

Chemical Accident Reconstruction Services, Inc.



April 25, 2006

Office of Hazardous Materials Standards
Research and Special Programs Administration
ATTN: DHM-10
Department of Transportation
400 7th Street, SW
Washington, DC 20590-0001

Dear Sir/Madam:

Re: Petitions for Rulemaking Under 49 CFR 106.95

The purpose of this letter is to request a change to the regulations found under 173.306(a)(3)(ii). This is a follow-up to an exchange of letters (see attached) concerning 173.306(a)(3)(ii) and the invitation of John Gale to submit a petition.

In summary, the proposed change is to include a specific burst test method in connection with the burst pressure requirement found in 173.306(a)(3)(ii) that reads:

“In any event, the metal container must be capable of withstanding without bursting a pressure of one and one-half times the equilibrium pressure of the content at 130°F.”

The proposed test method is a heat-to-burst test using the actual contents within the container. The language of the above 173.306(a)(3)(ii) would be changed to read (new text underlined):

In any event, the metal container must be capable of withstanding without bursting a pressure of one and one-half times the equilibrium pressure of the content at 130°F. The burst test method shall be a heat-to-burst test of the container with its contents such that the rate of heating does not exceed 1°F per minute. The burst pressure shall be determined by the known equilibrium temperature versus pressure behavior of the actual

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contents and/or an attached calibrated pressure gauge accurate to within 2 psig.

It is my recommendation that this heat-to-burst testing be the responsibility of the Filler and not the Manufacturer of the container. This is because the Filler would have the most knowledge about the pressure versus temperature behavior of the contents. It would unreasonable to expect the manufacturer of the container to have the knowledge or the materials to perform the heat-to-burst tests for the many varied contents that can go into an aerosol container.

My interest in this proposed action is limited to a concern for adequate safety for transportation and consumers. I represent no other entity with connections to the aerosol or transportation industries. However, I have investigated many aerosol-related explosions that have resulted in personal injury.

While the DOT regulates with transportation as the focus, the DOT regulations are the only meaningful existing codes to which aerosol manufacturers are required to comply. There are no other meaningful regulations ensuring the burst safety of aerosol products in the hands of consumers. Consumers use literally billions of aerosol products each year. According to NEISS, there were an average of 4,862 incidents of injury per year from 1995 to 1999 under the category of aerosol container (category 1133). These may not all be explosions, but when aerosol explosions do occur, the injuries can be very serious.

The scientific justification for the proposed change is based on a number of burst tests conducted using different test methods. The burst test method most often used within the aerosol industry is the hydraulic test method, most commonly using water. Using the hydraulic test method, the pressure in the container drops the instant deformation initiates, which in turn lowers the pressure inside the container and stops the deformation. Hydraulic tests can be stopped at any point and in essence puts the burst failure into slow motion. Aerosol containers never explode or burst via the hydraulic test method – they leak. The worst thing that can happen during a hydraulic test is a leak. Hydraulic test methods are not really “burst tests.” Someone might get wet during a hydraulic test, but that is about all. Moreover, aerosol containers full of water (alone) are rarely transported or used by consumers.

The experimental comparison of the hydraulic burst method and the heat-to-burst method has consistently shown that containers may pass the DOT burst standards via the hydraulic test with flying colors, but fail miserably when tested by heat-to-burst test methods. Please see the attached peer-reviewed scientific publication.

Failures via the heat-to-burst test do not result in harmless leaks, but harmful, violent explosions. For example, a DOT-2Q container did not leak via hydraulic testing until 390 psig was reached, well above the DOT minimum of 270 psig. However, when this same type of DOT-2Q container was tested via heat-to-burst with its contents, it exploded as low as 200 psig, well below the required 270-psig minimum.

When an aerosol container explodes from heat (or other defects) it becomes a rocket capable of significant physical damage. When flammable liquefied gases, such as propane and/or butane, propel aerosols there is also the potential for fireballs. I have personally investigated a number of incidents of exploding aerosols that resulted in serious burns, lost eyes and impact trauma. While it serves no purpose to mention any companies by name in this petition, these incidents of harm to consumers have been well documented in the courts. I can provide case citations, if necessary and if requested.

The phenomenon of different burst test methods producing different results has been studied in detail and has been discussed in the peer reviewed scientific literature. One such paper is attached. While at first it may not make any sense that the heat-to-burst method produces different results than the hydraulic method, this is more consistent than it appears. The hydraulic test is a slow motion method while the heat-to-burst test involves a considerable amount of kinetic energy that is converted into mechanical work on the container.

It is worth repeating that neither transporters nor consumers ever encounter an aerosol filled with high-pressure water alone. A failure of a hydraulic nature is not only unlikely, but even if it did occur, no damage (beyond a leak) would occur. On the other hand, transporters and consumers consistently encounter aerosols with actual contents, and when those burst they do so explosively and can cause great physical and bodily damage.

Any comparison of the costs and benefits of the proposed change greatly favors the benefits. The costs are minimal. Aerosol fillers already have to

determine the pressure of their contents at 130°F. Extending this to higher temperatures is not that difficult or costly. The technology to do this as well as perform heat-to-burst testing already exists (see attached paper) and is not overly burdensome compared to the benefits it will produce. The benefit is improved safety for transportation and consumers (fewer lost eyes, impact trauma, and burns). *Reduced consumer injury should result in lower insurance rates for the aerosol companies, thereby offsetting the minor cost of the proposed testing.* Formulas that use the same solvents and propellants would not have to be retested if only non-volatile ingredients were changed. For example, air fresheners with different fragrances and spray paints with different pigments would only have to be tested one time as long as the propellant and solvent system did not change.

As far as I know, there are no preemption effects of the proposed change. The burden on small business would be relatively small as laboratories specifically set up for such testing could perform most of the additional testing and record keeping. When the proposed changes become routine, the costs and record keeping burdens of the proposed change would be minimal. Once performed, such testing would also reduce potential liabilities of aerosol companies, further offsetting any burden or cost. There are no known burdens on small organizations or Indian tribes.

On the other hand, the proposed change would improve the quality of the natural and social environments. Fewer aerosol explosions would reduce the unwanted and uncontrolled release of chemicals into the natural environment, not to mention the reduction in lost eyes, impact trauma injuries and burns.

I believe I have addressed all of the requirements of 49 CFR 106.95. However, if there are any questions or if I have overlooked something, or you need more copies, do not hesitate to ask for further information and assistance.

Sincerely,

Michael Fox, Ph.D.
Founder