



11-6678

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
101 MARIETTA ST., N.W., SUITE 3100  
ATLANTA, GEORGIA 30303

November 18, 1980

MEMORANDUM FOR: Charles E. MacDonald, Chief, Transportation Certification  
Branch Division of Fuel Cycle and Material Safety

FROM: William T. Orders, Resident Inspector, Oconee Nuclear Station

SUBJECT: NAC-1 CASK CAVITY MEASUREMENT

Please find enclosed a copy of the completed NAC-1 Cask Cavity Measurement procedure performed Nov. 11, 1980, at Oconee Nuclear Station on package USA/6698/B()F.

The licensee reports that the cask failed to meet the acceptance criteria delineated in the certificate of compliance and will not be employed unless and until package integrity is resolved.

Sincerely,

  
William T. Orders

Enclosure: NAC-1 Cask Cavity Measurement

DUKE POWER COMPANY  
PROCEDURE PREPARATION  
PROCESS RECORD

(1) ID No: OP/0/A/1510/0  
Change(s) (C) to  
1 Incorporated

(2) STATION: OAS  
(3) PROCEDURE TITLE: NAC-1 CASK CAVITY MEASUREMENTS

(4) PREPARED BY: Edmond A. Gile DATE: 11/7/80

(5) REVIEWED BY: [Signature] DATE: 11/17/80

Cross-Disciplinary Review By: \_\_\_\_\_ N/R: [Signature]

(6) TEMPORARY APPROVAL (IF NECESSARY):  
By: \_\_\_\_\_ (SRO) Date: \_\_\_\_\_  
By: \_\_\_\_\_ Date: \_\_\_\_\_

(7) APPROVED BY: J. N. Pope / [Signature] Date: 11-10-80

(8) MISCELLANEOUS:  
Reviewed/Approved By: [Signature] Date: 11/7/80  
Reviewed/Approved By: [Signature] Date: 11/7/80

CHECKED CONTROL COPY *EM*

OP/0/A/1510/09

CASK NO.

*NAC-1B*

DATE

*11/10/80*

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

NAC-1 CASK CAVITY MEASUREMENTS

1.0 Purpose

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

2.0 Limits and Precautions

- 2.1 A Radiation Work Permit (RWP) is required for all work performed on this job.
- 2.2 A flotation device or safety belts are required for all personnel working on the cask.
- 2.3 Cask measurements must be done with the basket removed and the cask as clean as possible. Radiation levels at the top of the cask should be less than 50 MR/HR.
- 2.4 Health Physics and Quality Assurance personnel will be required for parts of the coverage on this job.
- 2.5 When working in the spent fuel pool, all tools shall be tied off to prevent dropping them in the pool or the cask.
- 2.6 This procedure is to be run by the NAC personnel with assistance from Duke Power Company personnel.

3.0 Calibration of the NAC-1 Cask Cavity Measuring Tool

Date  
Init. Time

- 3.1 Assemble the traveling spider per Figure 1 and label each indicator A, B, C, D, E, or F.

*MV 11/10/80 1500*

Date  
Init. Time

- 3.2 Place the spider on a shaft section and locate the shaft in "V" blocks and as shown in Figure 2. With the use of shims, adjust the distance between the bottom of the shaft to measuring surface near the "V" blocks until the readings are within 0.010 inch.
- 3.3 Attach the individual gauges to the power supply and then turn power on. "Zero" each indicator in the free position.
- 3.4 Rotate shaft or the spider until the indicator is vertical to and touches the measuring surface. Record this initial reading for each indicator on Data Sheet 1 of 3.
- 3.5 With at least three sizes of gauge blocks, verify the accuracy of each indicator. The linearity should be within  $\pm 0.03$  mm over the full range of the individual gauge.
- 3.6 Verify that all receiving units agree with each other when attached to the gauges.
- 3.7 In the spent fuel pool, using the aux crane, assemble 3 sections of the center shaft and suspend vertically by the threaded eye in the top end.
- 3.8 Attach both the lower and upper spiders to the shaft.

JMV 11/10/80 1515

JMV 11/10/80 1530

JMV 11/10/80 1535

JMV 11/10/80 1600

JMV 11/10/80 1630

JMV 11/10/80 1800

JMV 11/10/80 1815

Date  
Init. Time

3.9 With the upper and lower spiders oriented such that the slots for the straightness check wire are at the same angular location relative to the shaft, insert a 0.018 inch wire in the corresponding slots in each spider. Tighten the upper allen set screw, apply tension to the wire and tighten the lower allen set screw. JMU 11/10/80 1830

3.10 Check straightness by inserting feeler gauges into any openings between the wire and shaft. Record the size of the insertable feeler gauges. A minimum of 6 readings shall be taken at both orientations. One reading shall be taken near each shaft assembly point. JMU 11/10/80 1930

3.11 Repeat steps 3.7 through 3.10 using the other slot (90° from the first) in the lower spider. After this measurement, remove the straightness check wire. JMU 11/10/80 2000

4.0 Installation and Operations

4.1 Calibrate the traveling spider per section 3.1 through 3.6. JMU 11/10/80 2005

4.2 Calibrate the shaft section per sections 3.7 through 3.11. JMU 11/10/80 2010

4.3 Remove the upper spider from the shaft and install the guide bars to the lower spider. Attach the lifting eye to the top of the shaft. JMU 11/10/80 2015

Date  
Init. Time

- 4.4 Lift the shaft with the crane and insert it with the lower spider into the cavity of the cask. *JW 11/10/80 2020*  
NOTE: The cask must be in an upright position. *JW 11/10/80 2025.*
- 4.5 Verify that power is on to the gauges and the gauges are zeroed in their free position. *JW 11/10/80 0910*
- 4.6 Place the traveling spider onto the shaft and guide bars. 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. *JW 11/10/80 0915*
- 4.7 Place the top spider onto the shaft and guide bars. 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. The calibration equipment should now be assembled as per Figure 2. *JW 11/10/80 0930*
- 4.8 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). *JW 11/10/80 0945*
- 4.9 Loosen the four (4) adjusting screws in the upper spider and measure the distance from the center bar to the side of the cask cavity. Rotate the adjusting screws and measure until the spider

Date  
Init. Time

is within 0.010 inch of being centered. Tighten the jam nuts to lock the adjusting screws. The location of the upper spider should be such that the distance from the cavity flange to the center line of the indicator is  $4.5 \pm 1/4$ " with the traveling spider in the top position.

JMU 11/80 1000

- 4.10 With the traveling spider in the top position (4.5" from top of cavity), record the reading of each indicator on the chart on Data Sheet 2 of 3.
- 4.11 Lower the traveling spider on the first marked position on the small shaft (6.5" from the cavity flange). Record the readings on Data Sheet 2 of 3.
- 4.12 Lower the traveling spider to the next marked position (12.5" from the cavity flange). Record the readings on Data Sheet 2 of 3.
- 4.13 Repeat at  $6" \pm 1/4$ " intervals until the traveling spider reaches the bottom of the cask. Add the remaining sections of the small shaft as necessary.
- 4.14 Recheck and rerecord random locations as selected by the data taker on Data Sheet 3 of 3.
- 4.15 Remove top spider from the shaft, remove the auxiliary shaft, remove the traveling spider from the shaft.

JMU 11/80 1005

JMU 11/80 1010

JMU 11/80 1015

JMU 11/80 1045

JMU 11/80 1050

JMU 11/80 1055

Date  
Init. Time

4.16 Remove the shaft and lower spider from the cavity of the crank.

JMV 11/20 1058

4.17 Repeat Steps 4.4 through 4.15 for the second set of readings. The center shaft and lower spider should be rotated 120° from the original position prior to reinsertion into the crank cavity.

Not Rotated 1130

JMV 11/20

4.18 Repeat Steps 4.4 through 4.15 for the third set of readings. The center shaft and lower spider should be rotated an additional 120° prior to reinsertion into the cavity.

Not Rotated 1215  
JMV 11/20

4.19 Once the measurements are completed, the gauges shall be verified that they are still in calibration per sections 3.1 through 3.6 after use.

JMV 11/20/20 1000

#### 5.0 Gauge Replacement

Should a gauge fail during the measurement sets, the gauge may be replaced with a calibrated gauge. The traveling spider will need to be removed from the shaft and guide bar and calibrated per sections 3.1 through 3.6 with one exception. A 2 inch  $\pm$  1 mm diameter bar can be used in place of the shaft sections. Once the gauge has been changed, the traveling spider can then be reinstalled as described in section 4.6 with the procedural operation commencing from that point. When the measurement sets are completed, the traveling spider will then need to be recalibrated to determine the replacement gauge "Zero" reading in section 3.



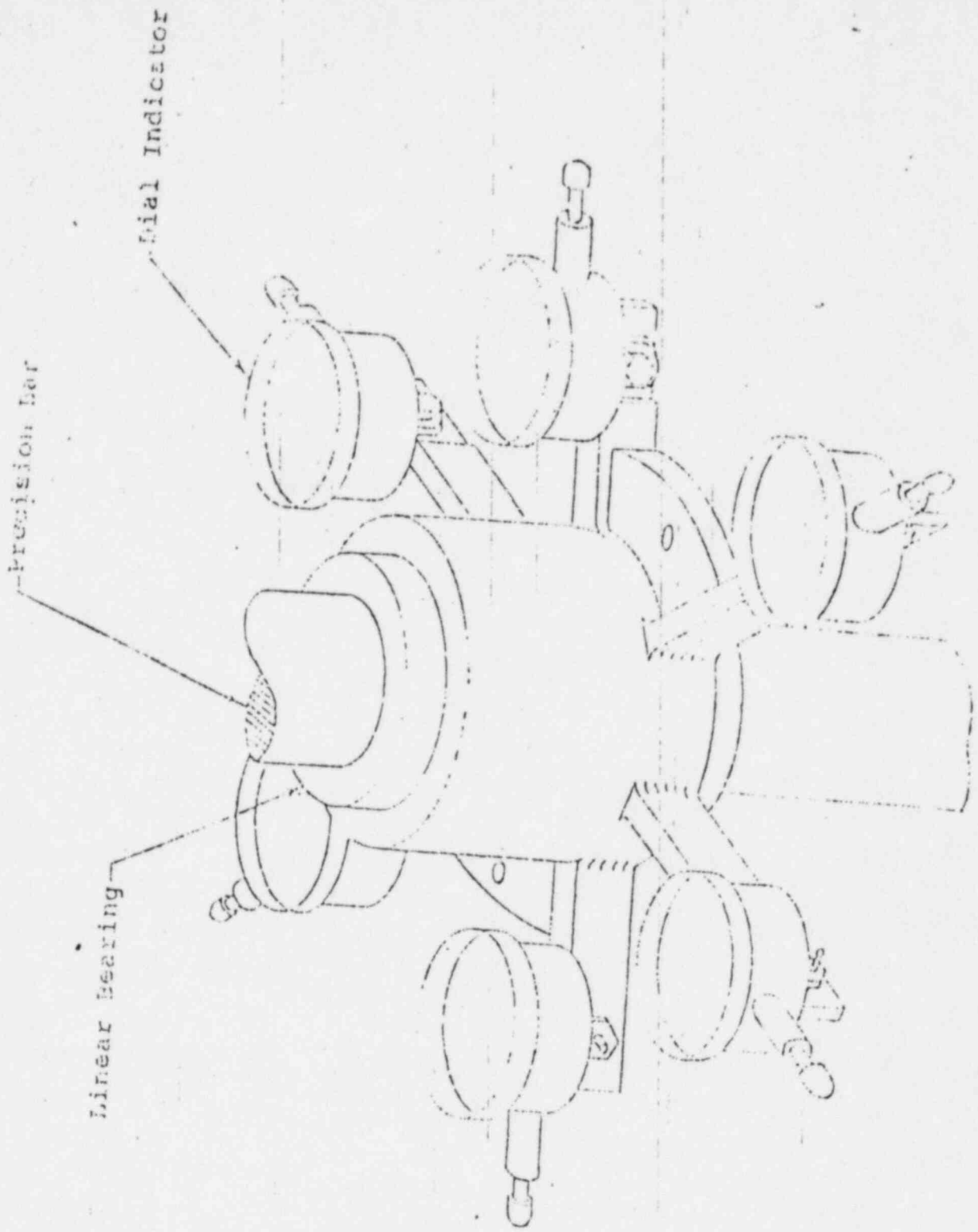
6.0 Emulsion

6.1 Data Sheet

6.2 Figure 1

6.3 Figure 2

6.4 Figure 3



MEASUREMENT SLIDER

FIG. 6,3





Location: Oconee Nuclear Station Date 11/10/80

Cask Serial No. NAC-1B Ambient Air Temp. 68°F

I. Calibration -

A. Record thicknesses and location of any inserted feeler gauge from top of shaft

Location	210°?	300°?				
1. 11"	.030"	105", .102"	.099	4. 70"	.062", .065"	.015", .014" First Joint 6; Second Joint 12
2. 35"	.044", .042"	.060", .063"		5. 95"	.050", .050"	
3. 58"	.063", .065"	.018", .019"		6. 122"	.027", .033"	.023", .023"
		Second Joint 127 1/2"		7. 133"	.032", .036"	.029", .026", .031"
				8. 160"	.021", .021"	.057", .057"
				9. 185"	.015", .016"	.094", .090"

B. Record measured shaft diameters

1. 1.9992	in.	9. 185"	.015", .016"	.094", .090"
2. 1.9993	in.			
3. 1.9992	in.			

1/2 Average = 0.9996

II. Calibration of Traveling Spider

1-2 MICROMETER ID No OCHNT 27924 Calibrated 9/10/80 Due 12/10/80 by DL Robertson

INSIDE MICROMETER ID No OCHNT 27923 Calibrated 10/6/80 Due 1/6/80 by DL Robertson

No.	Indicator	Distance to Bottom of Shaft to Measuring Surface (in.)	Indicator "Zero" Reading (in.)
801125	1A	5.27(.2075)	6.002
801133	2B	5.74(.2260)	6.002
801086	3C	5.66(.2228)	6.003
801070	4D	5.94(.2339)	6.002
801130	5E	6.92(.2724)	
801129	6F	6.21(.2445)	

Average = 6.0022

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

Indicator	5.27	7.81	12.89
911377A	5.27	7.81	12.89
911377B	5.27	7.81	12.89
911377C	5.27	7.81	12.89
9113768 D	5.27	7.81	12.90
9069152 E	5.27	7.81	12.89
9113771 F	5.27	7.81	12.89
9113784 S	5.27	7.81	12.89

III. Calibration Date for Indicator -

WEBCO GAUGE BLOCKS ID No OCHNT 27894 Calibrated 12/31/79 due 12/31/81

Gauge Number	0	0.100"	0.200"	0.300"	0.400"	0.500"	x10 <sup>-2</sup> Microm	Date	By
1A	5.27	7.81	10.35	12.89	15.43	17.97	+0	11/10/80	J Viebrock NAC
2B	5.74	8.30	10.84	13.38	15.91	18.45	+2	11/10/80	J Viebrock NAC
3C	5.66	8.21	10.75	13.29	15.83	18.36	+1	11/10/80	J Viebrock NAC
4D	5.94	8.49	11.03	13.57	16.11	18.65	+0	11/10/80	J Viebrock NAC
5E	6.92	9.47	12.01	14.56	17.10	19.64	+2	11/10/80	J Viebrock NAC
6F	6.21	8.76	11.30	13.84	16.38	18.92	+1	11/10/80	J Viebrock NAC

Data Taken by Wakat / PCB of Nuclear Assurance Corporation  
Qualified Operator Organization

Data Verified by: DL Osborne Duke QA Personnel

ENCLOSURE 6.1  
NAC-1 Cask Cavity Measurement Procedure

Data Sheet 2 of 3

IV. Cask Measurement Data -

Run 1 of Set 1 11/11/80

Indicator Number

Spider Position from Top of Cavity	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)
4.5"	12.08	12.37	12.28	11.86	13.80	12.96
6.5"	12.65	12.24	12.55	12.33	14.41	13.29
12.5"	12.31	10.99	9.75	10.22	12.52	11.18
18.5"	12.53	10.33	9.39	10.14	12.40	12.41
24.5"	12.61	9.74	8.87	9.92	12.35	13.51
30.5"	12.73	9.34	8.37	9.46	12.47	14.42
36.5"	12.87	8.95	8.49	9.15	12.57	15.44
42.5"	13.30	8.88	7.86	8.81	12.58	15.96
48.5"	13.81	9.03	7.38	8.50	12.64	16.10
54.5"	14.13	9.19	6.69	8.27	12.73	15.82
60.5"	14.57	9.12	6.14	7.97	13.00	15.59
66.5"	14.74	8.88	6.08	7.89	13.14	15.61
72.5"	14.74	8.98	5.83	7.93	13.09	15.63
78.5"	14.71	9.06	5.73	7.66	13.10	15.89
84.5"	14.87	9.19	5.57	7.57	13.13	15.93
90.5"	14.69	9.25	5.33	7.52	13.23	15.76
96.5"	14.69	9.29	5.21	7.56	12.97	15.79
102.5"	14.82	9.33	5.36	7.59	12.79	15.52
108.5"	15.23	9.68	5.21	7.78	12.65	15.36
114.5"	15.69	9.77	5.11	7.65	12.53	15.03
120.5"	15.89	9.96	4.96	7.79	12.29	14.49
126.5"	15.90	9.89	5.07	8.01	12.07	14.39
132.5"	15.78	10.13	5.42	8.27	11.72	14.23
138.5"	15.35	10.10	6.07	8.62	11.45	14.42
144.5"	14.80	10.02	6.81	9.11	11.42	14.57
150.5"	13.94	10.00	7.57	9.63	11.35	14.30
156.6"	13.08	10.02	8.18	10.04	11.57	13.65
162.5"	12.39	10.00	8.91	10.67	11.94	13.05
168.5"	12.01	10.00	9.56	11.41	12.26	12.42
174.5"	13.51	13.11	12.71	12.22	15.01	14.70

Data Taken by: Michael of Nuclear Assurance Corporation  
 Qualified Operator Organization

Data Verified by: D.L. Osborne Duke QA Personnel

V. Re-verified Data\* - Run 1 of Set 1

Spider Position	Indicator Number					
	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)
174.5	13.50	13.06	12.67	12.18	14.99	14.70
144.5	14.82	10.03	6.79	9.12	11.43	14.57
114.5	15.64	9.67	5.10	7.62	12.66	15.11
78.5	14.73	8.93	5.71	7.69	13.16	15.99
42.5	13.30	8.86	7.85	8.83	12.64	16.06

Data Taken by: Samuel Helton <sup>11/11/80</sup> of Nuclear Assurance Corporation  
 Qualified Operator Organization

Data Verified by: DR Odame Duke QA Personnel

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

ENCLOSURE 6.1  
NAC-1 Cask Cavity Measurement Procedure

Data Sheet 2 of 3

IV. Cask Measurement Data -

Run 2 of Set 1

11/11/80

Indicator Number

Spider Position from Top of Cavity	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)
4.5"	12.16	12.39	12.33	11.98	13.69	12.98
6.5"	12.71	12.32	12.48	12.25	14.22	13.22
12.5"	12.29	11.12	9.57	10.31	12.41	10.78
18.5"	12.56	10.48	9.12	10.29	12.35	11.98
24.5"	12.60	9.92	8.62	10.17	12.24	13.07
30.5"	12.65	9.55	8.16	9.74	12.31	13.97
36.5"	12.78	9.36	8.09	9.38	12.36	14.72
42.5"	13.11	9.29	7.53	9.05	12.32	15.21
48.5"	13.52	9.24	7.15	8.70	12.47	15.48
54.5"	13.95	9.44	6.50	8.68	12.48	15.16
60.5"	14.42	9.33	5.93	8.45	12.65	14.88
66.5"	14.52	9.30	5.80	8.23	12.75	14.76
72.5"	14.78	9.15	5.59	8.29	12.69	14.85
78.5"	14.67	9.13	5.49	7.91	12.77	15.31
84.5"	14.75	9.24	5.32	8.09	12.80	15.47
90.5"	14.61	9.12	5.10	8.05	12.96	15.49
96.5"	14.62	9.13	5.08	8.06	12.82	15.63
102.5"	14.64	9.09	5.26	8.01	12.81	15.42
108.5"	15.00	9.38	5.18	8.15	12.77	15.33
114.5"	15.36	9.37	5.11	8.00	12.78	15.05
120.5"	15.52	9.46	4.99	8.10	12.55	14.55
126.5"	15.58	9.46	5.07	8.34	12.27	14.48
132.5"	15.32	9.66	5.44	8.59	11.98	14.33
138.5"	15.01	9.71	6.05	9.01	11.64	14.44
144.5"	14.51	9.67	6.81	9.52	11.60	14.54
150.5"	13.63	9.63	7.50	10.08	11.56	14.26
156.6"	12.79	9.65	8.10	10.50	11.84	13.61
162.5"	12.14	9.62	8.79	11.13	12.21	13.00
168.5"	11.76	9.55	9.49	11.85	12.53	12.38
174.5"	12.97	12.46	12.49	12.48	15.01	14.58

Data Taken by: James Wallace of Nuclear Assurance Corporation  
 Qualified Operator Organization

Data Verified by: D.L. Osborne Duke QA Personnel



V. Re-verified Data\* - Run 2 of Set  $\Phi$  11/11/80

Spider Position	Indicator Number					
	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)
174.5	13.03	12.55	12.52	12.53	15.09	14.62
168.5	11.77	9.56	9.46	11.86	12.56	12.36
108.5	15.26	9.69	5.12	8.26	12.53	15.19
78.5	14.99	9.65	5.22	8.29	12.51	15.35
48.5	13.65	9.35	7.01	8.97	12.08	15.30

Data Taken by: James Vickor of Nuclear Assurance Corporate  
 Qualified Operator Organization

Data Verified by: D.L. Osborne Duke QA Personnel

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

Top of Flange to Top of Shaft =  $14 \frac{5}{16}$  inches

$\pm 0.6 \rightarrow \pm 0.013$ "

ENCLOSURE 6.1  
NAC-1 Cask Cavity Measurement Procedure

IV. Cask Measurement Data -

Run 3 of Set 1 11/11/80

Indicator Number

Spider Position from Top of Cavity	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)
4.5"	12.06	12.24	12.20	12.92	13.76	13.00
6.5"	12.66	12.16	12.47	13.44	14.36	13.34
12.5"	12.28	10.96	9.55	11.33	12.57	11.10
18.5"	12.50	10.29	9.14	11.26	12.48	12.29
24.5"	12.54	9.65	8.63	11.09	12.41	13.43
30.5"	12.65	9.32	8.13	10.65	12.50	14.29
36.5"	12.81	9.12	8.07	10.31	12.62	15.10
42.5"	13.17	9.05	7.48	9.92	12.64	15.63
48.5"	13.68	9.22	6.91	9.68	12.35	15.56
54.5"	14.03	9.33	6.32	9.55	12.63	15.41
60.5"	14.46	9.20	5.77	9.23	12.92	15.18
66.5"	14.62	9.18	5.62	9.05	12.96	15.00
72.5"	14.94	9.12	5.41	9.20	12.72	15.00
78.5"	14.88	9.13	5.29	8.93	12.72	15.38
84.5"	14.92	9.28	5.15	9.06	12.71	15.56
90.5"	14.92	9.31	4.88	9.13	12.75	15.51
96.5"	14.92	9.40	4.86	9.09	12.60	15.60
102.5"	14.88	9.28	5.11	8.99	12.57	15.44
108.5"	15.39	9.78	4.97	9.20	12.48	15.28
114.5"	15.78	10.04	4.86	8.97	12.48	14.87
120.5"	15.83	10.29	4.74	9.07	12.33	14.27
126.5"	15.90	10.08	4.78	9.40	12.01	14.12
132.5"	16.00	10.50	5.15	9.57	11.69	13.83
138.5"	15.56	10.41	5.78	9.90	11.56	13.98
144.5"	14.91	10.16	6.62	10.45	11.49	14.23
150.5"	14.00	10.16	7.29	10.97	11.49	13.86
156.6"	13.04	10.17	7.91	11.31	11.78	13.24
162.5"	12.40	10.06	8.64	11.91	12.09	12.68
168.5"	11.88	9.86	9.46	12.64	12.28	11.96
174.5"	13.26	12.79	12.53	13.60	15.08	14.71

Data Taken by: James Vellone of Nuclear Assurance Corporation  
 Qualified Operator Organization

Data Verified by: D.L. O'Connell Duke QA Personnel

V. Re-verified Data\* - Run 3 of Set 1 11/11/80

Spider Position	Indicator Number					
	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)
174.5	13.26	12.80	12.53	13.61	15.23	14.72
150.5	14.02	10.17	7.28	10.94	11.61	13.88
120.5	15.81	10.08	4.91	8.78	12.03	13.92
90.5	15.10	9.76	4.81	9.09	12.65	15.34
60.5	14.86	9.65	5.62	9.63	12.40	14.93

Data Taken by: Samuel Kullord of Nuclear Assurance Corp.  
Qualified Operator Organization

Data Verified by: D.L. Osborne Duke QA Personnel

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

V. Re-verified Data\* - Run 1 of Set 2 11/11/80

Spider Position	Indicator Number					
	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)
174.5	13.09	12.66	12.58	12.55	14.97	14.44
144.5	14.59	9.92	6.91	9.77	11.58	14.03
114.5	15.42	10.03	5.19	8.35	12.47	14.36
84.5	14.54	9.62	5.49	8.77	12.57	14.78
54.5	13.47	9.34	6.88	9.60	12.30	14.47

Data Taken by: James V. Miller of Nuclear Assurance Corp.  
 Qualified Operator Organization

Data Verified by: D.L. Osborne Duke QA Personnel

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

IV. Cask Measurement Data -

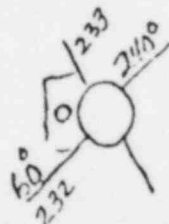
Run 1 of Set 2 11/11/80

Indicator Number

Spider Position from Top of Cavity	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
4.5"	11.95	12.29	12.49	12.23	13.64	12.65
6.5"	12.42	12.16	12.59	12.55	14.19	12.88
12.5"	12.01	10.92	9.96	10.64	12.35	10.78
18.5"	12.13	10.17	9.67	10.64	12.27	11.92
24.5"	12.11	9.49	9.29	10.52	12.23	13.06
30.5"	12.12	8.99	8.91	10.16	12.39	13.91
36.5"	12.19	8.72	8.96	9.92	12.54	14.72
42.5"	12.53	8.69	8.39	9.68	12.59	15.12
48.5"	12.92	8.81	7.93	9.44	12.67	15.16
54.5"	13.26	8.90	7.23	9.23	12.79	14.93
60.5"	13.74	8.73	6.73	8.92	13.07	14.83
66.5"	13.94	8.52	6.61	8.80	13.21	14.90
72.5"	13.93	8.49	6.40	8.86	13.16	15.09
78.5"	13.94	8.54	6.28	8.57	13.22	15.40
84.5"	13.96	8.55	6.09	8.48	13.31	15.54
90.5"	13.82	8.56	5.93	8.34	13.48	15.60
96.5"	13.94	8.59	5.80	8.32	13.33	15.66
102.5"	14.17	8.49	5.98	8.35	13.24	15.46
108.5"	14.39	8.75	5.81	8.44	13.12	15.35
114.5"	14.91	8.96	5.59	8.30	13.01	14.93
120.5"	15.06	9.26	5.32	8.33	12.63	14.26
126.5"	15.40	9.50	5.23	8.66	12.16	13.98
132.5"	15.14	9.67	5.61	8.85	11.88	12.91
138.5"	14.81	9.70	6.24	9.21	11.57	14.08
144.5"	14.27	9.63	7.00	9.64	11.55	14.25
150.5"	13.53	9.64	7.63	10.20	11.47	13.96
156.6"	12.73	9.71	8.20	10.61	11.74	13.30
162.5"	12.14	9.71	8.83	11.20	12.12	12.64
168.5"	11.78	9.63	9.54	11.89	12.42	12.04
174.5"	13.01	12.59	12.55	12.46	13.86	14.38

Data Taken by: James Veltou of Nuclear Assurance Corporation  
 Qualified Operator Organization

Data Verified by: D.L. Osborne Duke QA Personnel



.232 -  
 .232  
 5.500  
 5.500  
 11.464  
 + 2

IV. Cask Measurement Data -

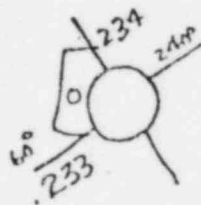
Run 2 of Set 2 11/11/80

Indicator Number

Spider Position from Top of Cavity	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)
4.5"	12.04	12.30	12.38	12.00	13.73	12.79
6.5"	12.54	12.15	12.44	12.13	14.24	12.93
12.5"	12.16	11.02	9.59	10.27	12.45	10.60
18.5"	12.41	10.38	9.13	10.29	12.38	11.73
24.5"	12.43	9.77	8.62	10.17	12.31	12.84
30.5"	12.52	9.45	8.13	9.79	12.30	13.69
36.5"	12.64	9.24	8.06	9.40	12.36	14.46
42.5"	12.96	9.08	7.57	8.97	12.56	15.16
48.5"	13.38	9.08	7.15	8.65	12.60	15.37
54.5"	13.92	9.36	6.40	8.80	12.33	14.91
60.5"	14.29	9.18	5.89	8.37	12.75	14.73
66.5"	14.39	9.03	5.82	8.09	13.07	14.76
72.5"	14.64	9.01	5.59	8.23	12.77	14.69
78.5"	14.53	9.00	5.47	7.86	12.84	15.12
84.5"	14.64	9.14	5.30	8.10	12.80	15.26
90.5"	14.37	8.93	5.15	7.97	13.16	15.33
96.5"	14.54	9.08	5.03	8.11	12.79	15.39
102.5"	14.70	9.18	5.14	8.08	12.61	15.14
108.5"	15.20	9.67	5.03	8.23	12.55	15.00
114.5"	15.51	9.66	4.96	8.01	12.62	14.69
120.5"	15.62	10.44	4.81	7.96	12.30	13.87
126.5"	15.70	10.60	4.89	8.15	11.80	13.42
132.5"	15.81	10.44	5.18	8.53	11.73	13.52
138.5"	15.49	10.56	5.89	8.76	11.49	13.52
144.5"	14.87	10.45	6.68	9.11	11.39	13.63
150.5"	14.00	10.28	7.28	9.69	11.51	13.48
156.6"	13.08	10.18	7.91	10.28	11.86	12.99
162.5"	12.40	9.99	8.65	10.93	12.16	12.42
168.5"	11.82	9.70	9.55	11.52	12.42	11.75
174.5"	12.96	12.43	12.33	12.25	14.94	14.47

Data Taken by: James Uehara of Nuclear Assurance Corporation  
 Qualified Operator Organization

Data Verified by: D.L. Osborne Duke QA Personnel



13.000	13.000
+ .233	.234
.233	.234
<hr/> 13.466	<hr/> 13.468

V. Re-verified Data\* - Run 2 of Set 2 11/11/80

Spider Position	Indicator Number					
	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)
174.5	13.06	12.60	12.39	12.35	15.14	14.58
144.5	14.94	10.53	6.67	9.08	11.39	13.58
114.5	15.61	10.82	5.00	7.71	12.08	14.30
84.5	14.93	9.82	5.14	8.15	12.48	15.01
24.5	12.40	9.80	8.70	10.17	12.33	12.85

Data Taken by: James Vukob of Nuclear Assurance Corporation  
 Qualified Operator Organization

Data Verified by: DL Osborne Duke QA Personnel

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

IV. Cask Measurement Data -

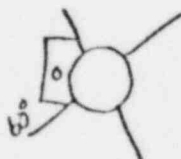
Run 3 of Set 2 11/11/80

Indicator Number

Spider Position from Top of Cavity	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)
4.5"	12.02	12.25	12.24	11.92	13.82	12.80
6.5"	12.61	12.17	12.44	12.24	14.40	13.09
12.5"	12.21	10.95	9.54	10.26	12.63	10.76
18.5"	12.43	10.31	9.13	10.26	12.55	11.92
24.5"	12.44	9.68	8.69	10.10	12.49	13.09
30.5"	12.49	9.23	8.27	9.68	12.53	14.03
36.5"	12.61	9.05	8.25	9.34	12.70	14.34
42.5"	12.96	8.94	7.67	9.02	12.75	15.37
48.5"	13.41	8.95	7.27	8.75	12.80	15.56
54.5"	13.85	9.35	6.48	8.72	12.55	14.96
60.5"	14.27	9.20	5.95	8.37	12.91	14.75
66.5"	14.38	9.05	5.86	8.12	13.13	14.76
72.5"	14.48	8.92	5.67	8.19	13.13	14.89
78.5"	14.49	9.00	5.55	7.88	13.03	15.14
84.5"	14.63	9.18	5.37	8.08	12.90	15.24
90.5"	14.55	9.10	5.14	8.07	12.97	15.19
96.5"	14.61	9.21	5.08	8.13	12.77	15.30
102.5"	14.72	9.31	5.24	8.10	12.59	15.06
108.5"	15.23	9.79	5.11	8.26	12.54	14.92
114.5"	15.62	10.08	5.00	8.00	12.54	14.51
120.5"	15.65	10.56	4.92	7.99	12.31	13.78
126.5"	15.76	10.63	4.98	8.20	11.83	13.37
132.5"	15.90	10.90	5.42	8.33	11.45	13.20
138.5"	15.61	10.86	6.08	8.72	11.34	13.32
144.5"	14.89	10.62	6.84	9.12	11.32	13.50
150.5"	14.05	10.49	7.45	9.68	11.40	13.32
156.5"	13.11	10.40	8.05	10.25	11.73	12.82
162.5"	12.49	10.24	8.80	10.89	12.02	12.28
168.5"	11.91	9.95	9.72	11.49	12.28	11.57
174.5"	13.17	12.87	12.56	12.36	15.00	14.44

Data Taken by: James Vukobrat of Nuclear Assurance Corporation  
Qualified Operator Organization

Data Verified by: D. K. Osborne Duke QA Personnel



60°	150°
13.000	13.000
.233	.234
.233	.234
13.466	13.468



V. Re-verified Data\* -

Run 3 of Set 2 11/11/30

Indicator Number

Spider Position	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)
174.5	13.29	12.96	12.64	12.47	15.14	14.52
114.5	15.61	10.60	5.08	7.75	12.32	14.24
84.5	15.18	10.19	5.24	7.93	12.21	14.77
48.5	13.66	9.44	6.89	8.98	12.10	15.09
12.5	12.20	11.00	9.55	10.28	12.64	10.66

Data Taken by: James V. Hill of Nuclear Assurance Corporation  
 Qualified Operator Organization

Data Verified by: D. J. Quinn Duke QA Personnel

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

Location: Ocoee Nuclear Station Date 11/12/80

Cask Serial No. NAC-1B Ambient Air Temp. 68°F

I. Calibration - Reference Section 4.1.1.3 through 4.1.1.6

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

- |    |            |    |            |
|----|------------|----|------------|
| 1. | <u>N/A</u> | 4. | <u>N/A</u> |
| 2. |            | 5. |            |
| 3. |            | 6. |            |

B. Record measured shaft diameters                     :

- |    |                       |                          |  |
|----|-----------------------|--------------------------|--|
| 1. | <u>1.9992, 1.9992</u> | in.                      | MICROMETER OCMNT 27692 calibrated 10/29/80       |
| 2. | <u>1.9993, 1.9991</u> | in.                      | Due 4/24/80 by DL Roberts                        |
| 3. | <u>1.9990, 1.9993</u> | in.                      | INSIDE MICROMETER OCMNT 27823 calibrated 10/6/80 |
|    |                       | Due 1/6/81 by DL Roberts |  |
- Average = 1.9992      1/2 Average = 0.9996

II. Calibration of Traveling Spider                     :

WITH CORRESPONDING DISPLAY

No.	Indicator Initial Reading (mm)	Distance to Bottom of Shaft to Measuring Surface Reading (in.)	Indicator "Zero" Reading * (in.)	Difference (microns)
A	5.19 (.2043)	6.0095	7.2079	-0.0014
B	5.70 (.2244)	6.0090	7.2280	-0.0002
C	5.59 (.2201)	6.0037	7.2237	-0.0009
D	5.87 (.2311)	6.0090	7.2347	-0.0000
E	6.71 (.2642)		7.2677	-0.0065 *
F	5.94 (.2339)		7.2375	-0.0038 *
		Average 6.0070		

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

III. Calibration Date for Indicator -                     

Webber Gauge Blocks Id. OCMNT 27844 Calibrated 12/31/79 Due 12/31/81

Gauge Number	0	Readings (mm)					Error $\pm 10^{-2}$ $\mu m$	Calibrated By
		.100"	.200"	.300"	.400"	.500"		
A 1	5.19	7.74	10.20	12.81	15.35	17.87	+1	11/12/80 J Viebrock
B 2	5.70	8.25	10.79	13.32	15.04	18.40	-0	11/12/80 J Viebrock
C 3	5.59	8.14	10.68	13.22	15.75	18.29	+1	11/12/80 J Viebrock
D 4	5.87	8.41	10.95	13.49	16.03	18.57	+0	11/12/80 J Viebrock
E 5	6.71	9.26	11.79	14.34	16.08	19.43	+2	11/12/80 J Viebrock
F 6	5.94	8.48	11.02	13.56	16.10	18.64	+0	11/12/80 J Viebrock

Data Taken by: William of Nuclear Assurance Corporation  
 Qualified Operator Organization

Data Verified by: D.L. Osborne Duke QA Personnel