76	0.85
6	26		DSI	H04	0.76	0.81
6	48		DSI	H02	0.76	0.73
7	102		DSI	H04	0.76	0.6
12	51		DSI	H04	0.76	1
12	85		DSI	H05	0.76	0.51
2	68		DSI	H03	0.75	0.76
16	67		DSI	H05	0.75	0.58
19	90		DSI	H05	0.75	0.62
2	112		DSI	H04	0.74	0.44
6	62	y	DSI	H05	0.74	0.61
13	72		DSI	H02	0.74	0.36
14	48	y	DSI	H06	0.74	0.38
25	27		DSI	H02	0.74	0.9
6	79		DSI	H05	0.72	1.17
6	61	y	DSI	H05	0.71	0.58
7	68		DSI	H03	0.71	0.26
8	76		DSI	H04	0.71	0.62
3	83		DSI	H02	0.7	0.55
4	35		DSI	H02	0.69	0.71

Steam Generator 3						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
32	26	y	DSI	H02	0.69	0.39
6	41		DSI	H03	0.68	0.39
7	104		DSI	H05	0.68	0.59
8	3		DSI	H02	0.68	0.64
4	113	y	DSI	H02	0.67	0.75
5	47		DSI	H03	0.67	0.4
35	57		DSI	H03	0.67	0.61
3	69		DSI	H02	0.65	0.44
5	20		DSI	H02	0.65	0.42
5	95		DSI	H04	0.65	0.84
6	68		DSI	H03	0.65	0.61
6	42		DSI	H03	0.64	0.75
10	61		DSI	H02	0.64	0.42
1	76		DSI	H06	0.62	0.63
7	93		DSI	H04	0.62	0.98
37	96		DSI	H02	0.62	0.38
14	21		DSI	H03	0.61	0.45
3	66		DSI	H03	0.6	0.54
4	86		DSI	H02	0.6	0.65
4	112		DSI	H03	0.59	INR
6	43		DSI	H02	0.59	0.61
7	102		DSI	H05	0.59	0.41
9	46		DSI	H04	0.59	0.47
19	90		DSI	H03	0.59	0.57
9	62		DSI	H04	0.58	1.08
15	72		DSI	H03	0.58	0.34
11	90		DSI	H05	0.57	0.31
14	62		DSI	H02	0.57	0.56
16	97		DSI	H03	0.57	0.35
28	95		DSI	H03	0.57	0.2
5	36		DSI	H06	0.56	0.57
5	95		DSI	H02	0.56	0.55
6	81		DSI	H04	0.56	0.49
10	15		DSI	H05	0.55	0.63
13	75		DSI	H02	0.55	0.18
14	86		DSI	H01	0.55	0.69
20	45		DSI	H02	0.55	0.81
3	60		DSI	H03	0.54	0.44
6	79		DSI	H02	0.54	0.53
7	68		DSI	H06	0.54	0.21
11	68		DSI	H03	0.54	0.5
5	18		DSI	H03	0.53	0.72

Steam Generator 3						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
35	30		DSI	H02	0.53	0.3
11	62		DSI	H02	0.52	0.57
20	86		DSI	H06	0.52	0.17
5	25		DSI	H04	0.51	0.64
6	62	y	DSI	H03	0.51	0.51
6	63	y	DSI	H05	0.51	0.42
14	111		DSI	H02	0.51	0.29
3	65		DSI	H03	0.5	0.69
7	76		DSI	H05	0.5	0.34
22	65		DSI	H02	0.5	0.29
10	101		DSI	H02	0.49	0.17
22	76		DSI	H02	0.49	0.31
22	92		DSI	H03	0.49	1.45
6	84	y	DSI	H04	0.48	0.58
5	56		DSI	H02	0.47	0.69
6	10		DSI	H05	0.47	0.42
10	61		DSI	H04	0.47	0.35
10	82		DSI	H04	0.46	0.5
6	63	y	DSI	H02	0.45	0.51
9	53		DSI	H04	0.45	0.54
12	83		DSI	H06	0.45	0.3
6	61	y	DSI	H04	0.44	0.33
7	63		DSI	H03	0.44	0.51
12	37		DSI	H02	0.44	0.33
17	92		DSI	H05	0.44	0.32
4	23		DSI	H03	0.43	0.46
6	70		DSI	H03	0.42	0.35
6	78		DSI	H02	0.42	0.75
6	97		DSI	C14	0.42	0.6
7	106		DSI	H04	0.42	0.44
9	22		DSI	H02	0.42	0.59
3	61		DSI	H02	0.41	0.48
5	37		DSI	H02	0.41	INR
28	94		DSI	H03	0.41	0.32
3	65		DSI	H02	0.4	0.45
7	30		DSI	H05	0.39	0.42
31	99		DSI	H02	0.39	0.19
38	55		DSI	H02	0.39	0.21
3	74		DSI	H03	0.38	0.25
10	112		DSI	H05	0.38	0.22
12	36		DSI	H05	0.38	0.66
17	86		DSI	H02	0.38	0.38

Steam Generator 3						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
6	80		DSI	H04	0.36	0.35
7	49		DSI	H03	0.35	INF
33	95		DSI	H02	0.35	INF
7	4		DSI	H02	0.34	0.36
28	95		DSI	H04	0.34	0.33
17	45		DSI	H03	0.33	0.28
29	103		DSI	H06	0.33	0.67
2	24		DSI	H07	0.32	0.35
7	44		DSI	H02	0.32	0.34
17	95		DSI	H02	0.32	1.28
8	10		DSI	H05	0.31	0.32
4	26		DSI	H02	0.29	0.38
10	76		DSI	H03	0.29	0.25
15	75		DSI	H03	0.29	0.29
46	33		DSI	H03	0.29	0.3
3	78		DSI	H03	0.28	0.31
4	47		DSI	H02	0.28	0.29
4	86		DSI	H03	0.28	0.37
17	94		DSI	H05	0.27	0.42
22	84		DSI	H08	0.27	0.4
40	91		DSI	H05	0.27	0.38
10	88		DSI	H05	0.26	0.56
5	106		DSI	H08	0.24	0.26
18	91		DSI	H04	0.24	0.23
5	89		DSI	H04	0.23	0.33
6	31		DSI	H08	0.23	0.26
10	75		DSI	H02	0.23	0.12
4	21		DSI	H07	0.22	0.35
6	30		DSI	H03	0.21	0.69
4	89		DSI	C13	0.2	0.19
22	105		DSI	H02	0.19	0.11
28	95		DSI	H06	0.18	0.17
18	88		DSI	H06	0.15	0.47
28	95		DSI	H02	0.11	0.21

(1) All indications greater than or equal to 1 volt at EOC-6 were subject to a Plus Point inspection. All indication confirmed by Plus Point inspection were repaired by plugging.

(2) Indications without an EOC5 Volts value were not used in the determination of growth rate.

INF = Indication Not Found

INR = Indication Not Reportable

Steam Generator 4						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
6	110	y	DSI	H03	4.06	0.85
8	104	y	DSI	H02	2.57	0.67
8	91	y	DSI	H02	2.43	1.52
8	39		DSI	H03	1.78	2.61
6	109		DSI	H05	1.49	1.36
7	97	y	DSI	H02	1.42	0.95
29	41		DSI	H02	1.36	1.15
12	53	y	DSI	H02	1.33	0.56
8	36		DSI	H03	1.28	1.04
46	27		DSI	H02	1.26	1.33
6	8	y	DSI	H02	1.24	0.13
25	108	y	DSI	H04	1.24	0.74
8	39		DSI	H02	1.23	0.99
6	113		DSI	H02	1.2	1.51
7	97	y	DSI	H03	1.2	0.78
6	27		DSI	H03	1.1	1.37
8	34	y	DSI	H02	1.1	1.97
8	103	y	DSI	H02	1.1	0.51
4	33	y	DSI	H03	1.08	1.41
48	42		DSI	C05	1.08	1.12
10	95	y	DSI	H02	1.06	0.44
10	37		DSI	H04	1	0.65
5	102		DSI	H04	0.95	0.33
5	108		DSI	H02	0.93	0.34
8	98		DSI	H03	0.92	1.4
9	49		DSI	H02	0.92	0.65
5	31		DSI	H03	0.91	0.36
30	105		DSI	H03	0.91	0.5
8	27		DSI	H02	0.9	0.67
5	75		DSI	H04	0.89	0.76
6	45		DSI	H04	0.89	0.95
2	43		DSI	H03	0.86	0.31
3	25	y	DSI	H03	0.85	0.92
14	31		DSI	H05	0.85	0.65
7	112		DSI	H03	0.84	0.23
3	102		DSI	H03	0.83	0.8
12	52		DSI	H02	0.83	0.73
6	84		DSI	H07	0.81	0.71
12	87		DSI	H03	0.81	0.49
7	96		DSI	H02	0.79	0.71
1	87		DSI	H03	0.78	0.76

Steam Generator 4						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
5	98		DSI	H02	0.78	0.53
12	14	y	DSI	H02	0.78	0.37
6	109		DSI	H04	0.76	0.7
1	113		DSI	H02	0.74	0.48
5	2		DSI	H05	0.74	0.62
8	27		DSI	H03	0.74	1.18
1	26		DSI	H03	0.73	0.8
3	89	y	DSI	H02	0.73	0.58
7	6		DSI	H02	0.73	0.76
5	41		DSI	H03	0.72	0.66
7	45		DSI	H04	0.72	0.66
10	37		DSI	H03	0.72	0.99
12	89		DSI	H05	0.71	0.12
48	51		DSI	H03	0.71	0.36
3	53	y	DSI	H05	0.69	0.62
8	111		DSI	H04	0.69	0.54
11	41		DSI	H03	0.69	0.55
2	39		DSI	H04	0.68	0.89
4	85		DSI	H02	0.67	0.48
5	106		DSI	H02	0.67	0.14
7	108		DSI	H03	0.67	0.33
8	39		DSI	H04	0.67	1.13
4	87		DSI	H03	0.66	1.57
8	104	y	DSI	H03	0.66	0.3
12	12		DSI	H03	0.66	0.48
5	113		DSI	H04	0.65	0.66
6	50		DSI	H04	0.65	0.54
7	102		DSI	H02	0.65	0.38
24	66		DSI	C11	0.65	0.41
3	41		DSI	H03	0.64	0.69
8	100		DSI	H02	0.64	0.26
9	49		DSI	H04	0.64	0.4
4	87		DSI	H02	0.63	0.37
5	62		DSI	H02	0.63	0.59
3	9		DSI	H05	0.62	0.82
8	103	y	DSI	H04	0.62	0.45
14	48	y	DSI	H02	0.62	0.26
6	40		DSI	H03	0.61	0.52
7	62		DSI	H05	0.61	0.65
8	27		DSI	H04	0.61	0.99
9	41		DSI	H04	0.61	0.43
48	61		DSI	H03	0.61	1.52

Steam Generator 4						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
6	6		DSI	H02	0.6	0.25
6	100		DSI	H03	0.6	0.55
7	65		DSI	H05	0.6	0.59
8	34	y	DSI	H03	0.6	0.87
14	44		DSI	H02	0.6	0.44
14	33		DSI	H04	0.59	0.59
43	28		DSI	H02	0.59	0.64
46	77		DSI	H02	0.59	0.2
1	32		DSI	H03	0.57	0.5
4	39	y	DSI	H03	0.57	0.71
5	68		DSI	H02	0.57	0.51
5	103		DSI	H04	0.57	0.46
7	5		DSI	H04	0.57	0.37
2	61		DSI	H03	0.56	0.44
2	98		DSI	H03	0.56	0.63
4	46	y	DSI	H05	0.56	0.6
5	38		DSI	H03	0.56	0.59
2	39		DSI	H03	0.55	0.34
2	53		DSI	H02	0.55	0.41
3	29		DSI	H03	0.55	0.5
4	59		DSI	H05	0.55	0.44
4	72		DSI	H02	0.55	0.28
4	99		DSI	H03	0.55	0.48
5	67		DSI	H05	0.55	0.55
4	64		DSI	H05	0.54	0.51
5	62		DSI	H05	0.54	0.5
5	73		DSI	H04	0.54	0.33
2	66		DSI	C12	0.53	0.54
4	100		DSI	H02	0.53	0.52
6	28		DSI	H03	0.53	0.36
14	49	y	DSI	H02	0.53	0.58
3	101	y	DSI	H04	0.52	0.14
24	60		DSI	C10	0.52	0.61
4	26		DSI	H03	0.51	0.3
4	60		DSI	H04	0.51	0.56
5	68		DSI	H05	0.51	0.49
8	49		DSI	H03	0.51	0.5
11	41		DSI	H05	0.51	0.54
3	74		DSI	H02	0.5	0.25
39	97		DSI	H07	0.5	0.52
5	66		DSI	H04	0.49	0.48
6	101		DSI	H03	0.49	0.49

Steam Generator 4						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
9	41		DSI	H03	0.49	0.55
3	34		DSI	H03	0.48	0.47
3	58		DSI	H05	0.48	0.4
5	32		DSI	H03	0.48	0.6
5	36		DSI	H03	0.48	0.53
5	62		DSI	H03	0.48	0.25
22	58		DSI	H02	0.48	0.52
3	63		DSI	H02	0.47	0.17
13	51	y	DSI	H04	0.47	0.37
15	101		DSI	C11	0.47	0.46
4	70		DSI	H02	0.46	0.44
5	40		DSI	H03	0.46	0.92
4	107		DSI	H03	0.45	0.46
6	49	y	DSI	H04	0.45	0.69
16	82		DSI	C12	0.45	0.38
20	109		DSI	H04	0.45	0.61
9	28	y	DSI	H03	0.44	0.74
9	49		DSI	H03	0.44	0.67
1	29		DSI	H03	0.43	0.63
3	40		DSI	H05	0.43	0.69
5	42		DSI	H03	0.43	0.44
5	55		DSI	H02	0.43	0.27
15	55		DSI	H02	0.43	0.74
4	13		DSI	H03	0.42	0.46
6	49	y	DSI	H05	0.42	0.49
7	43		DSI	H04	0.42	0.34
8	49		DSI	H02	0.42	0.28
16	39		DSI	H02	0.42	0.61
16	82		DSI	H02	0.42	0.56
3	104		DSI	H02	0.41	0.37
7	99		DSI	H02	0.41	0.58
10	51		DSI	C10	0.41	0.66
17	13		DSI	H04	0.41	0.55
17	55		DSI	H05	0.41	0.43
5	52		DSI	H02	0.4	0.36
11	38		DSI	H02	0.4	0.27
13	64		DSI	C05	0.4	0.35
35	17		DSI	H04	0.4	0.66
7	75		DSI	H03	0.39	0.49
12	5		DSI	H04	0.39	0.29
1	55		DSI	H02	0.38	0.96
4	43		DSI	H02	0.38	0.36

Steam Generator 4						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
4	60		DSI	H06	0.38	0.52
22	11		DSI	C13	0.38	0.26
32	103		DSI	H02	0.38	0.55
1	57		DSI	H04	0.37	0.5
10	78		DSI	H03	0.37	0.28
14	32	y	DSI	H03	0.37	0.44
1	70		DSI	H02	0.36	0.32
5	55		DSI	H04	0.36	0.39
12	24		DSI	H03	0.36	0.74
6	113		DSI	H03	0.35	0.47
17	79		DSI	H04	0.35	0.57
29	62		DSI	H04	0.35	0.34
39	79		DSI	H02	0.35	0.16
39	97		DSI	H06	0.34	0.53
1	83		DSI	H04	0.33	0.39
5	97		DSI	H03	0.33	0.53
7	40		DSI	H03	0.33	0.25
13	40		DSI	H02	0.33	0.28
3	39		DSI	H05	0.32	0.34
14	29		DSI	H05	0.32	0.52
6	110	y	DSI	H05	0.31	0.28
14	111		DSI	H02	0.31	0.22
10	47	y	DSI	H03	0.3	0.16
3	56		DSI	H04	0.29	0.31
3	66		DSI	H05	0.29	0.18
4	52		DSI	H04	0.29	0.38
9	40		DSI	H03	0.28	0.61
9	60		DSI	H05	0.28	0.31
12	14	y	DSI	H05	0.28	0.19
12	49	y	DSI	H02	0.28	0.46
16	35		DSI	H02	0.28	0.19
13	84		DSI	H02	0.27	0.39
14	47	y	DSI	H02	0.26	0.42
32	103		DSI	H04	0.25	0.11
39	23		DSI	H02	0.25	0.53
13	77		DSI	H05	0.24	0.17
14	72		DSI	H03	0.24	0.38
4	114		DSI	H04	0.23	0.54
7	59		DSI	C10	0.23	0.42
9	44	y	DSI	H04	0.22	0.47
14	26		DSI	H03	0.22	0.89
14	31		DSI	H02	0.22	0.46

Steam Generator 4						
Row	Col	Plugged[1]	Ind	Elev	EOC6 Volts	EOC5 Volts[2]
18	70		DSI	H04	0.22	0.14
39	79		DSI	H03	0.21	0.32
2	30		DSI	H03	0.2	0.23
2	39		DSI	H07	0.2	0.16
4	81	y	DSI	H06	0.19	0.41
5	81		DSI	H03	0.16	0.98
17	109		DSI	H07	0.15	0.25

(1) All indications greater than or equal to 1 volt at EOC-6 were subject to a Plus Point inspection. All indication confirmed by Plus Point inspection were repaired by plugging.
(2) Indications without an EOC5 Volts value were not used in the determination of growth rate.