UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 6 1978

MEMORNADUM FOR: Olan D. Parr, Chief
Light Water Reactors Branch #3
Division of Project Management

FROM: I. Sihweil, Chief
Structural Engineering Branch
Division of Systems Safety

SUBJECT: TECHNICAL ASSISTANCE REQUEST, DESIGN CRITERIA FOR SNUPPS PLANTS CONTAINMENT STRUCTURE (TAC No. 4820) (SEB:1165)

As requested in your letter dated February 21, 1978, we have prepared the attached comments on the applicant's interpretation of PSAR commitments on design criteria for SNUPPS comtainments. Our position is the same as that stated in the January 23, 1978 meeting with the applicant.

/s/ I. Sihweil

I. Sihweil, Chief
Structural Engineering Branch
Division of Systems Safety

Attachment:
As stated

cc: R. Mattson
D. Vassallo
J. Knight
~~R. Shewmaker~~
E. Licitra
SEB Members

STRUCTURAL ENGINEERING BRANCH
COMMENTS ON
DESIGN CRITERIA FOR SNUPPS PLANTS CONTAINMENT STRUCTURE

In a letter to E. G. Case dated February 13, 1978, the applicant has submitted informaton in support of its contention that the reinforcing steel cover for the concrete containment may be a minimum of 1-1/3 inches and a maximum of 11-1/2 inches. The basic issue is whether the minumum and maximum reinforcing steel cover specified by the code may be altered by placement tolerances.

The applicant has presented the following arguments in support of its position:

(1) The design and placing drawings conform to the minimum and maximum cover requirements as specified in BC-TOP-5A which is referenced in the SNUPPS PSAR. These are the same requirements as specified in CC-3534 and CC-3535 of Division 2 of the ASME B & PV Code. However, the applicant claims that the tolerances permitted by Section 3.8.1.6.6.1 of the PSAR allow variations in the minimum and maximum values.

(2) A reference to the ACI Commitee 224 Report has been cited that states "the cracking mechanism in two-way action slabs and plates is controlled... only to a small extent by the magnitude of the concrete cover". Furthermore, they note that the containment is prestressed which will minimize the potential for any significant crack opening.

(3) They have performed calculations in accordance with Reference 2 as cited in their letter that demonstrates that there will be sufficient bond development with a minimum cover of 1-1/3 inches.

(4) Imposition of more stringent requirements will necessitate revision of the reinforcing steel detail drawings, thus forcing redesign of the containment.

The staff has reviewed the applicant's submittal and the referenced documents and has drawn the following conclusions:

(1) The minimum and maximum covers specified in BC-TOP-5A are controlling for both design and construction. The specified cover should be appropriately modified to accommodate the placing tolerances stated in Section 3.8.1.6.6.1. The staff notes that its position is consistent with a code interpretation made by the Working Group on Design of Section III, Division 2, of the ASME B & PV Code. As noted by the applicant, this interpretation was not supported by the Subgroup on Materials, Construction and Examinaton and therefore has not been resolved within the code committee. However the staff feels that the Working Group on Design should have the jurisdiction on this matter.

(2) The applicant's reference to ACI Committee Report 224 does not present any conclusive evidence regarding the absolute minimum cover requirements for corrosion protection. It is also noted that the same report states that for beams and one-way slabs "the thickness of the concrete cover is an important variable, but not the only geometric consideration".

(3) The applicant has not presented the calculations that demonstrate there will be sufficient bond development with a cover of 1-1/3 inches. Their conclusion does not appear to be consistent with the conclusion in Reference 2 which states: "Comparison of current provisions for development length with the proposed design recommendations shows that for minimum cover current provisions are unconservative".

(4) The staff does not believe that its interpretation of the cover requirements will have a significant cost impact on the appplicant. An increase in the specified cover may necessitate a drawing change, but it should not require a redesign of the containment. If a change in the depth of a section is a concern, it could be accommodated by a tightening of the placing tolerances. It is noted that the applicant's placing tolerances are greater than those specified in both ACI 318-71 and ACI 349-76.

(5) The staff is also concerned that the applicant's interpretation of cover requirements could result in a cover as small as 1/2 inch for the mechanical connectors used with #18 bars.

In conclusion, the staff's position is the same as that stated in the January 23, 1978 meeting with the applicant. It is summarized as follows:

1. The staff considers that the commitment of a 2-inch minimum concrete cover for the concrete containment as made in Section CC-3533.1 of Appendix C to BC-TOP-5 for #6 through #18 reinforcing steel to control design and construction. The value is a minimum meaning the absolute minimum cover to assure corrosion control in the actual construction shall not be less than 2 inches. The staff expects for Callaway, Unit #1 that by wall lift #6 all reinforcing in sizes #6 through #18 will meet this requirement.

2. The staff considers that the commitment of a depth of not more than t/5 to reinforcing steel that is considered face reinforcement as made in Section CC-3534 of Appendix C to BC-TOP-5 to control design and construction. The value is a maximum as rounded to the next whole

inch, meaning the absolute maximum depth in order to provide surface crack control for the concrete containment. The staff expects for Callaway, Unit #1 that by wall lift #6 all face reinforcing will meet this requirement. The staff will consider special cases on this requirement where necesssary wall blockouts may require local variations to the maximum depth to face reinforcing.

3. The staff considers items 1 and 2 to apply only to the concrete containment as indicated by the applicant's commitments. ACI 318-71 provisions as committed to by the applicant will govern requiremetns similar to these for the other Category I structures.

ATTACHMENT 6