MEMORANDUM FOR: Robert J. Bosnak
                   Deputy Director, DE, RES

FROM: Robert F. Burnett, Director
                   Division of Safeguards
                   and Transportation, NMSS

SUBJECT: REVIEW OF NUREG/CR-4554 VOLUMES 6 & 7
                   OF THE SCANS THEORY MANUAL

This is in reply to your memorandum of August 2, 1989,
requesting review, comment, and recommendation on the final
version of the SCANS Theory Manual Volumes 6 and 7.

We have reviewed the text of the reports. Our comments are
enclosed.

Robert F. Burnett, Director
Division of Safeguards
and Transportation, NMSS

Enclosure:
As Stated

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Comments on
"Buckling of Circular Cylindrical Shells"
SCANS Theory Manual Volume 6
NUREG /CR-4554

Encl to Memo dtd: **AUG 2 2 1989**

1. The computer codes BOSOR4 and BOSOR5 are finite difference analysis codes not finite element analysis codes as stated on pages xvii, 35, 37, 38, 40, 41, and 59.

2. Page 2, Figure 1-1, delete the descriptions, "shell is axisymmetric" and " shell is nonaxisymmetric".

3. Tables 1-1, 1-2, and 1-3, the elastic buckling stress (imperfect structure) may be shown as $\sigma_{ie}\,\alpha_{i}$. (see page xv Nomenclature).

4. Page 11, last paragraph, delete the reference "Regulatory Guide 1978".

5. Page 14, first paragraph states that in SCANS, Eqs 4-3 and 4-4 are replaced by Eqs 6-1 and 6-2. We are concerned that SCANS adopts the buckling analysis method of ASME Code Case N-284 (e.g. factor of safety, tolerance limits,etc.) but does not follow the code case exactly in calculating one of the key parameters. We strongly recommend that SCANS follows the Code Case N-284 completely without any modification. Changes, if needed, may be implemented in the future when more information and test data become available.

6. It is noted that the factor of safety (FS) in Eqs 4-7,4-8, 4-9 and 4-16 looks like a superscript.

7. Page 16, last paragraph, last sentence should be revised to read "It is used in Section 4.4 for the purpose of evaluating the combined effects of axial compression plus hoop compression."

8. Page 19, top line, revise "... in the equations given in (a) and (b)." to read "... in Eqs (4-17) and (4-18)." And delete $K\sigma_{re}$ and σ_{re} .

9. Page 19, last paragraph, second sentence, replace the term "external pressure" by "hoop compression".

10. Page 22, With the presence of Figure 5-1(c),Why do we need Figure 5-1(d)? Also, can a curve like Figure 5-1(c) for stainless steel type 304 be included in the report?

11. Page 25, provide the definition of "non-stress-relieved shells" and "stress-relieved shells".

12. Page 41, Table 8.1b, the theoretical elastic buckling stresses based on API Bulletin 2U are missing.

13. Page 44, Table 8.3a, change the first line E_t/E to $\sqrt{E_t/E}$.

14. Page 49, first paragraph, Tables 4.2 and 4.4 should be revised to Tables 8.2 and 8.4.

Comments on
"Puncture of Shipping Casks"
SCANS Theory Manual Volume 7
NUREG/CR-4554

AUG 2 2 1989

Encl to Memo dtd:_____

1. Page 2, add (a) and (b) to Figure 1.

2. Page 9, third line from the top, change 0.197 inch to 0.0197 inch.

3. Page 10, Table 1, revise "Ref. 4" to "I. Sakamoto, et al. (1974)".

4. Page 35, Figure 9, delete the top line "Sensitivity study on puncture -DYNA2D (Model B2)" and indicate the failure prediction methods for the data points shown.

5. Page 36, Table 4, revise "case" to "Failure Prediction Method" and describe how the incipient puncture energy is normalized.

6. Revise "Minimum Y-Z Shear" to "Transverse Shear Stress" and "Maximum Shear" to "Maximum Shear Stress" in Tables 4, 5, and 6.