U.S. Department
of Transportation
**Pipeline and
Hazardous Materials Safety
Administration**

400 Seventh Street, S.W.
Washington, D.C. 20590

NOV - 3 2005

Mr. Ed Mansell
P.O. Box 310
4825 E. Kearney
Springfield, OH 65801

Ref. No.: 05-0199

Dear Mr. Mansell:

This is in response to your August 18, 2005 letter requesting clarification of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) applicable to structural integrity of cargo tanks. Specifically, you ask whether the following allowable stress for stress concentrations are acceptable under the structural requirements for cargo tanks under § 178.345-3 of the HMR:

Primary Stress Allowable:	1.5xSa*E, where Sa is the 1998 ASME Code allowable stress, and E is the joint efficiency; and
Primary + Secondary Stress Allowable:	3xSa*E, where Sa is the 1998 ASME Code allowable stress, and E is the joint efficiency.

Section 178.345-3(b) specifically requires cargo tank designers to use Appendix G of the American Society of Mechanical Engineers (ASME) Code when considering stress concentrations which occur at pads, cradles, or other supports. Provided the stress concentrations occur at pads, cradles, or other supports, Appendix G of the ASME Code is mandatory when considering designing DOT specification cargo tanks.

I hope this information is helpful.

Sincerely,

Susan Gorsky
Acting Director
Office of Hazardous Materials Standards

050199

178.345-3

From: Ed Mansell
P.O. Box 310
4825 E. Kearney
Springfield, MO 65801

Thursday, August 18, 2005
Ref.: 178345-3STR

To: Office of Hazardous Materials
Research and Special Programs Administration
U.S. Department of Transportation
400 7th Street SW.,
Washington, DC 20590-001

Attn: DHM-10

Foster
§178.345-3
Cargo Tanks
05-0199

Sec. 178.345-3 Structural integrity.

(a) General requirements and acceptance criteria.

(1) The maximum calculated design stress at any point in the cargo tank wall may not exceed the maximum allowable stress value prescribed in Section VIII of the ASME Code (IBR, see Sec. 171.7 of this subchapter), or 25 percent of the tensile strength of the material used at design conditions.

(b) ASME Code design and construction. The static design and construction of each cargo tank must be in accordance with Section VIII of the ASME Code. The cargo tank design must include calculation of stresses generated by the MAWP, the weight of the lading, the weight of structures supported by the cargo tank wall and the effect of temperature gradients resulting from lading and ambient temperature extremes. When dissimilar materials are used, their thermal coefficients must be used in the calculation of thermal stresses.

(1) Stress concentrations in tension, bending and torsion which occur at pads, cradles, or other supports must be considered in accordance with appendix G in Section VIII of the ASME Code.

(2) Longitudinal compressive buckling stress for ASME certified vessels must be calculated using paragraph UG-23(b) in Section VIII of the ASME Code. For cargo tanks not required to be certified in accordance with the ASME Code, compressive buckling

Paragraph (a) (1) states that the allowable stress value shall be in accordance with Section VIII of the ASME Code. However, paragraph (b)(1) makes an exception for stress concentrations in tension, bending and torsion, which occur at pads, cradles, or other supports.

Therefore, based on Appendix G which references WRC-107 and WRC-297 bulletins, the allowable stress for stress concentrations would be:

Primary Stress Allowable:	1.5xSa*E, where Sa is the ASME allowable, and E the joint efficiency
Primary + Bending Stress Allowable:	3xSa, where Sa is the ASME allowable, and E is the joint efficiency

Question: Is the interpretation as stated above correct?

Sincerely,

Ed Manselll