



Nuclear Assurance Corporation
 24 Executive Park West
 Atlanta, Georgia 30329

Document No. 580
 (Supercedes : 7)

Page 1 of 7

Date:

Revision No. 3

10/80

Prepared By: H. R. Panter *[Signature]*

Title: NAC-1 Cask Cavity Measurements Procedure

Reviewed by: *[Signature]* 10-21-80
 C. C. Hoffman
 Manager, Cask Operations
 NUCLEAR ASSURANCE CORPORATION
 Date

Approved by: *[Signature]* 10/20/80
 J. M. Viebrock
 Manager, Operations and Engineering
 NUCLEAR ASSURANCE CORPORATION
 Date

Approved by: *[Signature]* 10/21/80
 D. A. Webster
 Corporate Manager, Quality Assurance
 NUCLEAR ASSURANCE CORPORATION
 Date

Prepared By: H. R. Panter

1.0 PURPOSE

To establish a procedure for measuring the cavity of the NAC-1, cask.

2.0 GENERAL

When measurements are to be taken on the NAC-1 cask cavity, the following procedure is to be used.

3.0 CAUTIONARY NOTES

- 3.1 A Radiation Work Permit (RWP) is required for this work.
- 3.2 A flotation device is to be worn by all personnel working over the pool.
- 3.3 Health Physics coverage is recommended.

4.0 OPERATION

4.1 Calibration of NAC-1 Cask Cavity Measuring Tool

4.1.1 Shaft

- 4.1.1.1 Assemble 3 sections of center shaft and suspend vertically by the threaded eye in the top end.
- 4.1.1.2 Attach a straight edge (5 ft min) to the shaft with one clamp at each end. Center the straight edge such that it overlaps both joints in the shaft.
- 4.1.1.3 Check straightness by inserting feeler gages into any openings between the straight edge and shaft. Record the size of the insertable feeler gages.
- 4.1.1.4 Rotate the shaft 90° and repeat step 4.1.1.3.
- 4.1.1.5 Repeat steps 4.1.1.2, 4.1.1.3, and 4.1.1.4 with the straight edge at the bottom of the shaft and top of the shaft.
- 4.1.1.6 Place one section of the shaft in "V" blocks and measure the diameter. Record the measurements.

Prepared By: H. R. Panter

4.1.2 Traveling Spider

- 4.1.2.1 Assemble per the drawing and label each indicator.
- 4.1.2.2 Place the spider on a shaft section and locate the shaft in "V" blocks.
- 4.1.2.3 "Zero" each indicator in the free position.
- 4.1.2.4 Rotate shaft or the spider until the indicator is vertical to and touches the measuring surface. Record this initial reading for each indicator.
- 4.1.2.5 - With at least three sizes of gage blocks, verify the accuracy of each indicator.

4.2 Installation and Operations

- 4.2.1 Calibrate the traveling spider per section 4.1.2.
- 4.2.2 Assemble the center shaft sections and attach the lower spider.
- 4.2.3 Attach the lifting eye to the top of the shaft and lift the shaft with the crane.
- 4.2.4 Insert the shaft with lower spider into the cavity of the cask.

NOTE: The cask must be in an upright position.

- 4.2.5 Place the traveling spider onto the shaft and insert it into the top of the cask cavity. Take care to keep the shaft centered on the cavity so as not to force the dial indicators past their operating range.
- 4.2.6 Place the top spider onto the shaft.
- 4.2.7 Slide the small auxiliary shaft through the hole in the top spider and screw it into one of the threaded holes in the traveling spider.
- 4.2.8 Position the top spider and traveling spider so the "B" dial indicator is at 90° with the "0°" cask body reference (center of the middle port and center of the antirotation bracket within the cask cavity).

Section: E15
 Title: NAC-1 Cask Cavity Measurements Procedure

Document No. 580
 (Super Des 20.7)

Revision No. 3

Date 10/80

Prepared By: H. R. Panter

NAC-1 Cask Cavity Measurement Procedure
 (Data Sheet 1 of 3)

Location: _____ Date _____

Cask Serial No. _____ Ambient Air Temp. _____

I. Calibration - Reference Section 4.1.1.3 through 4.1.1.6

A. Record thicknesses and location of any inserted feeler gage (4.1.1.3):

- 1. _____ 4. _____
- 2. _____ 5. _____
- 3. _____ 6. _____

B. Record measured shaft diameters (4.1.1.6):

- 1. _____ in.
- 2. _____ in.
- 3. _____ in.

II. Calibration of Traveling Spider (4.1.2.4):

No.	Indicator Initial Reading (mm)	Distance to Bottom of Shaft to Measuring Surface Reading (in.)	Indicator "Zero" Reading* (in.)
1			
2			
3			
4			
5			
6			

* Indicator "Zero" Reading = Indicator Initial Reading + Distance to Shaft + 1/2 Shaft Diameter.

III. Calibration Data for Indicators - Reference Section 4.1.2.5

Gauge Number	Readings (mm)					Date	Calibrated By
1							
2							
3							
4							
5							
6							

Data taken by: _____ of _____
 Qualified Operator Organization

Section: ETS	Document No. 580	Page 6 of 7
Title: NAC-1 Cask Cavity Measurements Procedure	(Supersedes 20.7)	
Prepared By: H. R. Panter	Revision No. 3	Date 10/80

NAC-1 Cask Cavity Measurement Procedure
(Data Sheet 2 of 3)

IV. Cask Measurement Data - Reference Section 4.2.10 through 4.2.14

Run _____ of Set _____

Spider Position from Top of Cavity	Indicator Number					
	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
4.5"						
6.5"						
12.5"						
18.5"						
24.5"						
30.5"						
36.5"						
42.5"						
48.5"						
54.5"						
60.5"						
66.5"						
72.5"						
78.5"						
84.5"						
90.5"						
96.5"						
102.5"						
108.5"						
114.5"						
120.5"						
126.5"						
132.5"						
138.5"						
144.5"						
150.5"						
156.6"						
162.5"						
168.5"						
174.5"						

Data taken by: _____ of _____
Qualified Operator Organization

Title: NAC-1 Cask Cavity Measurements Procedure

Revision No. 3

Date 10/80

Prepared By: H. R. Panter

NAC-1 Cask Cavity Measurement Procedure
(Data Sheet 1 of 3)

Location: Oconee Nuclear Power Station Date 10/22/80

Cask Serial No. NAC-1B Ambient Air Temp. 64-66°F

I. Calibration - Reference Section 4.1.1.3 through 4.1.1.6

A. Record thicknesses and location of any inserted feeler gage (4.1.1.3):

- 1. _____ 4. _____
- 2. _____ 5. _____
- 3. _____ 6. _____

B. Record measured shaft diameters (4.1.1.6): with "A" indicator

- 1. 1.999, 1.999 in.
- 2. 1.999, 1.999 in.
- 3. 1.999, 1.999 in.

DIGITAL READ OUT DISPLAY	0.200" Gauge	0.300"	0.900"
A9113772	2.03	4.57	19.81
B9113775	2.03	4.57	19.81
C9113776	2.03	4.57	19.81
D9113768	2.03	4.57	19.81
E9069152	2.03	4.57	19.81
F9113778	2.03	4.57	19.81

II. Calibration of Traveling Spider (4.1.2.4):

All MEASUREMENTS DONE WITH "B" Digital READOUT DISPLAY

Gauge Serial Number	Indicator No.	Indicator Initial Reading (mm) **	Distance to Bottom of Shaft to Measuring Surface Reading (in.) ***	Indicator "Zero" Reading* (in.)	Notes
801059	1A	2.02 (0.0795)	6.133 (6.1336)	7.2101	IV Inside Micrometer Reading V Inside Micrometer Reading measured with Master Height Gauge VI Seventh receiver Spare #/ 9113784
801062	2B	1.27 (0.0500)	6.132 (6.1314)	7.1806	
801068	3C	1.76 (0.0693)	6.129 (6.1294)	7.1999	
801065	4D	1.74 (0.0488)	6.130 (6.1308)	7.1794	
801066	5E	1.65 (0.0656)	6.131 (6.1314)	7.1956	
801063	6F	1.52 (0.0598)	6.129 (6.1299)	7.1904	

Average = 6.1307 (6.1311)

* Indicator "Zero" Reading = Indicator Initial Reading + Distance to Shaft + 1/2 Shaft Diameter.

** USED 0.200" GAUGE BLOCK TO DEPRESS INDICATOR *** CORRECTED FOR 0.200 in GAUGE BLOCK

III. Calibration Data for Indicators - Reference Section 4.1.2.5

Gauge Number	Readings (mm)							Date	Calibrated By
	.300"	.400"	.500"	.600"	.700"	.800"	.900"		
1	4.56	7.16	9.64	12.13	14.72	17.27	19.81	10/22/80	W. Miller
2	3.81	6.35	8.89	11.43	13.97	16.51	19.05	10/22/80	W. Miller
3	4.29	6.84	9.38	11.92	14.46	17.00	19.54	10/22/80	W. Miller
4	3.78	6.32	8.86	11.40	13.94	16.48	19.02	10/22/80	W. Miller
5	4.19	6.723	9.27	11.81	14.35	16.89	19.43	10/22/80	W. Miller
6	4.06	6.60	9.14	11.68	14.23	16.76	19.30	10/22/80	W. Miller
A	2.04	4.58	7.12	9.66	12.20	14.74	17.28	19.82	Repeat of Gauge A

Data taken by: Robert Bennett of NAC
 Qualified Operator Organization
 Verified by: W. Miller NAC

Title: NAC-1 Cask Cavity Measurements Procedure

Revision No. 3

Date 10/80

Prepared By: H. R. Panter

NAC-1 Cask Cavity Measurement Procedure
(Data Sheet 1 of 3)

Location: Oconee Nuclear Power Station Date 10/23/80

Cask Serial No. NAC-1B Ambient Air Temp.

I. Calibration - Reference Section 4.1.1.3 through 4.1.1.6

- A. Record thicknesses and location of any inserted feeler gage (4.1.1.3):
- | | 0° | 90° | 0° | 90° |
|-----------------------|----|--------------------|---------------------|---------------------|
| 1. $0.003 @ 10^\circ$ | | $0.003 @ 37^\circ$ | $0.006 @ 138^\circ$ | $0.005 @ 129^\circ$ |
| 2. < 0.002 | | $0.005 @ 96^\circ$ | $0.004 @ 142^\circ$ | $0.005 @ 158^\circ$ |
| 3. < 0.002 | | < 0.002 | | |
- B. Record measured shaft diameters (4.1.1.6): * Across the joints
- _____ in.
 - _____ in.
 - _____ in.

II. Calibration of Traveling Spider (4.1.2.4):

No.	Indicator Initial Reading (mm)	Distance to Bottom of Shaft to Measuring Surface Reading (in.)	Indicator "Zero" Reading* (in.)
1			
2			
3			
4			
5			
6			

* Indicator "Zero" Reading = Indicator Initial Reading + Distance to Shaft + 1/2 Shaft Diameter.

III. Calibration Data for Indicators - Reference Section 4.1.2.5

Gauge Number	Readings (mm)					Calibrated	
						Date	By
1							
2							
3							
4							
5							
6							

Data taken by: Arno Uebel of NAC
Qualified Operator Organization

Prepared By: H. R. Panter

10/80

NAC-1 Cask Cavity Measurement Procedure
 (Data Sheet 2 of 3)

IV. Cask Measurement Data - Reference Section 4.2.10 through 4.2.14

Run 1 of Set 1

Indicator Number

Spider Position from Top of Cavity	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
4.5"	12.03	11.30	11.82	11.35	11.72	11.29
6.5"	12.62	11.33	12.05	11.73	11.96	11.35
12.5"	12.28	10.28	9.49	10.25	9.71	8.36
18.5"	12.85	10.30	9.34	10.93	9.09	9.12
24.5"	12.97	10.34	9.22	10.09	8.54	9.78
30.5"	12.84	10.29	9.23	9.03	8.36	10.71
36.5"	13.02	10.55	9.47	8.81	7.81	10.99
42.5"	13.32	10.72	9.22	8.53	7.56	11.22
48.5"	13.75	11.02	9.10	8.03	7.37	11.20
54.5"	14.35	11.02	8.49	7.57	7.78	11.43
60.5"	14.78	11.10	7.93	7.42	7.84	10.91
66.5"	15.06	10.93	7.72	7.08	8.04	11.08
72.5"	15.04	10.84	7.59	7.07	8.03	11.28
78.5"	14.99	10.84	7.63	6.71	8.04	11.73
84.5"	15.04	10.87	7.40	6.72	8.13	11.85
90.5"	14.95	10.99	7.17	6.68	8.13	11.72
96.5"	15.08	11.15	7.19	6.70	7.78	11.72
102.5"	15.27	11.14	7.26	6.69	7.65	11.45
108.5"	15.51	11.43	7.19	6.90	7.55	11.26
114.5"	15.80	11.61	7.34	7.02	7.35	10.59
120.5"	15.87	11.78	7.21	7.24	7.15	9.96
126.5"	15.83	11.75	7.20	7.77	6.95	9.75
132.5"	15.66	11.74	7.44	8.08	6.89	9.71
138.5"	15.34	11.62	7.96	8.38	6.87	10.08
144.5"	14.81	11.36	8.69	8.83	7.05	10.33
150.5"	13.97	11.21	8.87	9.22	7.37	10.13
156.6"	13.12	11.06	9.29	9.68	7.87	9.72
162.5"	12.34	10.51	9.75	10.53	8.60	9.37
168.5"	11.62	9.76	10.44	11.22	9.46	8.94
174.5" Bottom	11.92	10.51	12.18	12.82	11.34	9.83

Data taken by: James Uppel of _____
 Qualified Operator Organization

Witnessed By: R. J. White (Dept. PA)

Section: ETS	Document No. 580 (Supersedes 20.7)	Page 7 of 7
Title: NAC-1 Cask Cavity Measurements Procedure	Revision No. 3	Date 10/80
Prepared By: H. R. Panter		

NAC-1 Cask Cavity Measurement Procedure
(Data sheet 3 of 3)

Run 1 of Set 1

V. Re-verified Data* - Reference Section 4.2.14

Spider Position	Indicator Number					
	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
168.5	11.60	9.83	10.33	12.13	9.80	8.54
138.5	15.47	12.36	8.20	8.45	6.77	9.22
108.5	15.52	12.43	7.49	7.29	6.91	10.35
78.5	15.02	11.66	7.69	7.04	7.38	10.46
48.5	14.02	10.87	9.17	7.69	7.65	11.73
18.5	12.62	10.39	9.48	9.90	9.22	9.22

Data Taken by: James Ullrich of NAC
 Qualified Operator Organization

Witnessed By: O. L. White (Duke - PA)

* If more than 10 re-verification data points are checked, use an additional copy of this form.

Section: ETS

Document No. 580

Title: NAC-1 Cask Cav...y Measurements Procedure

(Super: les 20.7)

Page 6 of 7

Revision No. 3

Date

10/80

Prepared By: H. R. Panter

NAC-1 Cask Cavity Measurement Procedure
(Data Sheet 2 of 3)

10/23/80

IV. Cask Measurement Data - Reference Section 4.2.10 through 4.2.14

Run 2 of Set 1 SHAFT ROTATED ~120° FROM RUN 1

Indicator Number

Spider Position from Top of Cavity	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
4.5"	12.16	11.08	11.64	11.31	11.80	11.76
6.5"	12.55	10.96	11.60	11.57	12.17	11.44
12.5"	12.16	10.01	9.19	9.94	10.36	9.06
18.5"	12.30	9.54	8.99	10.26	9.96	9.62
24.5"	12.08	8.92	9.04	9.97	9.89	10.96
30.5"	11.98	8.45	9.09	9.68	9.79	11.80
36.5"	12.00	8.42	9.22	9.43	9.84	12.28
42.5"	12.33	8.51	8.95	9.77	9.78	12.75
48.5"	12.70	8.46	8.67	9.10	9.77	12.73
54.5"	13.00	8.49	8.17	8.89	9.76	12.45
60.5"	13.50	8.31	7.71	8.57	10.03	12.39
66.5"	13.70	8.57	7.34	8.41	10.13	12.06
72.5"	13.58	8.56	7.11	8.50	10.10	12.02
78.5"	13.41	8.77	7.07	8.18	10.10	12.12
84.5"	13.50	8.77	6.92	8.24	10.16	12.26
90.5"	13.36	8.27	6.68	8.27	10.18	12.06
96.5"	13.35	8.94	6.72	8.42	9.89	12.04
102.5"	13.52	8.99	6.77	8.46	9.67	11.73
108.5"	13.91	9.25	6.64	8.65	9.62	11.60
114.5"	14.25	9.25	6.61	8.58	9.65	11.26
120.5"	14.34	9.35	6.40	8.82	9.54	10.69
126.5"	14.44	9.20	6.39	9.05	9.29	10.75
132.5"	14.05	9.22	6.75	9.15	9.12	10.84
138.5"	13.62	9.17	7.42	9.42	8.94	11.18
144.5"	13.21	9.11	8.05	9.73	8.89	11.38
150.5"	12.70	9.16	8.40	10.39	8.92	11.15
156.6"	12.06	9.18	8.86	10.69	9.28	10.59
162.5"	11.57	9.13	9.19	11.16	9.77	10.03
168.5"	11.20	8.99	9.93	11.59	10.16	9.56
174.5" Finish	11.63	9.91	11.92	13.12	11.33	10.25

Data taken by: James Vetter 10/23/80 of NAC Organization
Qualified Operator

W/H
H.R. Panter

Revision No. 3

Date 10/80

Prepared By: H. R. Panter

NAC-1 Cask Cavity Measurement Procedure
(Data sheet 3 of 3)

Run 2 of Set 1

10/23/80

V. Re-verified Data* - Reference Section 4.2.14

Spider Position	Indicator Number					
	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
168.5	11.19	8.99	10.01	11.55	10.14	9.52
144.5	13.58	9.29	7.92	9.98	8.90	11.18
120.5	14.16	9.08	6.59	8.58	9.67	10.95
96.5	13.46	8.27	7.19	8.25	10.10	12.95
72.5	13.44	8.08	7.41	8.60	9.98	12.66
48.5	12.62	8.15	8.99	9.02	9.85	12.84
24.5	12.12	9.12	8.83	10.10	9.84	10.62
4.5	12.17	11.08	11.65	11.33	11.85	11.49

Data Taken by: Mukow 10/23/80

of NAC

Qualified Operator

Organization

W/E D. Clayton

* If more than 10 re-verification data points are checked, use an additional copy of this form.

Procedure

Revision No. 3

Date

Prepared By: H. R. Panter

10/80

NAC-1 Cask Cavity Measurement Procedure
(Data Sheet 2 of 3)

10/23/80

IV. Cask Measurement Data - Reference Section 4.2.10 through 4.2.14

Run 3 of set 1 SHAFT ROTATED 240° FROM RUN 1

Indicator Number

Spider Position from Top of Cavity	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
4.5"	12.22	11.04	11.64	11.38	11.90	11.57
6.5"	12.63	10.91	11.58	11.73	12.23	11.65
12.5"	12.21	9.67	9.32	9.91	10.12	9.83
18.5"	12.44	9.80	8.91	9.63	10.28	11.03
24.5"	12.18	8.16	8.99	9.06	10.18	12.03
30.5"	12.19	7.64	8.75	8.58	10.48	12.78
36.5"	12.16	7.16	8.63	8.31	10.97	13.55
42.5"	12.39	7.04	8.20	8.01	10.98	14.07
48.5"	12.56	6.90	7.95	7.89	11.18	14.33
54.5"	12.61	6.62	7.87	7.66	11.32	14.70
60.5"	12.89	6.35	7.49	7.62	11.38	14.68
66.5"	12.91	6.15	7.14	7.74	11.32	14.29
72.5"	12.58	5.95	7.17	7.95	11.32	15.16
78.5"	12.62	5.84	6.90	8.04	11.55	14.74
84.5"	12.62	5.73	7.32	7.70	11.70	14.95
90.5"	12.58	5.76	7.05	7.45	11.94	15.25
96.5"	12.80	5.82	6.73	7.44	11.94	15.05
102.5"	13.26	5.83	6.62	7.59	12.23	14.72
108.5"	13.52	5.76	6.46	7.69	11.66	14.85
114.5"	14.39	5.83	6.32	7.86	11.33	14.82
120.5"	14.48	5.89	6.23	7.85	10.82	14.92
126.5"	14.41	6.14	6.67	7.66	10.33	14.95
132.5"	14.15	6.32	6.89	7.88	10.29	14.83
138.5"	13.68	6.53	7.46	8.07	9.92	14.99
144.5"	13.17	6.84	7.72	8.33	9.57	14.42
150.5"	12.52	7.36	8.40	8.87	9.72	13.96
156.6"	12.05	7.67	9.00	9.54	9.79	13.29
162.5"	11.45	8.30	9.55	10.04	9.90	12.43
168.5"	11.05	8.92	9.93	10.73	9.78	11.81
174.5" Bottom	12.36	9.71	10.77	12.67	10.69	12.16

Data taken by: James Wilson 10/23/80 of NAC
Qualified Operator Organization

[Handwritten signature]

Title: NAC-1 Cask Cavity Measurements Procedure

(Supersedes 20.7)

Page 7 of 7

Revision No. 3

Date 10/80

Prepared By: H. R. Panter

NAC-1 Cask Cavity Measurement Procedure
(Data sheet 3 of 3)

Run 3 of Set 1

10/23/80

V. Re-verified Data* - Reference Section 4.2.14

Indicator Number

Spider Position	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
168.5	11.04	8.80	9.84	10.72	9.76	11.85
150.5	12.57	7.36	8.42	8.89	9.71	13.96
114.5	14.39	5.83	6.29	7.85	11.36	14.85
84.5	13.11	6.09	7.23	7.53	11.56	14.77
54.5	13.55	7.47	7.02	7.76	10.77	14.12
30.5	12.71	8.07	8.11	8.90	10.07	12.95
12.5	12.27	9.73	9.19	9.75	10.30	9.72
4.5	12.20	11.07	11.61	11.32	11.85	11.52

Data Taken by: Samuel Wilson 10/23/80 of NAC
 Qualified Operator Organization

w/B H.R. Panter

* If more than 10 re-verification data points are checked, use an additional copy of this form.

Prepared By: H. R. Panter

10/80

NAC-1 Cask Cavity Measurement Procedure
(Data Sheet 2 of 3)

10/24/80

IV. Cask Measurement Data - Reference Section 4.2.10 through 4.2.14

Run 1 of Set 2 Shift rotated 90° From RUN 1, Set 1

Indicator Number

Spider Position from Top of Cavity	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
4.5"	12.18	11.25	11.75	11.27	11.68	11.37
6.5"	12.61	11.16	11.74	11.49	11.97	11.31
12.5"	12.27	10.30	9.31	9.82	9.91	8.65
18.5"	12.57	10.08	9.27	10.14	9.33	9.31
24.5"	12.52	9.85	9.15	10.08	8.91	10.04
30.5"	12.50	9.83	9.03	9.86	8.55	10.55
36.5"	12.51	9.88	9.27	9.31	8.33	11.06
42.5"	12.82	10.00	8.97	8.94	8.31	11.45
48.5"	13.14	10.12	8.67	8.56	8.18	11.49
54.5"	13.78	10.55	8.05	8.81	8.04	11.08
60.5"	14.34	10.81	7.62	8.39	8.14	10.50
66.5"	14.21	11.01	7.62	7.82	8.14	10.21
72.5"	14.77	10.78	7.41	8.02	8.18	10.24
78.5"	14.42	10.83	7.40	7.73	8.13	10.54
84.5"	14.46	11.01	7.23	8.03	8.04	10.30
90.5"	14.45	10.96	7.08	8.09	7.98	10.81
96.5"	14.42	11.08	7.16	8.08	7.80	10.22
102.5"	14.39	11.21	7.23	7.91	7.67	10.61
108.5"	14.75	11.50	7.23	8.06	7.81	10.48
114.5"	14.73	11.67	7.28	8.06	8.04	10.03
120.5"	14.80	11.58	7.21	8.21	8.03	9.44
126.5"	14.86	11.34	7.09	8.57	7.85	9.25
132.5"	14.89	11.27	7.38	8.76	7.74	9.33
138.5"	14.65	11.13	7.95	9.13	7.77	9.62
144.5"	14.00	10.83	8.67	9.38	7.79	9.97
150.5"	13.25	10.64	8.83	9.81	8.02	9.96
156.6"	12.54	10.51	9.34	10.29	8.43	9.66
162.5"	11.87	10.10	9.75	10.89	8.96	9.35
168.5"	11.33	9.53	10.44	11.38	9.58	9.09
174.5" Bottom (171.1±%)	11.78	10.46	12.27	12.93	11.29	9.86

Data taken by: James Villone 10/24/80 of NAC
Qualified Operator Organization

w/E RAC.pds

Frank Lopez
Bill Giers

Prepared By: H. R. Panter

NAC-1 Cask Cavity Measurement Procedure
(Data sheet 3 of 3)

10/24/80

Row 1 of Set 2

V. Re-verified Data* - Reference Section 4.2.14

Indicator Number

Spider Position	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
168.5	11.35	9.60	10.39	11.38	9.53	9.12
138.5	14.09	10.35	8.09	8.88	7.77	10.64
114.5	15.09	10.15	7.39	7.55	8.58	11.31
84.5	14.40	9.48	7.55	7.35	8.87	12.67
54.5	13.83	9.62	8.64	7.92	8.45	12.31
30.5	12.37	9.21	9.86	8.72	8.92	11.50
12.5	12.30	10.31	9.41	9.69	10.01	9.08
4.5	12.22	11.23	10.80	11.35	11.74	11.43

Data Taken by:

James Wilson 10/24/80

of

NAC

Qualified Operator

Organization

u/E H. R. Panter

* If more than 10 re-verification data points are checked, use an additional copy of this form.

Prepared By: H. R. Panter

10/80

NAC-1 Cask Cavity Measurement Procedure
(Data Sheet 2 of 3)

10/24/80

IV. Cask Measurement Data - Reference Section 4.2.10 through 4.2.14

Run 2 of Set 2 Shaft rotated 180° from Run 1, Set 1

Indicator Number

Spider Position from Top of Cavity	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
4.5"	12.24	11.20	11.72	11.36	11.90	11.56
6.5"	12.64	11.02	11.66	11.46	12.09	11.46
12.5"	12.23	9.98	9.05	9.81	10.36	9.05
18.5"	12.38	9.40	8.74	9.94	10.20	10.03
24.5"	12.35	8.93	8.43	9.83	10.07	11.06
30.5"	12.28	8.37	8.32	9.40	10.14	12.10
36.5"	12.31	8.09	8.55	9.16	10.24	12.92
42.5"	12.64	7.94	8.19	8.94	10.16	13.44
48.5"	13.02	8.25	7.67	8.66	10.22	13.23
54.5"	13.36	8.27	7.19	8.52	10.30	13.02
60.5"	13.83	8.22	6.67	8.23	10.60	12.77
66.5"	13.95	8.25	6.49	8.08	10.64	12.65
72.5"	13.86	8.02	6.39	8.21	10.63	12.89
78.5"	13.74	7.89	6.53	8.04	10.69	13.45
84.5"	13.80	8.00	6.29	7.98	10.76	13.35
90.5"	13.61	7.97	6.16	7.90	10.91	13.44
96.5"	13.69	7.87	6.31	7.98	10.75	13.60
102.5"	13.95	7.83	6.43	8.05	10.65	13.25
108.5"	14.10	8.03	6.25	8.15	10.54	13.06
114.5"	14.59	8.27	6.15	8.08	10.46	12.62
120.5"	14.59	8.58	5.78	8.13	10.14	11.96
126.5"	14.70	8.55	5.86	8.28	9.84	12.13
132.5"	14.40	8.67	6.19	8.57	9.55	12.05
138.5"	13.91	8.69	6.89	8.84	9.29	12.28
144.5"	13.49	8.79	7.49	9.16	9.16	12.23
150.5"	12.78	8.90	8.10	9.64	9.16	11.96
156.6"	12.08	9.02	8.70	10.05	9.30	11.36
162.5"	11.49	9.08	9.17	10.63	9.70	10.72
168.5"	11.37	9.06	9.81	11.33	10.02	10.31
174.5" Bottom (171.1)	12.05	9.81	11.72	13.13	11.40	10.90

Data taken by:

James Vukobrat 10/24/80 of NAC
Qualified Operator Organization

v/r. D. [Signature]

Title: NAC-1 Cask Cavity Measurements
Procedure

Revision No. 3

Date 10/80

Prepared By: H. R. Panter

NAC-1 Cask Cavity Measurement Procedure
(Data sheet 3 of 3)

Run 2 of Set 2 10/24/80

V. Re-verified Data* - Reference Section 4.2.14

Spider Position	Indicator Number					
	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
4.5	12.24	11.24	11.70	11.34	11.90	11.58
6.5	12.70	11.02	11.64	11.41	12.00	11.42
18.5	12.78	9.43	8.57	10.45	9.97	9.90
42.5	12.62	8.39	7.84	8.37	10.17	12.98
72.5	13.88	8.16	6.28	8.19	10.64	12.73
102.5	13.87	8.49	5.91	8.14	10.19	12.57
114.5	14.75	8.92	5.76	8.17	10.08	12.08
144.5	13.94	9.07	7.44	9.50	9.06	11.88
168.5	11.49	9.15	9.84	11.25	10.01	9.72

Data Taken by:

James Wilson

10/24/80

of

WAC

Qualified Operator

Organization

w/p OAC reports

* If more than 10 re-verification data points are checked, use an additional copy of this form.

Revision No. 3

Date

Prepared By: H. R. Panter

10/80

NAC-1 Cask Cavity Measurement Procedure
(Data Sheet 2 of 3)

10/24/80

IV. Cask Measurement Data - Reference Section 4.2.10 through 4.2.14

Run 3 of Set 2 Shaft rotated 270° from Run 1, Set 1

Spider Position from Top of Cavity	Indicator Number					
	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
4.5"	12.25	11.20	11.64	11.23	11.82	11.54
6.5"	12.79	11.12	11.65	11.42	12.08	11.66
12.5"	12.61	10.12	8.35	9.56	10.07	9.11
18.5"	13.31	9.81	8.32	9.48	9.62	10.25
24.5"	13.58	9.56	7.85	9.00	9.26	11.38
30.5"	13.85	9.53	7.36	8.44	8.95	12.25
36.5"	14.18	9.60	7.25	7.81	8.68	12.96
42.5"	14.60	9.72	6.83	7.36	8.59	13.46
48.5"	15.05	9.81	6.41	6.92	8.50	13.67
54.5"	15.67	10.04	5.76	6.90	8.61	13.48
60.5"	16.30	10.13	5.21	6.56	8.76	13.16
66.5"	16.23	10.11	5.07	6.17	8.93	13.07
72.5"	16.77	10.11	4.84	6.12	8.80	13.13
78.5"	16.54	10.27	4.77	5.56	8.75	13.55
84.5"	16.73	10.49	4.56	5.84	8.75	13.75
90.5"	16.80	10.36	4.25	5.72	8.77	13.85
96.5"	16.87	10.54	4.26	5.55	8.61	13.93
102.5"	17.01	10.69	4.38	5.39	8.46	13.67
108.5"	17.38	11.16	4.44	5.45	8.41	13.42
114.5"	17.61	11.29	4.51	5.34	8.43	13.03
120.5"	17.74	11.54	4.43	5.44	8.17	12.33
126.5"	17.64	11.71	4.70	5.82	7.68	11.78
132.5"	17.55	11.79	5.19	6.10	7.40	11.60
138.5"	17.26	11.68	5.81	6.58	7.41	11.75
144.5"	16.33	11.26	6.59	7.05	7.53	11.91
150.5"	15.41	10.95	7.00	7.75	7.89	11.76
156.6"	14.43	10.69	7.55	8.59	8.50	11.26
162.5"	13.56	10.28	8.30	9.58	9.09	10.47
168.5"	12.52	9.64	9.46	10.37	9.72	9.64
174.5" B.H. 171.1	12.58	10.34	11.23	12.00	11.55	10.58

Data taken by: James Upton 10/24/80 of NAC
Qualified Operator Organization

Witnessed By: Eyal White (NAC QA)

Prepared By: H. R. Panter

NAC-1 Cask Cavity Measurement Procedure
(Data sheet 3 of 3)

Run 3 of Set 2 10/24/80

V. Re-verified Data* - Reference Section 4.2.14

Indicator Number

Spider Position	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
168.5	12.45	9.60	9.48	10.40	9.69	9.72
138.5	16.78	10.50	5.45	6.70	7.86	12.85
108.5	16.69	8.31	4.52	5.67	9.90	15.34
96.5	16.21	8.20	4.52	5.38	10.26	15.85
66.5	16.10	8.36	5.31	6.07	9.89	14.78
42.5	14.54	9.30	6.90	6.97	9.29	14.12
24.5	13.60	9.56	7.83	9.01	9.26	11.37
12.5	12.63	10.11	8.83	9.54	10.07	9.12
4.5	12.25	11.20	11.64	11.23	11.82	11.53

Data Taken by: Samuel Ullrich 10/24/80 of NAC
 Qualified Operator Organization

* If more than 10 re-verification data points are checked, use an additional copy of this form.

Witnessed By: Opal White (Duke-PA)

Prepared By: H. R. Panter

NAC-1 Cask Cavity Measurement Procedure
(Data Sheet 1 of 3)

Location: Oconee Nuclear Power Station Date 10/24/80

Cask Serial No. NAC-1B Ambient Air Temp. 66°F

I. Calibration - Reference Section 4.1.1.3 through 4.1.1.6

A. Record thicknesses and location of any inserted feeler gage (4.1.1.3):

- 1. _____ 4. _____
- 2. _____ 5. _____
- 3. _____ 6. _____

B. Record measured shaft diameters (4.1.1.6):

- 1. _____ in.
- 2. _____ in.
- 3. _____ in.

II. Calibration of Traveling Spider (4.1.2.4):

No.	Indicator Initial Reading (mm)	Distance to Bottom of Shaft to Measuring Surface Reading (in.)	Indicator "Zero" Reading* (in.)
1			
2			
3			
4			
5			
6			

* Indicator "Zero" Reading = Indicator Initial Reading + Distance to Shaft + 1/2 Shaft Diameter.

III. Calibration Data for Indicators - Reference Section 4.1.2.5

Re check of indicators after measurements of cavity using "F" Digital Readout Display

Gauge Number	Readings (mm)						Date	By
	.300	.400	.500	.600	.700	.800		
A 1	4.05	6.59	9.13	11.67	14.20	16.74	10/24/80	W. Victor
B 2	3.27	5.81	8.35	10.89	13.43	15.97	10/24/80	W. Victor
C 3	3.74	6.28	8.82	11.36	13.90	16.44	10/24/80	W. Victor
D 4	3.21	5.75	8.29	10.83	13.37	15.91	10/24/80	W. Victor
E 5	3.61	6.15	8.69	11.23	13.77	16.31	10/24/80	W. Victor
F 6	3.54	6.07	8.62	11.15	13.69	16.23	10/24/80	W. Victor

Data taken by: W. Victor of NAC
Qualified Operator Organization

W/V