U.S. CONSUMER PRODUCT SAFETY COMMISSION
4330 EAST WEST HIGHWAY
BETHESDA, MD 20814

August 24, 2012

Ms. Kathy Woods
OPEI Standard Development Process
341 South Patrick Street
Alexandria, Virginia 22314

Dear Ms. Woods:

U.S. Consumer Product Safety Commission (CPSC) staff is pleased to submit to the ANSI B71.10 Technical Committee comments on ANSI B71.10-201X, *Small Off-road Ground Supported Outdoor Power Equipment Gasoline Fuel Systems Performance Specifications and Test Procedures* standard, subsequently referred to as "standard." CPSC staff understands that these comments[1] are part of the canvass review process for approving proposed changes to the standard.

A review of CPSC recall data identified at least six recalls involving gasoline-powered, ground-supported outdoor power equipment due to fuel leaks since 2008, the year that the first edition of the standard was issued. The number of units of ground-supported, gasoline-powered outdoor equipment recalled from January 2008 to the present is approximately 39,000. CPSC staff In-Depth Investigations (IDIs) have shown that fuel leaks continue to occur, despite the existence of ANSI B71.10-201X. Recalled equipment includes riding lawn mowers, snow blowers, and tillers.

In the letter,[2] dated November 8, 2006, CPSC staff recommended including handheld engine outdoor equipment in the standard. From 2008 to the present, there were at least three leaf blower recalls involving more than 100,000 units due to fuel tank leaks. Gasoline powered, ground-supported equipment and handheld equipment are similar in many aspects, particularly the fuel systems. CPSC staff believed then, and continues to believe now, that it is beneficial to address the same potential fire hazard associated with leaks with handheld equipment using the same standard.

The fuel tanks for both types of equipment have exhibited similar performance-related failures, such as tanks splitting at the seams. Since the latest version of the standard does not include handheld equipment, CPSC staff recommends that the scope of ANSI B71.10-201X be amended to include handheld equipment. Alternatively, CPSC staff would participate in the development of an

[1] These comments are those of CPSC staff and have not been reviewed or approved by, and may not necessarily represent the views of, the Commission.

[2] Letter from Susan Bathalon of CPSC staff to James McNew of OPEI, November 8, 2006. Source: http://www.cpsc.gov/volstd/fueltank/ansi11806.pdf

alternative standard to address fuel tank requirements for handheld power equipment, consistent with the requirements in ANSI B71.10-201X.

The standard does not elaborate on what constitutes "substantive changes" to a design that needs requalification, as stated in *Section 3.9 Design*. Numerous sections in the current standard allow one-time qualification tests. It is CPSC staff's opinion that changes to manufacturing processes, final assembly processes, deflashing errors, design revisions, and component supplier/sub-supplier changes can affect whether a fuel tank and its components can have the potential to leak. CPSC staff recognizes that although many fuel tanks' makes and models are manufactured to meet the standard, testing to the standard is necessary only when there are significant design changes. To address the current deficiency in the standard, ANSI B71.10-201X should include a definition of design, manufacturing, and material changes that could affect field performance, and require recertification after any change that meets the definition. Furthermore, CPSC staff recommends removing all instances of "one time qualification tests" in Sections *4.2 Tank Integrity*, *4.3 Resistance to Stress Cracking*, *5.2 Fuel Tank Cyclic Pressure Integrity Test,* and *5.3 Fuel Tank Elevated Temperature Fuel Soak Test.*

CPSC staff is aware of several instances of tanks splitting at the seams and stress cracks occurring in incidents dating from 2008 to the present. CPSC staff believes that tanks splitting at the seams and stress cracks can be caused by several factors, including (and not limited to) cyclic temperature flux, impact with hard surfaces, vibration, elevated pressure, and elevated temperature. The current standard only requires a cyclic pressure test (Section 5.2) and elevated temperature test (Section 5.3).

CPSC staff recommends that ANSI B71.10-201X should include the following additional requirements:

- **Temperature Cycling:** Expansion/contraction can occur with tanks and fuel line components when subjected to temperature extremes. A cyclic temperature test should specify soak times at high and low temperature points. An example of such a test requirement is contained in SAE J288, *Snowmobile Fuel Tanks*, which specifies stress crack testing at 60°C and -40°C. Like snowmobiles, ground-supported equipment, such as snow blowers and snow throwers, can be subjected to such temperature extremes.

- **Impact Test**: Riding lawn mowers have fuel tanks located below the seat and above tire wells. In addition to mechanical vibrations from the engines, tanks and mounting hardware are subjected to dynamic/shock loading when mowing on bumpy lawn areas. As a minimum, CPSC staff recommends that a drop test be added that is similar to the test in SAE J288, *Snowmobile Fuel Tanks*, and ASTM F 852, *Standard Specification for Portable Gasoline Containers for Consumer Use*. Both of these published standards require a minimum drop height of 1.25 meters (approximately 4 feet) onto a hard surface.

- **Vibration**: CPSC staff recommends adding a vibration test to simulate the conditions created by engine vibration. The number of cycles/accumulation hours should closely resemble use by consumers over the life of the product. Small, spark-ignition, non-road engines less than 19 kW are required to comply with useful life hours, as detailed in U.S. Environmental Protection Agency emission regulations 40 CFR part 90, Section 90.105(a)(2) and Part 1054, Section 1054.107(a)(1). In *Section 4.6 Installation*, the standard states: "the tank installation should accommodate the twisting and bending moments and vibrations of the machine." The standard, however, does not provide any objective criteria or performance benchmarks to

evaluate the equipment's ability to withstand engine vibrations, bending moments, and twisting moments. CPSC staff recommends that the technical committee consider developing an endurance test that subjects the tanks to the appropriate and representative engine vibration and moment effects.

The current pass/fail criteria specified in *Section 5.4 Fuel Line Assembly Tensile Test* appears to be based on subjective visual slippage observance. To ensure that fuel hoses and hardware, such as hose clamps, do not come loose and cause a leak, CPSC staff recommends that an additional fuel leak performance test be added that is similar to, or the same as, the fuel leak test procedures in *Section 5.1.1*. This fuel leak test should occur after application of the 30 lb tensile load (*Section 5.4.2 Initial Assembly Test*) and after application of the 10 lb tensile load (*Section 5.4.4 Service Test*).

To be consistent with the *Section 5.2 Fuel Tank Cyclic Pressure Integrity Test*, the test fuel (10% ethanol, 90% gasoline) should be the same for the *Section 5.3 Elevated Temperature Fuel Soak Test.* In *Section 5.3.2*, the standard states: "the fuel used for this testing shall be fresh, regular, unleaded gasoline. Fuel containing ethanol or other additives may be used." The above statements imply that non-ethanol gasoline may be used. For consistency, and to maximize the corrosive and swelling effects of ethanol, CPSC staff recommends that the test fuel be of the same type as Section 5.2 (10% ethanol, 90% gasoline).

CPSC staff appreciates the opportunity to comment and participate as a canvass member for ANSI B71.10-201X. Please contact me with any questions you may have about these comments.

Sincerely,

Han Lim
Mechanical Engineer
Division of Combustion and Fire Sciences
Directorate for Engineering Sciences

cc: ANSI B71.10 Technical Committee
Colin Church, CPSC Voluntary Standards Coordinator