square of the drum's lining material into a five-sided cube (or "boat") and exposing the bottom creases under the surface level of a sample of the liquid hazardous material in a closed 8 oz. jar which is then elevated in temperature for "any appropriate set of time and temperature conditions" (for example, 130 °F for 30 days). Other "product contact" materials (such as caulking and gaskets) may also be placed in the jar. Success is indicated when there is no stress cracking of the lining material. IFDI indicates that this test is performed for each different liquid hazardous material for which the drum is to be used.

• Joint Integrity (No. 110)—The test consists of filling a drum with water containing a "wetting agent" (such as "a squirt of dish detergent") and subjecting the drum to the one-hour vibration test specified in 49 CFR 178.608. Success is based on the absence of any "observable staining of the interior and exterior of the drum in the vicinity of the bottom chime." However, IFDI also states that the drum is closed and, accordingly, this test establishes the integrity of both top and bottom joints, including the gasket used in the closure.

• Leakage Spray (No. 120)—The test consists of spraying "[a]ll interior seams and joints of the (plastic lined) surface of each drum * * * with denatured alcohol or its equivalent in such a way that the target drum areas are wetted." The drum passes the test if no stains are observed on the interior surface that would indicate that the paperboard has been wetted through the plastic lining.

• Weatherproofing (No. 130)—This test is applied only to drums intended for outdoor or high humidity storage and consists of subjecting random samples to a 72-hour shower of water at the rate of one inch per hour. The drum passes the test if it loses no more than 15% of its compression strength and is still capable of passing the stacking test in 49 CFR 178.606.

• Impact (No. 150)—After conditioning at specified temperature and humidity for 48 hours, the drum is filled to its net capacity with water and subjected to two tests. It is first tipped over on concrete onto its cover chime. The same drum must then withstand a diagonal drop on the bottom chime "sufficient to provide at least 500 footpounds impact," except that the minimum drop height is one foot and the maximum is two feet. This means that a 55-gallon fiber drum designed to contain a liquid with the specific gravity of water (8.3 lbs. per gallon) would be tested from a height of approximately 13 inches. A drum passes the test if there is no leakage.

According to IFDI, "[t]he impact test cannot be evaluated by itself," but three standards in combination (structure, joint integrity, and impact) account for the "outstanding record" of fiber drums and should be compared to DOT's drop test. IFDI also states that the leakage spray test is the industry's version of DOT's leakproofness test, although no pressure is applied "because of the nature of the materials of construction.' Nonetheless, IFDI states that this is an "exceedingly sensitive" test and "will reliably detect the smallest leaks." IFDI further comments that the liquid hazardous materials for which fiber drums have been authorized have low vapor pressures, for which the hydrostatic pressure in 49 CFR 178.605 is not necessary. IFDI indicates it will not object if RSPA issues alternate standards limited to liquids with a vapor pressure (Reid Test) not to exceed 16 psia at 100 °F.

IFDI implies that its standards have been in use in the fiber drum industry since 1973, when the liquid materials shipped in fiber drums were first regulated under the HMR. IFDI has claimed a safety record for fiber drums of 99.99% since 1980, based on its review of industry records and DOT's Hazardous Materials Incident Reporting System (HMIS) (and a comparable record before that time). It states that the lack of customer complaints and commercial claims confirms that fiber drums are dependable and safe. Three members of IFDI and two users of fiber drums echo these contentions: Astro Fibre Drum Inc., General Cooperage Co., Sonoco Products Co., Neste Polyester Inc., and Sybron Chemicals Inc.

General Cooperage indicates that 40 million fiber drums of all types are produced each year; between 1980 and 1991, a total of more than 13 million were built for shipping solid and liquid hazardous materials and, during that time, DOT received only 1,487 incident reports "indicating a failure of some type with fibre drums of all kinds." (In its 1992 exemption application, FDTC stated that only 455 of these incidents involved liquid hazardous materials for which non-specification fiber drums were authorized.) According to General Cooperage, the HMIS "indicates that only 72 failures occurred between January 1992 and October 1994 from a total of two million drums built for liquid hazardous materials." Astro and Sonoco also refer to the fiber drum industry's "99.99 percent safety record."

Neste states that, for each of the past seven years, it has shipped approximately 10,000 fiber drums containing its gelcoat product, a polyester resin, without any reported incidents of spillage or other problems in shipping and handling. It indicates it has not had the same success with steel drums, which it previously used. Sybron testifies that it has not had any "safety-related problems" during more than 20 years of shipping various materials, including corrosives and combustibles, in open-head fiber drums. It states its customers prefer fiber drums to other packagings, such as steel and plastic drums, and that fiber drums offer "definite advantages" over these other packagings.

IFDI and Sonoco both assert:

The yardstick by which any alternate standards should be measured or evaluated in determining whether the standards provide an equal or greater level of safety for transport is whether the standards predict safety in the transport—not whether the alternate standards are identical to the UN or HM–181 standards.

These parties further contend that IFDI's proposed alternate standards "should be evaluated as a whole in terms of their ability to predict safety" in transportation of hazardous materials, and "not on an individualized basis."

ACR and SSCI specifically challenge IFDI's proposed standards. ACR repeats an earlier characterization of IFDI's alternate standards as "similar to but less stringent than those adopted by DOT under HM-181." SSCI states that the HM-181 performance standards are "minimum standards based on real world experience and conditions," but that IFDI's proposed standards "do not adequately reflect a 'real world' transportation environment." ACR contends that the fiber drum industry's arguments come down to: (1) Nonspecification open-head fiber drums have a good record of safety in transportation, and (2) these fiber drums have been constructed to industry standards which, based on shipping experience, appear to work well in practice even though the industry standards are not as stringent as the HM–181 performance standards. In this context, however, SSCI states that the IFDI standards "were first adopted in May 1992," both questioning the procedures under which these standards were adopted and implying that the prior shipping experience has little relevance.

ACR points out that IFDI's compatibility test (Standard 101) may be run "under any appropriate set of time and temperature conditions," which "does not meet the rigors of good packaging testing methodology, makes nearly impossible meaningful comparisons of test data, and eliminates the possibility of repeating the tests for purposes of enforcement." According to