



The calculation does not provide a methodology section that documents how the calculation is performed. The methodology is barely described in the calculation section. This deficiency does not meet CC-AA-309 Step 4.3.1 and CC-AA-309-1001 Sections: 4.1.3 and 4.3.7. Please note this calculation was generated under the GPUN Calculation Procedure EP-006. However this GPUN procedure contained the same requirement.

**Item 3 -**

The calculation develops a term called evaluation thickness based on actual measured thicknesses. This value is then compared to the design basis minimum required uniform thickness for the sandbed region of 0.736. The method in which evaluation thickness is developed is poorly explained. In addition the justification as to why it is acceptable to compare the evaluation thickness to the design basis required minimum uniform thickness of 0.736 is not documented in the calculation nor is there a reference to an industry standard.

**Item 4 -**

The calculation uses a Local Wall Acceptance Criteria. This criteria was developed by GE and is referenced in the calculation. The criteria can be applied to a small area (less than 12 by 12), which are less than 0.736 thick so long as the small area is at least 0.536 thick. In developing the criteria GE developed an ANSYS model of the Drywell Vessel. The model included a 12 by 12 area that was 0.536 thick at the weakest location (with respect to buckling) of the drywell. The 12 by 12 area was then surrounded by a larger 24 by 24 area that transitioned from 0.536 to 0.736. The remaining thickness of the Drywell Vessel was then modeled at a uniform thickness of 0.736.

Both the GE referenced report and calculation C-1302-187-5320-024 state that in this case the ultimate theoretical buckling capacity of the drywell vessel shell is reduced by 9.5%. Calculation C-1302-187-5320-024 contains no statement or justification that a 9.5% reduction in buckling load still meets code allowables.

**Item 5 -**

The calculation uses a Local Wall Acceptance Criteria. This criteria can be applied to small areas (less than 12 by 12), which are less than 0.736 thick so long as the small 12 by 12 area is at least 0.536. However the calculation does not provide additional criteria as to the acceptable distance between multiple small areas. For example, what is the minimum required linear distances between a 12 by 12 area thinner than 0.736 but thicker than 0.536 and another 12 by 12 area thinner than 0.736 but thicker than 0.536.

The actual data for two bays (13 and 1) shows that there are more than one 12 by 12 areas thinner than 0.736 but thicker than 0.536.

**Item 6 -**

The calculation uses a Very Local Wall Acceptance Criteria. This criteria can be applied to small areas (less than 2 1/2 in diameter), which are less than 0.736 thick so long as the very small area is at least 0.49 thick and remaining area surrounding the very small area has a uniform thickness of greater than 0.736. However the calculation does not provide additional criteria as to the acceptable distance between multiple very small areas. For example what is the minimum required linear distances between a 2 diameter area thinner than 0.736 but thicker than 0.49 and another 2 diameter area thinner than 0.736 but thicker than 0.49.

The actual data for two bay (13 and 1) shows that there are more than one 2 diameter areas thinner than 0.736 but thicker than 0.490.

**Item 7 -**

The calculation uses a Very Local Wall Acceptance Criteria. This criteria can be applied to small areas (less than 2 1/2 in diameter); which are thinner than 0.736 thick so long as the very small area is at least 0.49 thick and remaining area surrounding the very small area has a uniform

thickness of greater than 0.736.

The criteria was obtained from a second calculation (C-1302-24-5320-071), which is referenced. However C-1302-24-5320-071 does a poor job of developing the basis of the criteria and does not state whether the 0.49 criteria is acceptable for buckling loads.

Item 8 -

Calculation Section 5 Sub Section Bay 1 documents that there are 8 small areas in Bay 1 all less than 2 1/2 diameter, thinner than 0.736 but thicker than 0.536. These 8 small areas are scattered in a larger area, which is approximately 25 wide and 50 long. The calculation then selects 2 of the small areas that are closest together and combines these into a 4 by 4 area. The thickness of this 4 by 4 area is then compared to the Local Wall Acceptance Criteria, which is applicable for area up to 12 by 12. The small 4 by 4 area then is judged to be the bounding area for the larger 25 by 50 area. This is then used as justification that the larger 25 by 50 area is acceptable.

However, the calculation does not reconcile between the established criteria, for a 12 by 12 area, and the actual data, which has areas thinner than 0.736 scattered over a 25 by 50 area.

Item 9 -

Calculation Section 5 Sub Section Bay 1 documents that there are 8 small areas in Bay 1 all less than 2 1/2 diameter, thinner than 0.736 but thicker than 0.536. These 8 small areas are scattered in a larger area that is approximately 25 wide and 50 long. The calculation then states that the surrounding area around the 25 by 50 area has a uniform thickness of at least 0.800 inches. However the calculation provides no reference or assumption that justifies this input. The NDE datasheets of Bay 1 do not clearly substantiate this design input.

Item 10 -

Calculation Section 5 Sub Section Bay 13 documents that there are 9 small areas in Bay 13 all less than 2 1/2 diameter, thinner than 0.736 but thicker than 0.536. These small areas are scattered in a larger area, which is approximately 25 wide and 50 long. The calculation then selects a 6 by 6 area within this region that is 0.677. This area is then compared to the Local Wall Acceptance Criteria, which is applicable for area up to 12 by 12. The smaller 6 by 6 area then is judged to be the bounding area for the larger 25 by 50 area. This is then used as justification that the large 25 by 50 area is acceptable.

However, the calculation does not reconcile between the established criteria, for a 12 by 12 area, and the actual data, which has areas thinner than 0.736 scattered over a 25 by 50 area.

Item 11 -

Calculation Section 5 Sub Section Bay 13 documents that there are 9 small areas in Bay 13 all less than 2 1/2 diameter, thinner than 0.736 but thicker than 0.536. These 9 small areas are scattered in a larger area that is approximately 25 wide and 50 long. The calculation then states that the surrounding area has a uniform thickness of at least 0.800 inches. However the calculation provides no reference or assumption that justifies this input. The NDE datasheets of Bay 13 do not clearly substantiate this design input.

Immediate actions taken:  
Informed my Supervisor

Recommended Actions:  
Listed below are recommendations for the calculation revision:

- 1) The calculation should be revised to properly reference the NDE data sheets. Critical data sheets should be attached to the calculation.
- 2) The calculation should have a methodology section that documents how the data is treated. Specifically, how the evaluation thickness is developed and why it is acceptable to compare the evaluation thickness to the criteria of 0.736. It would be very helpful to cite an industry standard that prescribes and justifies this methodology.
- 3) The calculation uses a Local Wall Acceptance Criteria. The basis states that the criteria is associated with a 9.5% reduction in the ultimate theoretical buckling capacity of the drywell vessel shell. Revise calculation C-1302-187-5320-024 to state that a 9.5% reduction in buckling load still meets code allowables.
- 4) The calculation uses a Local Wall Acceptance Criteria. This criteria can be applied to small areas less than 12 by 12. Revise the calculation with additional criteria that defines the minimum acceptance distance between multiple local thin areas in which the Local Wall Acceptance Criteria can be applied.
- 5) The calculation uses a Very Local Wall Acceptance Criteria. This criteria can be applied to small areas less than 2 1/2 in diameter. Revise the calculation with additional criteria that defines the minimum acceptance distance between multiple local thin areas in which the Local Wall Acceptance Criteria can be applied.
- 6) The calculation uses a Very Local Wall Acceptance Criteria. This criteria can be applied to small areas less than 2 1/2 in diameter. Revise the calculation to justify that this criteria is applicable to the buckling loads.
- 7) The calculation documents that there are 8 small areas in Bay 1 and 9 small areas in bay 13, all less than 2 1/2 diameter, thinner than 0.736 but thicker than 0.536. In both bays the small areas are scattered in an area approximately 25 wide and 50 long. Revise the calculation to clearly demonstrate that these two areas meet design basis. The revision should clearly outline the methodology that is applied and the acceptance criteria.

What activities, processes, or procedures were involved?  
License Renewal Review of the Calculation

What are the consequences?  
Poor Design Basis Documentation

Were any procedural requirements impacted?  
Yes - CC-AA-309-1001

Were there any adverse physical conditions?  
None

List of knowledgeable individuals:  
Howie Ray and Tom Quintenz

Operable Basis:

Reportable Basis:

SOC Reviewed by: RALPH C LARZO 03/06/2006 19:50:06 CST  
SOC Comments:  
3/6/2006 RCL: ACIT assigned to revise calculation C-1302-187-5320-024.  
Close to ACIT.