



National Fireworks Association

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Todd A. Stevenson
Office of the Secretary
Consumer Product Safety Commission
Room 820
4330 East-West Highway
Bethesda, MD 20814

RE: National Fireworks Association Comments on Docket No. CPSC – 2016-0020

Dear Secretary Stevenson,

The National Fireworks Association (“NFA”) appreciates the opportunity to comment on the Commission’s proposed interpretation of the qualifying phrase “intended to produce audible effects” that appears in 16 CFR § 1500.17(a)(3). This qualifying phrase is essential in defining what fireworks devices are subject to the 2 grain (130 mg) pyrotechnic composition limitation. Only fireworks devices that are “intended to produce audible effects” are subject to the 2 grain limitation.

The Commission’s interpretation of the phrase “intended to produce audible effects” is of critical importance to NFA’s more than twelve hundred members, representing a broad spectrum of fireworks companies and supporters. NFA’s members work to promote the safe use of fireworks in all sections of the industry, and to ensure that their industry is regulated in a fair and sensible manner. For more than twenty years, NFA’s members have relied on the plain language “intended to produce audible effects” to design, manufacture, and market fireworks devices with the understanding that the audible noise created by the charge of a device would determine whether it was intended to produce audible effects.

NFA applauds the Commission for recognizing the uncertainty and unreliability of the current “Ear Test” for the routine detection of intended audible effects in the burst (or break) of aerial display devices like reloadable shells, single shot shells, cake shots, and stick rocket payloads. The Ear Test requires testers to crudely distinguish between sounds described as booms, bangs, pops, and poofs in uncontrolled testing conditions. If a tester determines that an aerial device booms or bangs (notated as a “report” in Commission testing forms), it is deemed as “intended to produce audible effects.” On the other hand, if a tester determines that an aerial device pops or poofs, that device is not classified as “intended to produce audible effects.”

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It is NFA's collective experience that the Ear Test is notoriously unreliable. Determining whether a particular sound is a bang, boom, poof, or pop is necessarily a subjective exercise where even the same person can reach different decisions on the same device. Indeed, the Commission has on numerous occasions made conflicting determinations about the exact same device. This uncertainty is burdensome to NFA's members who lose significant capital investments when devices that have previously passed the Ear Test are later deemed to bang or boom instead of poofing or popping. Further, without a *physical, quantitative measure*, NFA members have no reliable standard to meet in their design and production of aerial display devices.

To resolve the uncertainty and unreliability of the Ear Test, NFA proposes replacing the current testing instrument (the human ear) with a sound level meter ("SLM") to objectively measure a maximum sound level in decibels ("dBs"). SLM testing would cure the defects of the Ear Test by replacing subjective uncertainty with a quantitative measure of the sound level of the burst (or break) of aerial devices. SLM testing is inexpensive, reproducible, and can be carried out accurately with relatively little expertise. SLM directly addresses the question of whether a device is "intended to produce audible effects" by measuring the actual audible effects produced by that device.

In contrast, the Commission's proposal to impose a zero powdered metal threshold—even if the presence of the powdered metal is the result of cross-contamination or is derived from metallic compounds that do not contribute to producing audible effects—is a radical departure from its previous interpretation and completely ignores the wording "audible effects" in 16 CFR § 1500.17(a)(3). NFA thus strenuously opposes the Commission's proposed interpretation, even though NFA agrees that the Ear Test should be updated.

Benefits of SLM testing, and drawbacks to the Commission's proposal, are discussed in detail below.

I. SLM TESTING IS A STRAIGHTFORWARD WAY TO DETERMINE WHAT DEVICES ARE INTENDED TO PRODUCE AUDIBLE EFFECTS

NFA proposes that the Commission develop SLM based standard test procedures that include a threshold sound level for the burst of devices to be classified as "intended to produce audible effects." A maximum sound level in dBs would be a valuable addition to the list of existing numerical specifications like fuse burn times, mass (weight) loadings, dimensions, tilt angles, etc.

SLM testing is routinely used throughout the world for risk assessment of the hazards attendant the explosion of fireworks devices. With an appropriate separation distance between the center of an explosion and an SLM, the energy output is acoustic (sound waves) and readily measured by the meter in impulse mode. For any break of an aerial display device(s), multiple SLMs can be employed to increase the confidence in the sound level measurement.

An SLM based assessment of the "intent to produce an audible effect" offers several advantages over other forms of testing:

- The SLMs are easy to use and are amenable to routine calibration against recognized standards;
- The SLMs can record and digitally store multiple sound level measurements in dB in several alternate frequency responses (weightings), *e.g.*, A, C, linear;
- The sound levels measured can be adjusted to compensate for variabilities in ambient air temperature and relative humidity;
- The sound levels can be used to calculate the relative energy of the explosion; and
- The use of the SLMs would allow the Commission to design, in collaboration with outside expertise, standard procedures for sound level measurements of the bursts of individual shells and even shots from normally functioning cakes. These standard procedures would include the establishment of a field testing facility, which would include attention to conditions that could adversely affect sound level measurements, such as reflectance off of surrounding structures, and provide the minimum specifications for the SLMs.

Once standard procedures are established, anyone, anywhere can follow the procedures and measure a sound level with confidence that it will be in agreement with those recorded elsewhere. Accurate SLMs can be purchased for less than a few thousand dollars and require relatively little expertise to operate. The ease of accurate, reproducible testing would enable NFA's members, and other manufactures, importers, and distributors, to use the standard procedures to ensure compliance. In short, SLM testing is a cost efficient and predictable way to determine whether devices are "intended to produce audible effects" under § 1500.17(a)(3).

II. THE COMMISSION'S PROPOSAL CONTRADICTS THE PLAIN LANGUAGE OF § 1500.17(A)(3) AND WOULD BE A REWRITE OF THE EXISTING REGULATION

The Commission's proposal to use the detection of powdered metal as the decisive test for whether a device is "intended to produce audible effects" ignores the plain language of § 1500.17(a)(3), which specifically uses the word "audible" (defined universally by dictionaries as "able to be heard" or "loud enough to be heard") and describes as examples devices known to produce sharp, loud noises such as "cherry bombs, M-80 salutes, silver salutes, and other large firecrackers." The Commission's proposed interpretation erases the word "audible" from § 1500.17(a)(3) by imposing an arbitrary test of whether there is any trace of powdered metal—even if that powder does not contribute to producing audible effects.

The Commission's assertion that this proposed interpretation "would not change any person's rights, duties, or obligations under the FHSA or any other Act administered by the Commission" ignores its actual effect. By changing its testing standards in a way that disregards the actual audible effects of a fireworks device, the Commission would create an entirely new rule that bans any fireworks device that has more than 2 grains of pyrotechnic composition if it has any amount of powdered metal. This rule is unsupported by the plain language of § 1500.17(a)(3), and

the Commission cannot simply couch a rewrite of a regulation in terms of an “interpretation” to avoid full notice and comments obligations. *See FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515 (2009) (the APA “make[s] no distinction . . . between initial agency action and subsequent agency action undoing or revising that action”).

The Commission notes in its proposed interpretation that “since the adoption of the Sound [Ear] Test, there have been many developments in the fireworks market, including the use of fine-mesh metallic fuels to intensify device operation.” Yet, at the time that § 1500.17(a)(3) was promulgated, the use of powdered metals used as fuel in pyrotechnic compositions was well known. For example, M-80s—the original subject of the predecessor to § 1500.17(a)(3)—were charged in the past with a pyrotechnic mixture containing approximately 30% w/w powdered aluminum. Despite the use of powdered metals at the time § 1500.17(a)(3) was enacted, the Commission chose to write the rule in terms of a device’s audible effect, and not its powdered metal content.

III. THE COMMISSION’S PROPOSAL WOULD CLASSIFY DEVICES “INTENDED TO PRODUCE AUDIBLE EFFECTS” EVEN WHEN THE EXISTENCE OF POWDERED METAL IS UNRELATED TO PRODUCING AUDIBLE EFFECTS

Although the Commission accurately states that powdered metals *may* be used to intensify the audible effects of a device, the presence of powdered metals or metallic compounds is often *unrelated* to the audible effect. This is because of limitations in modern testing methods, which cannot distinguish between powdered metals and compounds, and because of contamination from manufacturing facilities and stars.

A. Modern methods for testing fireworks devices cannot distinguish between powdered metals and compounds that do not contribute to producing audible effects

In its laboratory measurement of the powdered metal content of burst charges, the Commission currently uses X-ray Fluorescence (“XRF”) and is expected to soon begin using Inductively Coupled Plasma-Optical Emission Spectroscopy (“ICP-OES”). Both of these instrumental analytical techniques can be used only to detect and quantify elements, independent of the oxidation state of the element in the original burst charge composition. That is, neither XRF nor ICP-OES can distinguish between powdered metals and compounds of those metals.

Examples of metallic compounds which may be present in burst charges, either introduced intentionally or as a result of contamination, which could be erroneously detected and measured as powdered metals by ICP-OES and XRF are:

- Cryolite (Na_3AlF_6);
- Aluminum oxide (Al_2O_3);
- Aluminum silicates (e.g., $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$) (present in clays);

- Magnesium oxide (MgO);
- Magnesium carbonate (MgCO₃);
- Magnesium silicates (e.g., Mg₃Si₂O₅(OH)₄); and
- Titanium dioxide (TiO₂).

The metallic compounds of aluminum (Al), magnesium (Mg), and titanium (Ti) do not act as fuels and in low quantities do not materially change the nature and function of the burst charges.

B. Testing samples are frequently contaminated from powdered metals in a way that does not contribute to producing audible effects

Powdered metals are often present in testing samples due to contamination. This contamination does not contribute to the audible effects of fireworks devices, but would nonetheless cause devices to fail the test that the Commission proposes. Contamination frequently occurs from the ubiquitous presence of powdered metals within fireworks manufacturing facilities and from stars.

By design, stars with powdered metals as part of the pyrotechnic compositions are intended to be ignited by the burst charge in an aerial shell or cake shot and then burned to produce visual effects (not audible effects). Because stars and break charges are typically comingled in aerial shells and cake shots, contamination during manufacturing and even during the processing of laboratory samples for analysis (*e.g.*, sieving, for powdered metals in the frangible stars to become detached and reside within the burst charges as cross-contaminants) is common.

Metallic aluminum and magnalium are often present in star compositions as fine particles with an average particle size of less than 149 microns (100 mesh) and might be present as high as 30% by weight (w/w) combined in total composition. For example, powdered aluminum is often present in stars with an average particle size (APS) of 88 microns (170 mesh) and magnalium with an APS of 98 microns (~ 140 mesh). Metallic titanium with a particle size greater than 149 microns (100 mesh) may be present at levels as high as 20% w/w of the total star composition. This means there may be powdered aluminum and/or magnalium in burst charges which have as their source comingled star compositions and have a particle size which will pass through a 100 mesh sieve (screen). If powdered titanium is present in a star composition with a particle size \geq 149 microns (\leq 100 mesh), it would not be expected to be present in any burst charge which would pass through a 100 mesh screen.

Powdered iron and powdered antimony (metalloid) may be present in star compositions, but their presence in a burst charge is not usually relevant to the issue of “intent to produce an audible effect.” Mössbauer Spectroscopy can be used to differentiate powdered iron and powdered antimony from their compounds. Unfortunately, Mössbauer Spectroscopy cannot be used for the detection and quantification of aluminum, magnesium and titanium in any form.

In sum, the Commission's proposed interpretation would have the arbitrary effect of classifying devices as "intended to produce audible effects" based on the presence of powdered metals that do not actually contribute to the audible effects of a device. At the very least, if the Commission were to proceed with enacting a powdered metal test, an appropriate allowance for contamination of at least 15% w/w would be critical to account for both the unintentional introduction of powdered metals into break charges, and the potential for metallic compounds to be characterized as powdered metals because of the use of either XRF or ICP-OES. A 15% w/w level would be well below the weight percentage of powdered metals required to contribute to an unreasonable risk.

IV. CONCLUSION

The Ear Test has proven to be an unreliable and unworkable standard to determine whether fireworks devices are "intended to have audible effects." Although NFA appreciates the Commission's recognition of the inadequacies of the current standard, the Commission's proposal is equally flawed.

The absence of testing to determine the "audible effects" as required under § 1500.17(a)(3) would create a new rule that would significantly alter the fireworks industry and limit consumer choice of popular products. Because of the prevalence of powdered metals and limitations of modern testing, countless products with more than 2 grains of pyrotechnic composition that have been legally distributed and sold throughout the United States for years could suddenly be banned.

Further, overclassifying devices as "intended to have audible effects" would create an obligation on the Commission to determine the pyrotechnic composition of many more devices than it currently tests. This would impose upon the Commission a herculean, and more likely impossible, task of analyzing thousands of different products. If such a program was implemented, it would be extremely expensive and result in time delays effectively shutting down a major component of the consumer fireworks market.

To address the inadequacies of the Ear Test, and to avoid the problems inherent in the proposed interpretation, NFA urges the Commission to develop and adopt sound level meter based standard test procedures that include a threshold sound level for the burst of a device to be classified as "intended to produce audible effects." NFA would welcome the opportunity to work with other industry groups and participants to help the Commission develop these standards.

Thank you in advance for your consideration.

Sincerely,



Nancy Blogin
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National Fireworks Association