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January 10, 2001

U.S. Nuclear Regulatory Commission
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DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT
SUPPLEMENTAL INFORMATION RELATED TO REVISED INCORE MONITORING CODE, PIDAL-3, AND CHANGES IN INCORE DETECTORS (TAC NO. MA8695)

By letter dated November 3, 2000, Consumers Energy submitted a reply to the staff's Request for Additional Information (RAI) concerning the revised PIDAL-3 Incore Monitoring Code. Subsequent to that submittal, a series of teleconference calls were held in late November and early December, 2000, to further explain and clarify our response to the RAI with the staff. As a result of these telecons, supplemental information was gathered and PIDAL-3 computer runs were generated to address the staff's questions.

In particular, the staff's questions related to two areas: 1) the station operating procedures governing the use of the two control rod position indication systems and their relationship to the PIDAL-3 Incore Monitoring System and 2) the calculated measurement uncertainties with reductions in operable detectors in the event of an asymmetric core power condition resulting from a transient (such as a dropped control rod from power operation).

As discussed in the telecons, our response to the first area of questions is that the PIDAL-3 system may take input from one of two rod position indication systems, provided a valid signal has been verified. PIDAL-3 does not play a role in determining which system may be correct if there is a discrepancy between the two. If a valid signal cannot be verified (if, for instance, one of the systems has been declared inoperable due to an electrical problem) PIDAL-3 becomes inoperable as well. Operability of rod position indications will be verified through redundant instrumentation and Plant operating procedures as required by Technical Specifications. Excerpts from the pertinent operating procedures are contained in Attachment 1.

A001

In the second area of questions, a series of PIDAL-3 cases were run with fewer and fewer incore detectors being operable (75%, 50% and 25% operable). Data from an actual dropped control rod transient that occurred at Palisades in 1988 was used as input. The measurement uncertainties were calculated for each of these cases and they show the general trend of increasing uncertainties with fewer detectors available (as would be expected). A complete discussion of this sensitivity analysis is given in Attachment 2.

SUMMARY OF COMMITMENTS

This letter contains no new commitments and no revisions to existing commitments.

Nathan L. Haskell
Director, Licensing & Performance Assessment

CC Administrator, Region III, USNRC
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Attachments

ATTACHMENT 1

CONSUMERS ENERGY COMPANY
PALISADES PLANT
DOCKET 50-255

January 10, 2001

Palisades Nuclear Plant
Technical Specification Surveillance Procedure SHO-1 (selected pages)

Palisades Nuclear Plant
Technical Specification Surveillance Procedure SHO-1Basis Document (selected pages)

Palisades Nuclear Plant
Permanent Maintenance Procedures DTA-1-11, DTA-1-12 (selected pages)

12 pages

TITLE: OPERATOR'S SHIFT ITEMS - CTS - ABOVE COLD SHUTDOWN {ITS - MODES 1, 2, 3, AND 4}

5.1.27 Primary and Secondary Rod Position Indication (CTS - Technical Specifications Table 4.17.6 Item 2 {ITS - Improved Technical Specifications LCO 3.1.4, SR 3.1.4.1 and SR 3.1.4.2}). Check position output data between Primary and Secondary Systems for agreement on each rod within eight (8) inches {ITS - and check each rod is within eight (8) inches of associated group rod positions}. Obtain Data from Palisades Plant Computer (PPC) pages 411 and 412 which can be obtained from the "Control Rod Monitoring" screens of the PPC Main Menu. {ITS - Required in Mode 1 and in Mode 2 except during Physics Testing per LCO 3.1.7.}

IF either the PIP or SPI nodes are not operable, or the host computer is not operable, THEN have an I&C Technician take readings of the rod positions at least every 12 hours, referring to Permanent Maintenance Procedures DTA-I-11, "Manual Reading of SPIs," and DTA-I-12, "Manual Reading of Rod Position Synchros." Record values in the appropriate column of Attachment 2, "Primary And Secondary Rod Positions," and compare the readings with the operable indication. IF both indications are inoperable, THEN have I&C Technician take manual reading AND fill in both columns in Attachment 2. Check the values to be within requirements.

IF DTA-I-12 cannot be performed for an inoperable PIP, THEN perform a channel check at least every 12 hours by verifying the position of the Rods using the limit switches for the rod matrix lights and record on Attachment 2. It may be necessary for I&C to assist by taking continuity/voltage readings or by jumpering the contacts from the PIP relays. IF a channel comparison cannot be performed, THEN perform a channel check each shift by verifying the rod position is as expected AND that there are no abnormal alarms associated with the PPC system being used for position indication. CTS - Not required if no more than one Control Rod is capable of being withdrawn.

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TITLE: OPERATOR'S SHIFT ITEMS - CTS - ABOVE COLD SHUTDOWN {ITS - MODES 1, 2, 3, AND 4}

3.1.27 Primary and Secondary Rod Position Indication

CTS - Technical Specifications Table 4.17.6 Item 2 requires {ITS - Improved Technical Specifications SR 3.1.4.1 and SR 3.1.4.2 require} Primary and Secondary rod position output data to be compared at least once every 12 hours for agreement on each rod indication within eight inches. {ITS - Additionally, each rod is checked to be within 8 inches of other rods in the associated group.} This ensures that no rod is misaligned during Plant operation further than assumed by ANF-90-078, "Palisades Cycle 9: Analysis of Standard Review Plan Chapter 15 Events" for a statically misaligned control rod or bank. If either the PIP or SPI Nodes of the Palisades Plant Computer (PPC) or the Host Computer itself is not operable, then that channel of rod position indication is read manually per Permanent Maintenance Procedure DTA-I-11, "Manual Reading of SPIs," or DTA-I-12, "Manual Reading of Rod Position Synchros," as applicable and is compared to the operable channel for agreement within eight inches. If the Host Computer is not operable, then the position information from the nodes can be obtained and compared through a computer terminal connected to the nodes. This process is described in DTA-I-11 and DTA-I-12. If the PIP is not available the procedure also allows verifying the position of the rods using the limit switches that supply the rod matrix lights. This allows a comparison of rod position from two different sources thus satisfying the intent of the Tech Specs. If no channel comparison can be performed, the procedure allows for the use of the operator verifying the position indication is as expected and that there are no alarms that would indicate the indication to be in error. Since the definition of a channel check includes a comparison of channels only if it is available, this also meets the intent of Tech Specs. The comparison for the eight inch rod alignment deviation is required CTS - when more than one CRDM is capable of rod withdrawal {ITS - in Modes 1 and 2 except during Physics Testing per LCO 3.1.7}.

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TITLE: MANUAL READING OF SPIs

5.0 PROCEDURE

USER ALERT
REFERENCE USE PROCEDURE

Refer to the procedure periodically to confirm that all procedure segments of an activity will be or are being performed. Where required, sign appropriate sign-off blanks to certify that all segments are complete.

5.1 GENERAL

5.1.1 Personnel performing this procedure shall review and understand its content prior to commencing work.

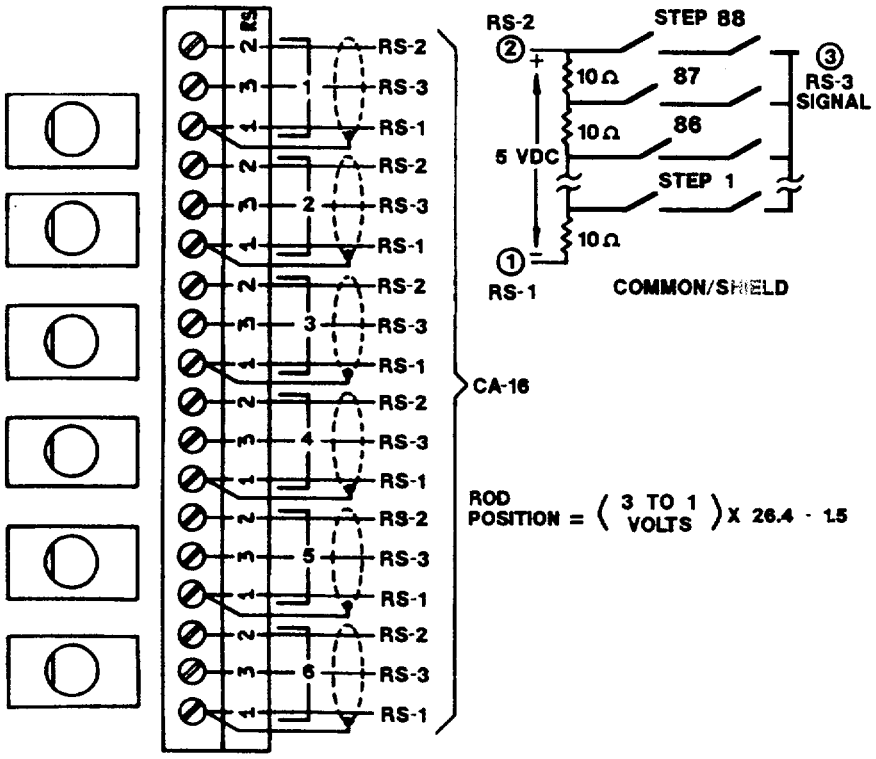
PRINT NAME	SIGNATURE	PRINT NAME	SIGNATURE

5.1.2 Refer to Figure 1, "Typical Analog Input Terminal Block - SPI System," (next page) for a line graphic of the SPI System.

5.1.3 Locate potentiometer input panel (lower quarter section of secondary computer cabinet).

TITLE: MANUAL READING OF SPIs

FIGURE 1: Typical Analog Input Terminal Block - SPI System



5.2 SETUP AND MEASUREMENT

5.2.1 Verify P/S voltage between terminals TB48-3(+) and 48-1(-) is 5 volts (4.98 to 5.01).

NOTE: Invalid information will be obtained if Control Rod positions are varied during measurement process.

5.2.2 Perform measurement for each Control Rod shown in Attachment 1 Table.

a. Measure appropriate terminal between Terminals 3 (+) and 1 (common).

b. Record DMM reading in "Secondary Voltage" column.

TITLE: MANUAL READING OF SPIs

5.2.3 Convert each of Attachment 1 Table "Secondary Voltage" items to inches.

a. Use Table 5.2.3 to perform conversion.

b. Record converted value in Attachment 1 Table "Secondary Inches" column.

TABLE 5.2.3: Secondary Volts to Rod Position Conversion

Volts	Rod Pos (inches)	Volts	Rod Pos (inches)	Volts	Rod Pos (inches)	Volts	Rod Pos (inches)
0.06	0.0	1.31	33.0	2.56	66.0	3.81	99.0
0.11	1.5	1.36	34.5	2.61	67.5	3.86	100.5
0.17	3.0	1.42	36.0	2.67	69.0	3.92	102.0
0.23	4.5	1.48	37.5	2.73	70.5	3.98	103.5
0.28	6.0	1.53	39.0	2.78	72.0	4.03	105.0
0.34	7.5	1.59	40.5	2.84	73.5	4.09	106.5
0.40	9.0	1.65	42.0	2.90	75.0	4.15	108.0
0.45	10.5	1.70	43.5	2.95	76.5	4.20	109.5
0.51	12.0	1.76	45.0	3.01	78.0	4.26	111.0
0.57	13.5	1.82	46.5	3.07	79.5	4.32	112.5
0.63	15.0	1.88	48.0	3.13	81.0	4.38	114.0
0.68	16.5	1.93	49.5	3.18	82.5	4.43	115.5
0.74	18.0	1.99	51.0	3.24	84.0	4.49	117.0
0.80	19.5	2.05	52.5	3.30	85.5	4.55	118.5
0.85	21.0	2.10	54.0	3.25	87.0	4.60	120.0
0.91	22.5	2.16	55.5	3.41	88.5	4.66	121.5
0.97	24.0	2.22	57.0	3.47	90.0	4.72	123.0
1.02	25.5	2.27	58.5	3.52	91.5	4.77	124.5
1.08	27.0	2.33	60.0	3.58	93.0	4.83	126.0
1.14	28.5	2.39	61.5	3.64	94.5	4.89	127.5
1.19	30.0	2.44	63.0	3.69	96.0	4.94	129.0
1.25	31.5	2.50	64.5	3.75	97.5	5.00	130.5

TITLE: MANUAL READING OF SPIs

5.2.4 Document performance of Steps 5.2.2 and 5.2.3 (measurements of secondary voltages, and conversions of secondary voltage to secondary inches) using signature lines on Attachment 1.

5.2.5 Obtain verification that data conversions and data conversion entries in Attachment 1 Table are correct, and document verification using signature lines on Attachment 1.

5.3 **COMPLETION OF WORK**

Make one copy of completed Attachment 1 and give to Control Operator.

5.4 **RETURN TO SERVICE**

No specific actions required.

5.5 **POST-MAINTENANCE CHECKOUT**

5.5.1 Assigned Supervisor shall inspect work area and verify all tools are picked up, put away, and all waste disposed of properly.

_____ / _____
Assigned Supervisor Date

5.5.2 Work completed.

_____ / _____
I&C Technician Date

5.5.3 Assigned Supervisor shall review procedure for satisfactory completion of all previous steps.

_____ / _____
Assigned Supervisor Date

6.0 **ACCEPTANCE CRITERIA**

6.1 Procedure completed satisfactorily, as required by and documented in both Section 5.0 and Attachment 1 of this procedure.

6.2 Procedure shall be used for data collection only; tolerances, corrective actions, etc, are **not** applicable.

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TITLE: MANUAL READING OF ROD POSITION SYNCHROS

4.2 **EQUIPMENT AND PARTS PROTECTION**

4.2.1 During performance of maintenance, removed parts shall be adequately packaged, identified, and stored so that they are not lost, damaged, or lose their traceability to the component from which they were removed. Also ensure plug in cable on torque receiver is in good condition.

4.3 **Q-LIST**

This procedure is considered safety-related.

4.4 **EQUIPMENT LIMITATIONS**

The primary and secondary rod position indication must be compared each shift. A maximum of 12 hours allowed between consecutive readings.

5.0 **PROCEDURE**

USER ALERT
REFERENCE USE PROCEDURE

Refer to the procedure periodically to confirm that all procedure segments of an activity will be or are being performed. Where required, sign appropriate sign-off blanks to certify that all segments are complete.

The following activities are covered by this procedure:

PARAGRAPH	ACTIVITY DESCRIPTION
5.1	Setup
5.2	Measurement
5.3	Post Maintenance Activities

TITLE: MANUAL READING OF ROD POSITION SYNCHROS

NOTE: It is recommended that the lead Technician initial steps which are complete, so that the oncoming shift will know where the outgoing shift stopped work.

5.1 SETUP

5.1.1 Locate synchro input panels, upper 1/4 section primary computer cabinet located in rear of C-06 panel.

5.1.2 Obtain synchro torque receiver. Refer to Attachment 1 for familiarization of typical synchro terminal block.

NOTE: Invalid information will be obtained if, during the process of measurement and comparison, rod positions are being varied.

5.2 MEASUREMENT

Fill out Attachment 3 per Attachment 3 instructions.

5.3 POST MAINTENANCE ACTIVITIES

5.3.1 Assigned Supervisor to inspect the work area and verify all tools are picked up, put away, and all waste is disposed of properly.

_____ / _____
Assigned Supervisor Date

5.3.2 Technician shall designate completion of work.

_____ / _____
Technician Date

5.3.3 Assigned Supervisor to review procedure for satisfactory completion.

_____ / _____
Assigned Supervisor Date

6.0 ACCEPTANCE CRITERIA

None. This procedure is for collection of data only. Control Room Operators will review data as part of SHO-1 procedure.

FIGURE 1

TYPICAL SYNCHRO INPUT TERMINAL BLOCK

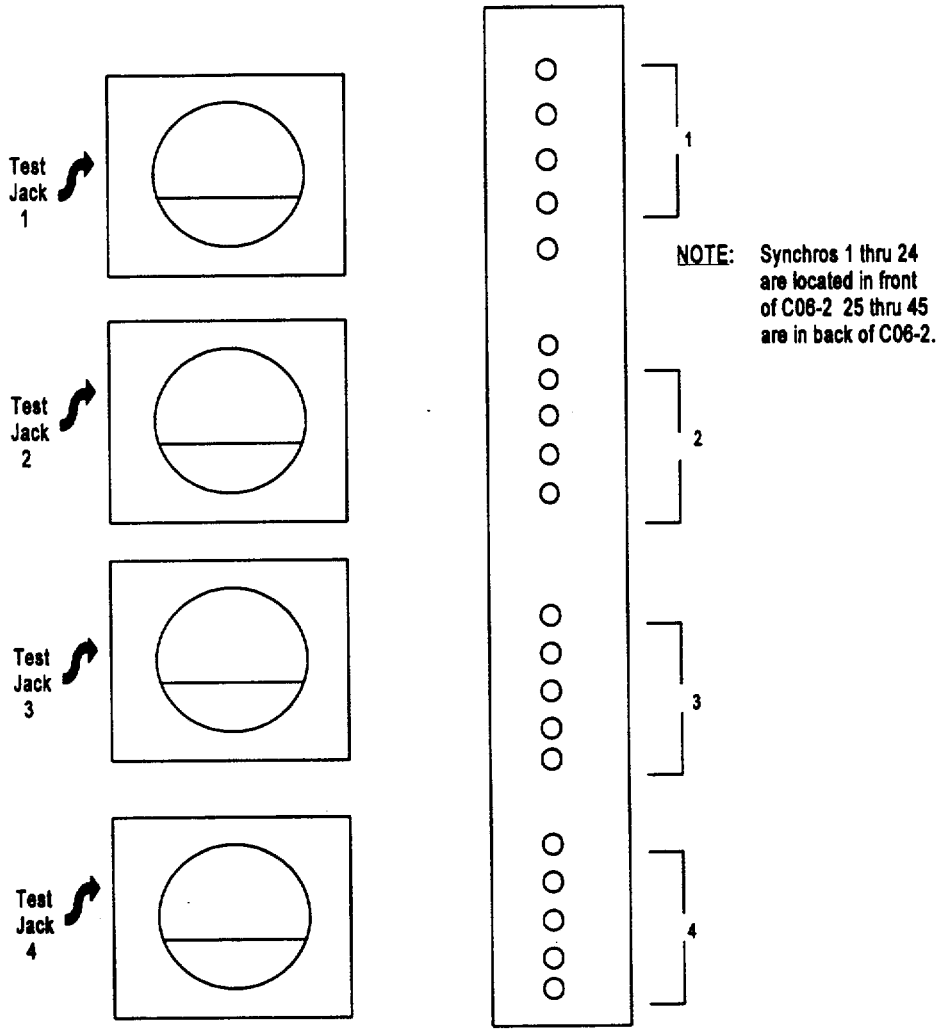


TABLE 1

Degrees	Inch	Degrees	Inch	Degrees	Inch	Degrees	Inch
180	0	108	36	36	72	324	108
178	1	106	37	34	73	322	109
176	2	104	38	32	74	320	110
174	3	102	39	30	75	318	111
172	4	100	40	28	76	316	112
170	5	98	41	26	77	314	113
168	6	96	42	24	78	312	114
166	7	94	43	22	79	310	115
164	8	92	44	20	80	308	116
162	9	90	45	18	81	306	117
160	10	88	46	16	82	304	118
158	11	86	47	14	83	302	119
156	12	84	48	12	84	300	120
154	13	82	49	10	85	298	121
152	14	80	50	8	86	296	122
150	15	78	51	6	87	294	123
148	16	76	52	4	88	292	124
148	16	76	52	4	88	290	125
146	17	74	53	2	89	288	126
144	18	72	54	0/360	90	286	127
142	19	70	55	358	91	284	128
140	20	68	56	356	92	282	129
138	21	66	57	354	93	280	130
136	22	64	58	352	94	278	131
134	23	62	59	350	95	276	132
132	24	60	60	348	96		
130	25	58	61	346	97		
128	26	56	62	344	98		
126	27	54	63	342	99		
124	28	52	64	340	100		
122	29	50	65	338	101		
120	30	48	66	336	102		
118	31	46	67	334	103		
116	32	44	68	332	104		
114	33	42	69	330	105		
112	34	40	70	328	106		
110	35	38	71	326	107		

CONTROL ROD POSITION DATA SHEET

Based on Manual Reading of Control Rod Synchros

Date: _____ Time: _____

1. Measure Synchros.
   For each CRDM in table, perform following:
   a. Insert Synchro Torque Receiver into an appropriate synchro test jack.
   b. Record Synchro Degrees to table below.
2. Convert degrees to inches using Attachment 2, Table 1.

CRDM No (Synchro Jack No)	Synchro Degrees	Rod Position Inches (From Table 1 Att 2)	CRDM No (Synchro Jack No)	Synchro Degrees	Rod Position Inches (From Table 1 Att 2)
1			24		
2			25		
3			26		
4			27		
5			28		
6			29		
7			30		
8			31		
9			32		
10			33		
11			35		
12			36		
13			37		
14			38		
15			39		
16			40		
17			41		
18			42		
19			43		
20			44		
21			45		
22					
23					

Performed By: _____ / _____
Technician Date

Conversions Verified By: _____ / _____
Technician Date

ATTACHMENT 2

CONSUMERS ENERGY COMPANY
PALISADES PLANT
DOCKET 50-255

January 10, 2001

PIDAL-3 Results of Dropped Control Rod

11 Pages

This response addresses the NRC's concerns on the magnitude of uncertainty given a dropped control rod incident, and the uncertainty effects of 75%, 50%, and 25% of the detectors operable. The data presented demonstrates that the uncertainties calculated in the latest PIDAL-3 submittal are bounding for a representative asymmetric core condition with 50% of the detectors operable (Table 2 comparison). The data presented also demonstrates PIDAL-3 is accurately predicting uncertainties and modeling expected trends in those uncertainties for more extreme asymmetric core conditions down to 25% detector operability (Table 3 comparison).

Dropped control rod data prior to cycle 7 could not be located. Palisades had one dropped control rod incident in cycle 7 on April 27, 1988, from which we were able to extract the necessary incore detector data to analyze in PIDAL-3. The data consists of 2 cases as the plant was coming down in power:

04/27/1988 06:20 Control rod A-06 fully inserted from 100% power, all other rods withdrawn.
04/27/1988 06:39 First Incore snapshot at 94.2% power with A-06 inserted.
04/27/1988 06:58 Second Incore snapshot at 90.4% power with A-06 inserted.

Control rod A-06 (Core Location I-12 – please refer to the core map provided in the November 3, 2000 RAI response) lies in between quadrants 2 and 3. The quadrant power tilt produced for each case was:

Table 1

Snapshot	Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4
04/27/1988 06:39	1.0751	0.9587	0.9149	1.0485
04/27/1988 06:58	1.0810	0.9534	0.9090	1.0537

The following comparison uses data from the latest PIDAL-3 submittal, Figure 4.5a "11 Xenon," and the dropped control rod analysis of these two cases:

Table 2

	Peak Asm. (F_R^A)	Peak Pin (F_R^T)	Peak LHGR (F_Q)
Figure 4.5a "11 Xenon"	0.0360	0.0390	0.0417
Calculated for Dropped CR	0.0343	0.0366	0.0366

As the data shows, the cycle 7 dropped control rod analysis is bounded by the cycle 11 Xenon transient analysis. These cases include the uncertainty penalty resulting from 50% of the incore detectors being inoperable as derived in EA-PID-99-02 Rev 0, and shown in Figure 4.5a of the latest PIDAL-3 submittal. These cases have also eliminated any detectors with relative power fractions less than 1.0, and any of the previously identified mis-aligned detectors in EA-PID-99-01 Rev 0.

Included with this discussion are 5 pages of EXCEL colored tables that show how the random numbers were generated for each of the failure scenarios, and the percent deviations for the first Incore snapshot included in each of the uncertainty analyses. For cycle 7, detector strings 3 and 25 exhibited large deviations (mis-behaving), and for cycle 11, detector strings 2, 6, 9, 35, 36, and 40 were mis-behaving. In cycle 7, detector 3 was one of the 6 identified axially mis-aligned detectors, and detector 25 was next to the dropped control rod. In cycle 11, detectors 9, 11, 35, and 36 are symmetric partners next to the lead control rod group 4, which is partially inserted. Detector 40 is also next to group 4. Thus, the top detectors show larger than normal percent deviations.

The results of the uncertainty analysis with 75%, 50%, and 25% of the incore detectors operable is as follows:

Table 3

	Cycle 7 Dropped Control Rod			Cycle 11 Xenon Transient		
Case Number	Peak Asm. (F_R^A)	Peak Pin (F_R^T)	Peak LHGR (F_Q)	Peak Asm. (F_R^A)	Peak Pin (F_R^T)	Peak LHGR (F_Q)
Base	0.0408	0.0437	0.0461	0.0296	0.0344	0.0475
1 75%	0.0425	0.0453	0.0480	0.0282	0.0331	0.0444
2 75%	**0.0444**	**0.0470**	**0.0491**	0.0288	0.0336	0.0485
3 75%	0.0396	0.0426	0.0463	**0.0313**	**0.0358**	**0.0509**
4 75%	0.0372	0.0404	0.0446	0.0294	0.0341	0.0473
5 75%	0.0436	0.0463	0.0474	0.0295	0.0341	0.0473
1 50%	0.0492	0.0513	**0.0525**	0.0267	0.0318	0.0419
2 50%	0.0509	**0.0531**	0.0491	0.0287	0.0334	0.0496
3 50%	0.0404	0.0430	0.0423	**0.0324**	**0.0367**	**0.0519**
4 50%	0.0418	0.0444	0.0487	0.0305	0.0352	0.0467
5 50%	**0.0512**	**0.0531**	0.0476	**0.0324**	**0.0367**	0.0510
1 25%	0.0429	0.0437	0.0408	0.0290	0.0337	0.0451
2 25%	0.0500	0.0509	0.0457	0.0324	0.0366	0.0506
3 25%	0.0473	0.0474	0.0469	**0.0363**	**0.0400**	**0.0546**
4 25%	0.0459	0.0470	0.0423	0.0323	0.0365	0.0490
5 25%	**0.0750**	**0.0752**	**0.0599**	0.0341	0.0381	0.0496

As the data shows, the calculated uncertainty depends on which detectors (in terms of the magnitude of deviations present) are failed and not necessarily on the total number of detectors failed. For example, the results improve for cycle 7, case 1 from 50% to 25% operability, and for cycle 11, case 1 from 75% to 50% operability. Overall, the uncertainties increased as the total number of operable detectors decreased, for the most limiting cases. This is because the detectors with larger deviations (mis-behaved) remained operable throughout all of the cases, from the base case with 100%

operability to the 25% operability case. Thus, the effect of each nonrepresentative detector becomes more dominant as the number of valid detectors decreases, and the standard deviations become larger with fewer degrees of freedom. This is the reason why the cycle 7, case 5 uncertainties increased so dramatically at 25% operability since there are only 9 total detectors in 2 cases, and detector 25 (adjacent to dropped control rod) is operable.

The reason the base case uncertainties are higher in Table 3 than the uncertainties reported in Table 2 is that these include all assemblies with relative powers less than 1.0 and all of the identified mis-aligned detectors. This was done to help illustrate why the uncertainties are influenced more by which detectors are operable than by the total number of operable detectors.

EA-PID-99-02 Random Number Generation

Case 1	Case 2	Case 3	Case 4	Case 5
16	**37**	**38**	**24**	**12**
9	**33**	38	13	12
2	**27**	42	24	**26**
19	42	**26**	**6**	**18**
13	**15**	**27**	**12**	41
41	**21**	**23**	**26**	**39**
9	**30**	**10**	**16**	**29**
24	**35**	**8**	**20**	**5**
30	**31**	**25**	**25**	**16**
35	**40**	26	**10**	**2**
10	38	42	**11**	**22**
39	**3**	**18**	7	**40**
12	**8**	42	**9**	**8**
24	**16**	**15**	**22**	**24**
31	**5**	**5**	9	**3**
36	**20**	**28**	11	**43**
17	**24**	**32**	**31**	29
5	42	**16**	**29**	**10**
13	3	**12**	13	**21**
41	20	**36**	12	10
26	**26**	5	**27**	18
9	8	23	16	5
24	33	15	**8**	**6**
42	15	**3**	**40**	**17**
34	**2**	13	7	**38**
30	20	**31**	**17**	**33**
38	41	38	**15**	29
23	20	**21**	**35**	**9**
24	**43**	23	7	29
4	35	**14**	**21**	41
34	35	7	**33**	24
5	33	31	20	8
43	**10**	36	**3**	22
25	**14**	27	40	9
3	41	**37**	4	**23**
13	3	34	**28**	33
18	**6**	26	**39**	38
41	3	**19**	**37**	8
12	4	3	9	**11**
3	14	16	25	17
17	**17**	**39**	21	**19**
14	42	**35**	**43**	13
41	4	31	35	42
21	14	**33**	16	34
5	10	5	17	22
23	17	42	4	11
2	40	**6**	13	34
30	35	32	**5**	7
33	**28**	**11**	19	**14**
31	**25**	7	42	**30**
24	35	35	13	9
38	7	4	33	**32**
24	17	21	26	38
6	**39**	21	10	39
32	41	25	16	7
30	3	**24**	7	8
2	6	34	30	18
12	**9**	9	18	2
3	6	9	42	12
36	27	36	28	37
23	6	35	17	40
7	17	10	32	33
38	31	40	40	16
7	8	25	27	24
14	33	35	28	36
4	40	13	5	19
33	22	11	35	25
33	34	15	36	27
39	7	33	20	33
28	18	5	24	14

This is a random set of numbers from 2 to 43 using a uniform distribution since the failure probability is the same for each detector.

ICIs 1, 4, 13, 34, 41, 42, and 45 were eliminated due to ICI reductions in [PID991]. ICIs 7 and 44 were eliminated due to RVLIS.

The first 9, 18, and 27 numbers were chosen based on 36 total ICI strings disregarding duplicates and any of the eliminated ICIs listed above. This was determined to be acceptable for the 25%, 50%, and 75% failed ICI tests.

Failed ICI Strings in Bold Numbers

25%	50%	75%	Percent Failed
			ICIs Failed

C01

CYCLE 07 STATISTICAL DATA FROM PIDAL-3 CASE 1 DATE/TIME 04/27/1988 06:39:00

P3 VS S3 REPLACEMENT POWERS

	PIDAL-3 ICI POWERS					SIMULATE-3 ICI POWERS				
STRING	LEVEL1	LEVEL2	LEVEL3	LEVEL4	LEVEL5	LEVEL1	LEVEL2	LEVEL3	LEVEL4	LEVEL5
1	1.3611	1.3351	1.2892	1.2978	0.0000	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000
2	1.5166	1.7070	1.6596	1.6415	1.4220	1.5710	1.7052	1.6552	1.6514	1.4123
3	1.4824	1.5379	1.4926	1.3717	1.3767	1.5582	1.5692	1.5298	1.5439	1.3436
4	1.2015	1.2202	1.2126	1.2442	1.2086	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *
5	1.3513	1.3567	1.3406	1.3590	1.2307	1.3524	1.3649	1.3337	1.3046	1.2678
6	1.5330	1.7031	1.6470	1.6408	1.4545	1.5233	1.6812	1.6400	1.6538	1.4429
7	1.7118	1.8276	1.7533	1.7352	1.4830	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *
8	1.3659	1.4621	1.4371	1.4703	1.3493	1.3735	1.4891	1.4553	1.4759	1.3563
9	1.0323	1.0672	1.0595	1.0975	1.0660	1.0526	1.1021	1.0941	1.1211	1.0883
10	1.5800	1.6648	1.6555	1.6757	1.5211	1.5822	1.6824	1.6503	1.6719	1.5380
11	1.1891	1.1879	1.1573	1.1809	1.0923	1.2116	1.2296	1.2052	1.2205	1.1402
12	1.5719	1.6191	1.5699	1.5729	1.3782	1.5652	1.6248	1.5652	1.5637	1.3823
13	0.8363	0.9846	0.9662	0.9584	0.8274	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *
14	1.3364	1.3982	1.3815	1.4182	1.3598	1.3420	1.3761	1.3707	1.4049	1.3407
15	1.2752	1.3050	1.2827	1.3165	1.2545	1.2748	1.2987	1.2812	1.3012	1.2375
16	1.3762	1.4010	1.3668	1.3822	1.2754	1.3717	1.3784	1.3472	1.3675	1.2719
17	1.3243	1.4358	1.4192	1.4516	1.3139	1.3203	1.4369	1.4104	1.4393	1.3294
18	1.1237	1.2100	1.1808	1.2229	1.1896	1.1179	1.1662	1.1633	1.2030	1.1675
19	0.8658	0.8747	0.8879	0.9180	0.9031	0.8409	0.8763	0.8800	0.9126	0.9007
20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21	1.4169	1.4717	1.4536	1.4901	1.4173	1.4332	1.4560	1.4398	1.4691	1.3667
22	1.5332	1.5281	1.5111	1.5404	1.4016	1.5053	1.5470	1.5194	1.5470	1.4581
23	1.2450	1.3426	1.3137	1.3526	1.2401	1.2461	1.3530	1.3361	1.3649	1.2549
24	0.8919	0.9328	0.9359	0.9762	0.9631	0.8789	0.9227	0.9263	0.9685	0.9598
25	0.6872	0.7333	0.7442	0.7764	0.7668	0.6599	0.6944	0.6987	0.7305	0.7167
26	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
27	0.9462	0.9709	0.9714	0.9918	0.9794	0.9551	0.9803	0.9779	1.0106	0.9876
28	1.2752	1.2806	1.2573	1.2737	1.2222	1.2925	1.3033	1.2770	1.2998	1.2349
29	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30	1.5205	1.6101	0.0000	1.5549	1.3875	1.5160	1.5973	0.0000	1.5414	1.3713
31	1.1191	1.1565	1.1537	1.1829	1.1572	1.1041	1.1421	1.1370	1.1691	1.1321
32	1.4116	1.4517	1.4226	1.4646	1.4003	1.4250	1.4678	1.4562	1.4840	1.4071
33	1.4214	1.4623	1.4483	1.4724	1.3746	1.4441	1.4837	1.4513	1.4732	1.3766
34	1.2407	1.3966	1.3617	1.3685	1.1777	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *
35	1.0380	1.0718	1.0604	1.0945	1.0504	1.0687	1.1063	1.1002	1.1267	1.0885
36	1.1704	1.2011	1.1756	1.1994	1.1295	1.2252	1.2570	1.2288	1.2461	1.1697
37	1.2277	1.2703	1.2504	1.2663	1.1946	1.2227	1.2781	1.2616	1.2855	1.2019
38	1.4912	1.5468	1.5331	1.5552	1.4416	1.5082	1.5710	1.5432	1.5671	1.4685
39	1.5323	1.5749	1.5667	1.5835	1.4759	1.4921	1.5270	1.4997	1.5316	1.4438
40	1.7619	1.9150	1.8121	1.7915	1.5350	1.7080	1.8646	1.7834	1.7777	1.4855
41	0.8209	0.9938	0.9459	0.9510	0.7731	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *
42	1.2881	1.4316	1.3922	1.3937	1.1964	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *
43	1.4222	1.5398	1.4961	1.5235	1.4026	1.4683	1.5467	1.5183	1.5297	1.3701
44	1.7225	1.8311	1.7592	1.7524	1.3949	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *
45	1.2039	1.3289	1.2916	1.2874	1.0704	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *

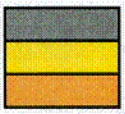
NOTE: (*) ELIMINATED FROM STATISTICS BY USER

C02

CYCLE 07 STATISTICAL DATA FROM PIDAL-3 CASE 1 DATE/TIME 04/27/1988 06:39:00

REPLACEMENT ICI POWER PERCENT DEVIATIONS

STRING	LEVEL1	LEVEL2	LEVEL3	LEVEL4	LEVEL5
1	0.00	0.00	0.00	0.00	0.00
2	-3.59	0.10	0.27	-0.60	0.68
3	-5.11 *	-2.03	-2.49	-12.55 *	2.40
4	0.00	0.00	0.00	0.00	0.00
5	-0.08	-0.60	0.51	4.00	-3.02
6	0.63	1.29	0.42	-0.79	0.80
7	0.00	0.00	0.00	0.00	0.00
8	-0.56	-1.85	-1.27	-0.38	-0.52
9	-1.97	-3.27	-3.27	-2.15	-2.09
10	-0.14	-1.06	0.32	0.23	-1.11
11	-1.90	-3.51	-4.14	-3.35	-4.39
12	0.43	-0.35	0.30	0.59	-0.30
13	0.00	0.00	0.00	0.00	0.00
14	-0.42	1.59	0.78	0.94	1.40
15	0.03	0.48	0.12	1.16	1.35
16	0.33	1.61	1.44	1.06	0.27
17	0.30	-0.07	0.62	0.85	-1.18
18	0.52	3.62	1.48	1.63	1.85
19	2.87	-0.18	0.90	0.59	0.27
20	0.00	0.00	0.00	0.00	0.00
21	-1.15	1.07	0.95	1.41	3.57
22	1.82	-1.24	-0.55	-0.43	-4.03
23	-0.09	-0.77	-1.70	-0.91	-1.19
24	1.46	1.08	1.03	0.79	0.34
25	3.97	5.31 *	6.11 *	5.91 *	6.52 *
26	0.00	0.00	0.00	0.00	0.00
27	-0.94	-0.96	-0.67	-1.90	-0.84
28	-1.36	-1.77	-1.57	-2.05	-1.03
29	0.00	0.00	0.00	0.00	0.00
30	0.29	0.79	0.00	0.87	1.17
31	1.34	1.25	1.45	1.17	2.17
32	-0.95	-1.11	-2.36	-1.33	-0.49
33	-1.60	-1.47	-0.21	-0.05	-0.14
34	0.00	0.00	0.00	0.00	0.00
35	-2.96	-3.22	-3.75	-2.95	-3.63
36	-4.68	-4.66	-4.53	-3.89	-3.55
37	0.41	-0.62	-0.89	-1.51	-0.60
38	-1.15	-1.56	-0.66	-0.77	-1.86
39	2.63	3.04	4.28	3.28	2.17
40	3.06	2.63	1.58	0.77	3.22
41	0.00	0.00	0.00	0.00	0.00
42	0.00	0.00	0.00	0.00	0.00
43	-3.24	-0.45	-1.48	-0.41	2.32
44	0.00	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00



ICI String Eliminated
ICI String Eligible
ICI String Misbehaving

C 03

NOTE: (*) PERCENT DEVIATIONS > 5%

CYCLE 11 STATISTICAL DATA FROM PIDAL-3 CASE 1 DATE/TIME 05/10/1995 15:02:00

P3 VS S3 REPLACEMENT POWERS

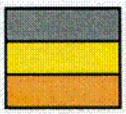
	PIDAL-3 ICI POWERS					SIMULATE-3 ICI POWERS				
STRING	LEVEL1	LEVEL2	LEVEL3	LEVEL4	LEVEL5	LEVEL1	LEVEL2	LEVEL3	LEVEL4	LEVEL5
1	0.1769	0.1879	0.1921	0.1938	0.1858	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *
2	0.5561	0.5161	0.5770	0.5596	0.5631	0.5565	0.5589	0.5688	0.5618	0.5642
3	0.8490	0.8853	0.0000	0.8934	0.0000	0.8701	0.8851	0.0000	0.8995	0.0000
4	0.9632	0.9770	1.0049	1.0290	1.0534	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *
5	0.8797	0.8539	0.8464	0.7943	0.7416	0.8506	0.8452	0.8526	0.8040	0.7730
6	0.6559	0.6570	0.6579	0.4333	0.2912	0.6594	0.6570	0.6653	0.4476	0.3127
7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.8610	0.8888	0.8932	0.7650	0.6771	0.8585	0.8892	0.8822	0.7703	0.6548
9	1.1308	1.1844	1.1873	0.8809	0.6689	1.1415	1.1754	1.1941	0.8575	0.6066
10	1.1874	1.2255	1.2603	1.2688	1.2072	1.1706	1.2131	1.2364	1.2413	1.2071
11	1.1841	1.1649	1.1772	0.8858	0.6347	1.1580	1.1835	1.1852	0.8433	0.6055
12	0.9029	0.9096	0.8992	0.7675	0.6741	0.8807	0.8857	0.8867	0.7738	0.6679
13	0.1740	0.1735	0.1749	0.1809	0.1832	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *
14	0.8954	0.8939	0.9176	0.9547	1.0330	0.9040	0.9012	0.9297	0.9769	1.0251
15	0.8159	0.8355	0.8547	0.8733	0.8895	0.8221	0.8340	0.8497	0.8719	0.8838
16	0.8144	0.8285	0.8330	0.7786	0.7540	0.8326	0.8210	0.8335	0.7881	0.7439
17	0.8626	0.8885	0.9039	0.9282	0.8786	0.8590	0.8888	0.9027	0.9257	0.9029
18	0.9204	0.9311	0.9423	0.9665	0.9566	0.9369	0.9526	0.9634	0.9710	0.9597
19	1.1242	1.1646	1.1965	1.2489	1.2263	1.1255	1.1611	1.1818	1.2317	1.2479
20	1.1135	1.1399	1.1709	1.1635	1.1209	1.1411	1.1726	1.1898	1.1887	1.1430
21	0.7742	0.7610	0.7813	0.8334	0.8960	0.7582	0.7437	0.7659	0.8106	0.8727
22	0.9030	0.8840	0.9066	0.9480	0.9929	0.9133	0.9044	0.9293	0.9725	1.0263
23	0.9293	0.9534	0.9842	1.0164	0.9880	0.9159	0.9553	0.9677	1.0219	0.9975
24	0.9140	0.0000	0.9367	0.9937	1.0035	0.9247	0.0000	0.9525	0.9922	1.0201
25	0.8982	0.0000	0.9154	0.9601	1.0218	0.9139	0.0000	0.9314	0.9841	1.0245
26	0.7869	0.7770	0.7993	0.8393	0.8876	0.7555	0.7530	0.7697	0.8188	0.8847
27	0.8173	0.7902	0.8036	0.8567	0.9469	0.8147	0.7918	0.8154	0.8677	0.9521
28	1.1033	1.1445	1.1768	1.1904	1.1560	1.1217	1.1564	1.1845	1.2088	1.1736
29	1.1688	1.1880	1.2203	1.2497	1.2139	1.1263	1.1566	1.1816	1.2232	1.2361
30	0.8838	0.9168	0.9278	0.9283	0.8970	0.8548	0.8804	0.9015	0.8995	0.8802
31	0.8343	0.8547	0.8715	0.8939	0.0000	0.8230	0.8493	0.8598	0.8814	0.0000
32	0.8850	0.0000	0.9175	0.9469	1.0339	0.9185	0.0000	0.9387	0.9860	1.0234
33	1.1680	1.2071	1.2428	1.2098	1.1128	1.1836	1.2256	1.2455	1.2060	1.1284
34	0.3237	0.3259	0.3306	0.3152	0.2997	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *
35	1.1907	1.2183	1.2186	0.8780	0.6628	1.1593	1.1958	1.1963	0.8674	0.6192
36	1.1622	1.1718	1.2058	0.8666	0.6505	1.1508	1.1830	1.2007	0.8536	0.6009
37	0.9296	0.9296	0.9273	0.6666	0.5053	0.9331	0.9355	0.9365	0.6645	0.4878
38	1.1362	1.1805	1.1812	1.0868	0.9620	1.1587	1.2009	1.1974	1.1021	0.9911
39	0.0000	1.2093	1.2409	1.3051	1.2416	0.0000	1.2110	1.2353	1.2720	1.2495
40	0.6606	0.6569	0.6592	0.4207	0.2941	0.6744	0.6604	0.6730	0.4476	0.3085
41	0.1319	0.1245	0.1229	0.1069	0.1039	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *
42	0.3411	0.3403	0.3311	0.2707	0.2335	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *
43	0.8465	0.8915	0.9109	0.9340	0.9126	0.8612	0.8941	0.9071	0.9325	0.9067
44	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45	0.2607	0.2642	0.2699	0.2828	0.2879	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *

NOTE: (*) ELIMINATED FROM STATISTICS BY USER

CYCLE 11 STATISTICAL DATA FROM PIDAL-3 CASE 1 DATE/TIME 05/10/1995 15:02:00

REPLACEMENT ICI POWER PERCENT DEVIATIONS

STRING	LEVEL1	LEVEL2	LEVEL3	LEVEL4	LEVEL5
1	0.00	0.00	0.00	0.00	0.00
2	-0.07	-8.29 *	1.43	-0.39	-0.18
3	-2.49	0.02	0.00	-0.68	0.00
4	0.00	0.00	0.00	0.00	0.00
5	3.31	1.02	-0.73	-1.23	-4.24
6	-0.53	-0.01	-1.12	-3.29	-7.40 *
7	0.00	0.00	0.00	0.00	0.00
8	0.29	-0.04	1.23	-0.69	3.29
9	-0.95	0.77	-0.58	2.66	9.32 *
10	1.41	1.01	1.90	2.17	0.02
11	2.21	-1.60	-0.68	4.80	4.60
12	2.46	2.63	1.39	-0.83	0.92
13	0.00	0.00	0.00	0.00	0.00
14	-0.97	-0.83	-1.32	-2.32	0.76
15	-0.77	0.18	0.59	0.16	0.64
16	-2.23	0.90	-0.06	-1.22	1.33
17	0.43	-0.03	0.13	0.28	-2.77
18	-1.80	-2.31	-2.25	-0.47	-0.32
19	-0.12	0.30	1.22	1.38	-1.76
20	-2.48	-2.86	-1.61	-2.17	-1.97
21	2.07	2.28	1.98	2.73	2.60
22	-1.14	-2.31	-2.51	-2.58	-3.36
23	1.44	-0.20	1.67	-0.55	-0.97
24	-1.18	0.00	-1.69	0.15	-1.66
25	-1.75	0.00	-1.74	-2.50	-0.27
26	3.99	3.10	3.70	2.44	0.33
27	0.31	-0.21	-1.48	-1.28	-0.54
28	-1.67	-1.04	-0.66	-1.55	-1.52
29	3.64	2.64	3.17	2.12	-1.83
30	3.27	3.97	2.84	3.11	1.87
31	1.36	0.63	1.34	1.40	0.00
32	-3.78	0.00	-2.31	-4.13	1.02
33	-1.33	-1.54	-0.22	0.32	-1.41
34	0.00	0.00	0.00	0.00	0.00
35	2.63	1.84	1.83	1.21	6.58 *
36	0.98	-0.96	0.42	1.50	7.63 *
37	-0.38	-0.64	-0.99	0.32	3.46
38	-1.98	-1.73	-1.37	-1.41	-3.02
39	0.00	-0.14	0.45	2.54	-0.64
40	-2.08	-0.54	-2.09	-6.38 *	-4.91
41	0.00	0.00	0.00	0.00	0.00
42	0.00	0.00	0.00	0.00	0.00
43	-1.73	-0.29	0.41	0.17	0.64
44	0.00	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00



ICI String Eliminated
ICI String Eligible
ICI String Misbehaving

NOTE: (*) PERCENT DEVIATIONS > 5%

C05

	Sample Variance Input for Uncertainty Components					Calculated Peaking Factor Variances			Degrees of Freedom Input for Uncertainty Components					Calculated Peaking Factor Degrees of Freedom			Tolerance Factor Input from [OWEN]			TS Tolerance Limits For 50% Failures		
Cycle	Sf(s)	Sf(sa)	Sf(r)	Sf(z)	Sf(L)	Sf(q)	Sf(rT)	Sf(rA)	Df(s)	Df(sa)	Df(r)	Df(z)	Df(L)	Df(q)	Df(rT)	Df(rA)	Kf(q)	Kf(rT)	Kf(rA)	F(q)	F(rT)	F(rA)
07 base	0.0237	0.0203	0.0009	0.0026	0.0100	0.0259	0.0226	0.0203	320	64	408	408	96	413	95	64	1.778	1.935	2.008	0.0461	0.0437	0.0408
07d125	0.0246	0.0205	0.0009	0.0026	0.0100	0.0267	0.0228	0.0205	240	48	408	408	96	312	71	48	1.797	1.987	2.075	0.0480	0.0453	0.0425
07d225	0.0253	0.0214	0.0009	0.0026	0.0100	0.0273	0.0236	0.0214	240	48	408	408	96	307	69	48	1.798	1.993	2.075	**0.0491**	**0.0470**	**0.0444**
07d325	0.0236	0.0191	0.0009	0.0026	0.0100	0.0258	0.0216	0.0191	240	48	408	408	96	317	76	48	1.796	1.974	2.075	0.0463	0.0426	0.0396
07d425	0.0226	0.0180	0.0009	0.0026	0.0100	0.0249	0.0206	0.0180	250	50	408	408	96	335	82	50	1.791	1.960	2.065	0.0446	0.0404	0.0372
07d525	0.0243	0.0211	0.0009	0.0026	0.0100	0.0264	0.0234	0.0211	250	50	408	408	96	324	74	50	1.794	1.979	2.065	0.0474	0.0463	0.0436
07d150	0.0267	0.0224	0.0009	0.0026	0.0100	0.0286	0.0245	0.0224	160	32	408	408	96	204	45	32	1.837	2.092	2.197	**0.0525**	0.0513	0.0492
07d250	0.0248	0.0234	0.0009	0.0026	0.0100	0.0269	0.0255	0.0234	170	34	408	408	96	225	47	34	1.825	2.081	2.176	0.0491	**0.0531**	0.0509
07d350	0.0206	0.0182	0.0009	0.0026	0.0100	0.0231	0.0208	0.0182	150	30	408	408	96	218	50	30	1.830	2.065	2.220	0.0423	0.0430	0.0404
07d450	0.0246	0.0192	0.0009	0.0026	0.0100	0.0267	0.0217	0.0192	170	34	408	408	96	225	54	34	1.825	2.046	2.176	0.0487	0.0444	0.0418
07d550	0.0238	0.0233	0.0009	0.0026	0.0100	0.0260	0.0254	0.0233	160	32	408	408	96	217	45	32	1.830	2.092	2.197	0.0476	**0.0531**	**0.0512**
07d175	0.0187	0.0164	0.0009	0.0026	0.0100	0.0214	0.0192	0.0164	70	14	408	408	96	113	26	14	1.908	2.275	2.614	0.0408	0.0437	0.0429
07d275	0.0216	0.0198	0.0009	0.0026	0.0100	0.0240	0.0222	0.0198	80	16	408	408	96	117	25	16	1.903	2.292	2.524	0.0457	0.0509	0.0500
07d375	0.0217	0.0173	0.0009	0.0026	0.0100	0.0241	0.0200	0.0173	60	12	408	408	96	89	21	12	1.946	2.371	2.736	0.0469	0.0474	0.0473
07d475	0.0197	0.0182	0.0009	0.0026	0.0100	0.0223	0.0208	0.0182	80	16	408	408	96	124	27	16	1.895	2.260	2.524	0.0423	0.0470	0.0459
07d575	0.0293	0.0297	0.0009	0.0026	0.0100	0.0311	0.0314	0.0297	80	16	408	408	96	100	20	16	1.927	2.396	2.524	**0.0599**	**0.0752**	**0.0750**

Cycle	Reference	Notes
	[PID892] EA-P-PID-89002 Rev 0	1) Spreadsheet Equations from [PID892]
	[PID992] EA-PID-99-02 Rev 0	2) Penalty for Large Number of ICI failures:
		For [PID892] the penalty for 25% failure as calculated
		Fq + 0.0041 FrT + 0.0046 FrA + 0.0067
	[OWEN] Factors for One-sided Tolerance Limits,	For [PID992] the penalty for 50% failure as calculated
	DB Owen, March 1963, Pages 46 to 51	Fq + 0.0064 FrT + 0.0094 FrA + 0.0104

	Sample Variance Input for Uncertainty Components					Calculated Peaking Factor Variances			Degrees of Freedom Input for Uncertainty Components					Calculated Peaking Factor Degrees of Freedom			Tolerance Factor Input from [OWEN]			TS Tolerance Limits For 50% Failures		
Cycle	Sf(s)	Sf(sa)	Sf(r)	Sf(z)	Sf(L)	Sf(q)	Sf(rT)	Sf(rA)	Df(s)	Df(sa)	Df(r)	Df(z)	Df(L)	Df(q)	Df(rT)	Df(rA)	Kf(q)	Kf(rT)	Kf(rA)	F(q)	F(rT)	F(rA)
11 Base	0.0252	0.0169	0.0013	0.0063	0.0100	0.0279	0.0197	0.0169	3245	649	4488	4488	96	2648	655	649	1.703	1.748	1.750	0.0475	0.0344	0.0296
11x125	0.0232	0.0159	0.0013	0.0063	0.0100	0.0261	0.0188	0.0160	2530	506	4488	4488	96	2119	542	519	1.703	1.760	1.763	0.0444	0.0331	0.0282
11x225	0.0259	0.0162	0.0013	0.0063	0.0100	0.0285	0.0191	0.0163	2365	473	4488	4488	96	2238	533	485	1.703	1.760	1.766	0.0485	0.0336	0.0288
11x325	0.0274	0.0177	0.0013	0.0063	0.0100	0.0299	0.0204	0.0177	2365	473	4488	4488	96	2331	556	473	1.703	1.757	1.770	**0.0509**	**0.0358**	**0.0313**
11x425	0.0251	0.0166	0.0013	0.0063	0.0100	0.0278	0.0194	0.0167	2475	495	4488	4488	96	2255	550	507	1.703	1.757	1.763	0.0473	0.0341	0.0294
11x525	0.0251	0.0166	0.0013	0.0063	0.0100	0.0278	0.0194	0.0167	2420	484	4488	4488	96	2224	543	496	1.703	1.760	1.766	0.0473	0.0341	0.0295
11x150	0.0214	0.0148	0.0013	0.0063	0.0100	0.0245	0.0179	0.0149	1650	330	4488	4488	96	1556	411	339	1.712	1.778	1.791	0.0419	0.0318	0.0267
11x250	0.0264	0.0159	0.0013	0.0063	0.0100	0.0290	0.0188	0.0160	1650	330	4488	4488	96	1773	419	338	1.712	1.778	1.791	0.0496	0.0334	0.0287
11x350	0.0279	0.0181	0.0013	0.0063	0.0100	0.0303	0.0207	0.0181	1705	341	4488	4488	96	1833	438	341	1.712	1.774	1.790	**0.0519**	**0.0367**	**0.0324**
11x450	0.0246	0.0170	0.0013	0.0063	0.0100	0.0273	0.0198	0.0170	1595	319	4488	4488	96	1662	420	319	1.712	1.778	1.796	0.0467	0.0352	0.0305
11x550	0.0273	0.0181	0.0013	0.0063	0.0100	0.0298	0.0207	0.0181	1650	330	4488	4488	96	1788	428	330	1.712	1.774	1.792	0.0510	**0.0367**	**0.0324**
11x175	0.0232	0.0157	0.0013	0.0063	0.0100	0.0261	0.0187	0.0158	990	198	4488	4488	96	1168	298	203	1.727	1.801	1.837	0.0451	0.0337	0.0290
11x275	0.0268	0.0175	0.0013	0.0063	0.0100	0.0293	0.0202	0.0175	880	176	4488	4488	96	1067	261	176	1.727	1.812	1.851	0.0506	0.0366	0.0324
11x375	0.0293	0.0197	0.0013	0.0063	0.0100	0.0316	0.0221	0.0197	935	187	4488	4488	96	1117	262	187	1.727	1.812	1.844	**0.0546**	**0.0400**	**0.0363**
11x475	0.0258	0.0174	0.0013	0.0063	0.0100	0.0284	0.0201	0.0174	825	165	4488	4488	96	1014	247	165	1.727	1.817	1.858	0.0490	0.0365	0.0323
11x575	0.0261	0.0184	0.0013	0.0063	0.0100	0.0287	0.0210	0.0184	880	176	4488	4488	96	1074	257	176	1.727	1.814	1.851	0.0496	0.0381	0.0341

Cycle	Reference	Notes
	[PID892] EA-P-PID-89002 Rev 0	1) Spreadsheet Equations from [PID892]
	[PID992] EA-PID-99-02 Rev 0	2) Penalty for Large Number of ICI failures:
		For [PID892] the penalty for 25% failure as calculated
		Fq + 0.0041 FrT + 0.0046 FrA + 0.0067
	[OWEN] Factors for One-sided Tolerance Limits,	For [PID992] the penalty for 50% failure as calculated
	DB Owen, March 1963, Pages 46 to 51	Fq + 0.0044 FrT + 0.0023 FrA + 0.0028