

Containment Exterior Surface Survey Data

Surveys were performed of the containment dome and buttresses (field date 11/21/09). Attachment 1 includes a map of the dome and buttresses. The dome survey was performed to identify if there are significant changes on the surface of the dome by comparing the current survey data to the final dome survey performed in 1981. The dome was surveyed between 1977 and 1982 as technical specification surveillance required based on the dome delamination event. Procedure SP-180, Reactor Building Structural Integrity Dome Surveillance Program, was initiated to perform a survey of the dome to identify changes in dome elevation and an inspection of the dome surface identifying crack width and crack pattern. The final surveillance was performed in 1981 with an additional survey performed 3 months later due to exceeding acceptance criteria. The buttress survey was performed to determine the relative position of the buttress corners.

Dome Survey

The current survey of the dome was performed using SP-180 as a guide. The original benchmark and survey point pins were found on the surface of the dome. Elevations were taken at each of the benchmarks and survey points. Delta elevations were determined by subtracting the elevation of each survey point from the average of the three benchmark elevations. The change in elevation is shown below as well as the original acceptance criteria and the results from the last survey performed in 1982.

Survey Point Location No.	Change in ΔEL ft.(inches) 2009	Change in ΔEL ft. (inches) 1982	% Change 2009 to 1982	ΔEL Acceptance Limit ft.+/- (inches)
1	-0.056 (0.672)	-0.054 (0.648)	+0.04	0.030 (0.360)
2	-0.059 (0.708)	-0.042 (0.504)	+0.29	0.030 (0.360)
3	-0.064 (0.768)	-0.044 (0.528)	+0.31	0.030 (0.360)
4	-0.060 (0.720)	-0.050 (0.600)	+0.17	0.030 (0.360)
5	-0.037 (0.444)	-0.025 (0.300)	+0.32	0.025 (0.300)
6	-0.014 (0.168)	-0.019 (0.228)	-0.36	0.025 (0.300)
7	-0.024 (0.288)	-0.027 (0.324)	-0.13	0.025 (0.300)

In a letter dated 2/23/82 from Gilbert Associates, Inc. (GAI) to Florida Power Corporation, GAI concluded that the structural integrity of the dome was not adversely affected by the measured deflections outside of the Technical Specification acceptance limits. The deflections were considered to be indicative of a seasonal variation in thermal deflections of the structure, which are practically impossible to accurately predict. Similar to the 1982 survey, the 2009 survey was performed with dome apex surface temperature and internal ambient temperature within approximately 10°F. The baseline delta temperature was 50°F.

0/4

The % change from the 1982 survey is considered insignificant with respect to detecting a change in the structure similar to the delamination found between buttress 3 and 4. In addition, a review of the boroscope video of the seven core bores in the dome did not find any delamination.

Buttress Survey

Unlike the dome survey, the buttress survey does not have a historical procedure that contains baseline information or acceptance criteria. The buttress survey is used to determine the relative position of the outermost surface of the buttress at the corner of the buttress adjacent to the tendon bearing plate. Attachment 1 identifies the buttress corners that were within line of sight during the survey. Both corners of buttresses 1, 2, 5, and 6 were visible. One corner of buttress 3 was not visible; therefore, the surveyors chose to survey the face of the buttress and the containment wall at the buttress to wall interface. Only the buttress survey data at buttress 3 will be evaluated. Buttress 4 only had one corner visible.

The survey data consists of three coordinates, N/S (x), E/W (z), and elevation (y). The relative position of each buttress was determined by calculating the lateral offset and angle of verticality. The angle is determined using the x and z coordinates of the lowest and the highest reading to calculate a Δx and Δz . These dimensions are used with the difference in elevation between the lowest and highest reading to calculate the angle of verticality.

Buttress ID	Lateral Offset ft.(inches)	Survey Length (ft.)	Angle of Verticality
B1a	0.1122 (1.3461)	59.912	0.1071°
B1b	0.2776 (3.3312)	95.874	0.1659°
B1b*	0.2023 (2.4277)	89.118	0.1301°
B2a	0.1974 (2.369)	77.870	0.1452°
B2b	0.0435 (0.5220)	76.143	0.0327°
B3a	0.2175 (2.610)	53.106	0.2346°
B4	0.0375 (0.4500)	76.027	0.0283°
B5a	0.1760	80.705	0.1250°

Buttress ID	Lateral Offset ft.(inches)	Survey Length (ft.)	Angle of Verticality
	(2.1120)		
B5b	0.1263 (1.5156)	43.684	0.1656°
B6a	0.1126 (1.3512)	48.477	0.1331°
B6b	0.0883 (0.9996)	73.984	0.0684°

*The top two survey points were compared and found to have a lateral offset, from the highest to lowest survey point, of 0.9" in the East direction over a length of 6.8'. Surface variations exist that can cause a shift in lateral locations. The lateral offset for this location is reduced to less than 3" by eliminating the highest survey point.

The vertical alignment requirement for cast-in-place concrete for buildings for heights greater than 100 ft. is 1/2000 times the height but not more than 3 in. at outside corner of exposed corner columns and control joint grooves in concrete (Ref. American Concrete Institute (ACI), 117-90, Standard Specifications for Tolerances for Concrete Construction and Materials, Section 4.1, Vertical Alignment)

An examination of the outermost surface of the buttresses identified the following conditions:

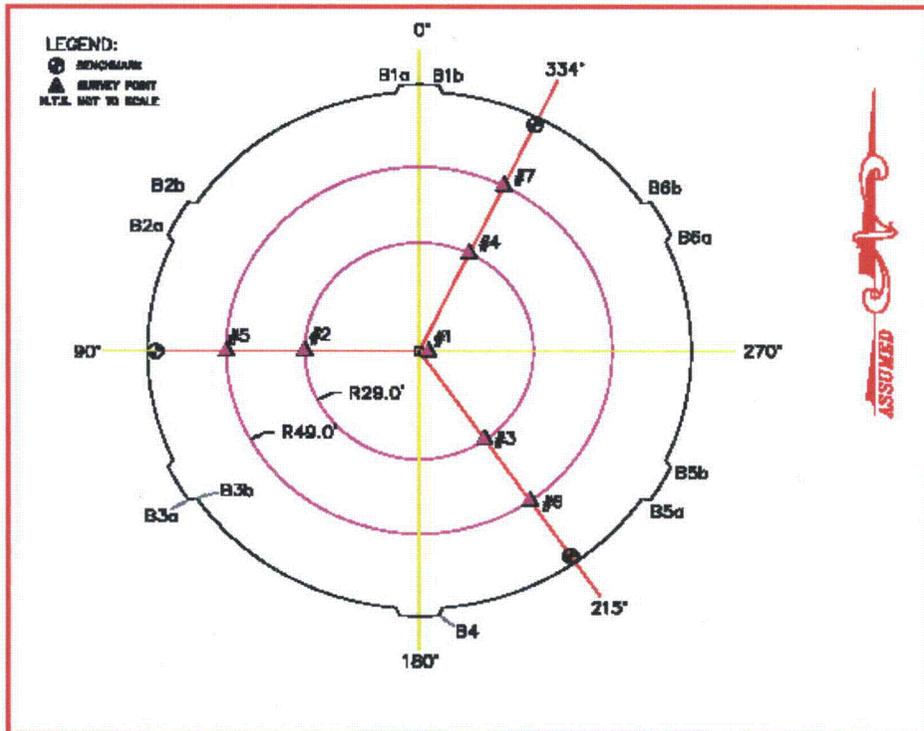
- Uneven surfaces between placements along form edges
- Cosmetic grout repairs along the face of the buttresses along the corner causes a radial change in to or out of the plane of the buttress
- Corners exhibit loss of cover concrete along the tendon bearing plate area, which causes a shift in lateral location of the corners

These conditions affect the accuracy of the survey data. As noted above, eliminating one survey point at Buttress ID B1b reduced the lateral offset by 0.9". The vertical alignment tolerance provided in ACI 117-90 is considered to be satisfied based on the localized surface variations affecting the accuracy of the survey data.

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Attachment 1



ENCLOSURE 1

ELEVATION BENCHMARK	ELEVATION BENCHMARK	ELEVATION BENCHMARK	#1	#2	#3	#4	#5	#6	#7
90°	215°	334°	285.106	281.245	281.227	281.106	274.244	274.308	274.311

SURVEYORS NOTES:

1. This is not a boundary survey. The Purpose of this survey is to provide vertide and horizontal data on the outside of the reactor as directed by the client.
2. The elevations shown hereon are assumed as provided by the client.
3. For buttress data, see accompanying spreadsheet titled 09017A04.xls.

CERTIFIED TO: Progress Energy, Crystal River, Florida

Walter L. Higgins, P.S.M. for GulfWest Surveying, Inc.
 Florida Surveyor and Mapper registration no. 5632
 Florida licensed business number 7314
 Not valid without the signature and original raised seal of a Florida licensed surveyor and mapper.

**SPECIFIC PURPOSE SURVEY FOR
 PROGRESS ENERGY**

Citrus County, Florida
 Project No. 09017A04 Field Book 44 Page 44 Date November 24, 2008
 Scale: N.T.S. Field Date 11/21/2008 Sheet 1 of 1



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