U.S. Department
of Transportation

**Research and
Special Programs
Administration**

JUN 5 1998

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

DOT-E 11824
(FIRST REVISION)

EXPIRATION: DATE: June 30, 1999

(FOR RENEWAL, SEE 49 CFR SECTION 107.109.)

1. GRANTEE: The Dow Chemical Company, Freeport, TX

   (See Appendix A to this document for a list of additional grantees and expiration dates)

2. PURPOSE AND LIMITATION: This exemption authorizes the use of acoustic emission non-destructive testing in place of the five non-destructive methods listed in 49 CFR 180.509(e) for the purpose of performing structural integrity inspections and tests. This exemption provides no relief other than as specifically stated herein.

3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107, and 171-180.

4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR Part 180.509(e) in that a non-authorized inspection and test method is utilized. The marking requirements of 172.203(a).

5. BASIS. This exemption is based on Dow's application dated December 12, 1996, submitted in accordance with 49 CFR 107.105 and the public proceeding thereon.

6. HAZARDOUS MATERIALS (49 CFR 172.101): Hazardous Materials authorized in tank cars by 49 CFR Part 173; by an exemption issued or as authorized in accordance with 49 CFR 171.12 or 49 CFR 171.12a.

7. PACKAGING AND SAFETY CONTROL MEASURES

   a. PACKAGING: Packaging prescribed are DOT specification tank car tanks, or tank car tanks built to an Association of American Railroads (AAR) specification, that are inspected and tested for structural integrity by an acoustic emission test method.

b. TESTING:

i. At a minimum, each tank car facility shall inspect the tank car for structural integrity as specified in 49 CFR 180.509. The structural integrity inspection and test shall include all transverse fillet welds greater than 0.64cm (.25 inch) within 121.92 cm (4 feet) of the bottom longitudinal centerline; the termination of longitudinal fillet welds greater than .64 cm (.25 inch) within 121.92 cm (4 feet) of the bottom longitudinal center line; and all tank shell butt welds within 60.96 cm (2 feet) of the bottom longitudinal center line by acoustic emission to determine that the welds are in proper condition.

ii. The acoustic emission testing will be performed in accordance with the latest issue of the Association of American Railroads Procedure for Acoustic Emission Evaluation of Tank Cars and IM101 Tanks.

iii. The requirements listed in the Association of American Railroads Manual of Standards and Recommended Practices, Section C, Part III, Specifications for Tank Cars M-1002, Appendix T, will also be adhered to.

iv. When appropriate, the applicant shall use calculation, laboratory test evidence, stress analysis, or comparative non-destructive testing of representative tank car designs, to establish and support the adequacy and sensitivity of the acoustic emission instrumentation, the test procedure, and the cumulative signal strength category (damage detection rating system). For each car tested, minimum detectable defect sizes shall be determined for the principal structural areas of interest to the structural integrity inspection.

v. For analysis purposes, representative tank car design types will be grouped as follows: In order to be considered representative of the tank car being tested, the representative tank car design and the test car shall have the same configuration (e.g. stud sill, continuous sill, dual diameter); same material of construction (e.g. carbon steel, stainless steel, aluminum, nickel, etc., but not necessarily the same grade) for both the tank and under frame; the same tank attachment and head block details; and the same sill geometry. For a representative design, the sill dimensions and the ratio of head to shell thickness shall not vary by more than 20% from the car being tested. A tank car design shall not be considered representative of the car being tested if a hoop stiffener or a continuous structural member, of the type listed in Section 6.3 of the Association

of American Railroads Procedure for Acoustic Emission Evaluation of Tank Cars and IM101 Tanks, is present on the representative or test car only. The stresses calculated for a representative tank car design shall be adjusted to reflect the true state of stress in the test car, and to account for geometric and other differences between the two cars. Approximate methods can be used to perform the stress adjustment.

A variation greater than that shown below shall be considered a significant departure from the representative designs.

Variable	Maximum Variation of Test Car from Representative Design
Material yield stress of principal structural components including cylindrical tank shell, tank heads, and sills	Increase of 10% Decrease of 40%
Membrane Stress Magnitude	Increase of 40% Decrease of 10%
Flexural Stress Magnitude	Increase of 40% Decrease of 20%
Thickness. Note: effect of changes in stress magnitude must be considered separately.	Increase of 100% Decrease of 50%

c. MARKING: Each tank must be marked "DOT-E 11824" in four inch letters and numerals on a contrasting background above the tank specification number.

8. SPECIAL PROVISIONS:

a. The grantee shall furnish the AAR Tank Car Committee all data documentation as described in the "Procedure for Acoustic Emission Evaluation of Tank Cars and IM-101 Portable Tanks." The AAR Tank Car Committee shall collect and compile the data documentation to ensure accuracy and reliability.

b. For each tank that is tested under the terms of this exemption, the following must be retained and made available to FRA upon request:

i. Data documentation, as described in the "Procedure for Acoustic Emission Evaluation of Tank Cars and IM-101 Portable Tanks"

ii. Any calculations, laboratory test evidence, stress analysis, or comparative non-destructive testing of representative tank car designs, used to establish and support the adequacy and sensitivity of the acoustic emission instrumentation, the test procedure, the cumulative signal strength category (damage detection rating system), representative car design type grouping, and minimum detectable defect sizes.

c. To allow for government observation of the AE testing of the first two cars, under this exemption:

i. At least 30 days prior to qualifying the first two tank cars under this exemption, the applicant shall notify the Federal Railroad Administration of the time and place of testing.

ii. At least 30 days prior to qualifying the first two tank cars under this exemption, the applicant shall forward to the Federal Railroad Administration Hazardous Materials Division appropriate calculation, laboratory test evidence, stress analysis, or the results of comparative non-destructive testing of representative tank car designs to establish and support the adequacy and sensitivity of the acoustic emission instrumentation, the test procedure, and the cumulative signal strength category (damage detection rating system) to be used on these cars.

9. MODES OF TRANSPORTATION AUTHORIZED. Rail Freight.

10. MODAL REQUIREMENTS: No modal specific requirements.

11. COMPLIANCE. Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by Federal hazardous materials transportation law, 49 U.S.C. Section 5101 et seq:

- All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, 49 CFR Parts 171-180.
- Registration required by 49 CFR 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in 49 CFR 171.8 who performs a function subject to this exemption must receive training on the requirements and conditions of this exemption in addition to the training required by 49 CFR 172.700 through 172.704.

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No person may use or apply this exemption, including display of its number, when the exemption has expired or is otherwise no longer in effect.

12. REPORTING REQUIREMENTS.

a. The carrier is required to report any incident involving loss of packaging contents or packaging failure to the Associate Administrator for Hazardous Materials Safety (AAHMS) as soon as practicable. (49 CFR 171.15 and 171.16 apply to any activity undertaken under the authority of this exemption.) In addition, the holder of this exemption must inform the AAHMS, in writing, of any incident involving the package and shipment made under the terms of this exemption.

Issued at Washington, D.C.:

for Ann Mazzullo 6/5/98

Alan I. Roberts (DATE)
Associate Administrator
for Hazardous Materials Safety

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590.
Attention: DHM-31.

The original of this exemption is on file at the above office. Photo reproductions and legible reductions of this exemption are permitted. Any alteration of this exemption is prohibited.

Dist: FRA