smiths detection
bringing technology to life

Prepared Statement of:
Mr. Michael Frunzi, Ph.D.
Product Manager – Optical Products
Smiths Detection Inc.

Hearing before the:
Senate Caucus on International Narcotics Control
October 2, 2018

Chairman Grassley, Co-Chairman Feinstein, members of the Senate Caucus. Thank you for the opportunity to testify on behalf of Smiths Detection Inc. a global leader in the screening of chemical, biological, radiological, nuclear, and explosive threats. My name is Michael Frunzi and I am responsible for products that detect and identify chemical threats, including pharmaceutical based agents like fentanyl. Over the past year and half, Smiths has been working with Congress, educating members and staff on the capabilities of technology to support interdicting these dangerous narcotics and protecting the health and safety of homeland security professionals on the front lines**.** Smiths was supportive of S. 708, the "Interdict Act" which passed overwhelmingly in the House and Senate and was signed into law. As you know, Congress followed this authorization with over $30 million in the Fiscal Year 2018 Homeland Security Appropriations Act. This was a great first step in stopping the transit of fentanyl into the United States by empowering Customs Border Patrol (CBP) with technology to quickly identify these threats. We want to thank Senator Boozman, Markey, and Portman and the cosponsors of this legislation. Nearly 20,000 Americans have died from fentanyl-related opioid overdose in 2016, a 540% increase in three years. The logical first step to curtail this trend is to stop it at our borders.

First, I think it is important to review the history of how laboratory equipment was initially fielded to first responders. The destruction of Pan Am flight 103 over Lockerbie, Scotland in 1988 marked the first successful terrorist bombing of a commercial aircraft. Following this tragedy, the need for enhanced security measures at airports and cargo terminals became very clear. Innovative technology was needed to maintain the safety of the commercial aviation traveler and the security of global air cargo without crippling these industries with onerous security measures. At the same time it was necessary to protect global commerce and transit from subsequent attacks. As government demanded increased capabilities, industry leveraged their expertise to field equipment in support of these new missions. Subsequent terror attacks accelerated the need for additional technology to screen for other threats while limiting the disruption of our day to day life.

For example, beginning in September 2001 letters containing live anthrax spores were delivered to several members of the media as well as to Senator Daschle's and Leahy's offices. The entire emergency response (ER) world descended into crisis mode. In the week that followed, ER teams composed of firefighters, police and emergency medical personnel were

responding daily to hundreds of suspicious white powder calls. Each of those calls was capable of paralyzing critical infrastructure, heavily taxing the emergency response system, wasting millions of dollars and disrupting many lives. No organizations were immune. Banks, airports, sports arenas, small and large businesses, and even private residences could become temporary 'hot zones' requiring quarantines and closures, all leading to massive disruption and fear. Again, almost overnight, the need for rapid identification of unknown materials in the field became critical to national emergency response.

In both cases, chemical detection technology addressed these security needs, through the detection of trace amounts of explosive chemicals or the identification of white powders appearing in visible quantities. Such instrumentation has been employed to detect and identify unknown materials inside the laboratory for decades. Initially, this equipment was bulky, heavy, and focused on only a small amount of materials. Modern advances in computing, materials engineering and other technology increased the speed, sensitivity, and discriminating power of these devices.

In the last 25 years, academe and industry have invested significant resources to push the 'field-ability' of chemical instrumentation. Devices were miniaturized to make them portable, first small enough to be deployed via vehicle, then carried by a single person, and finally operated in a handheld fashion. Devices were also made to be 'rugged' (dust resistant, waterproof, resilient to heat and cold) and 'deployable' (operate on battery with minimal consumables and calibration requirements). Lastly, advanced software significantly reduced the training burden so only a few hours of instruction were needed to properly operate the device.

Smiths Detection is the world's largest manufacturer of threat detection equipment with a long record supporting of federal customers like Transportation Security Administration (TSA) and Customs Border Patrol (CBP) as well as police and fire departments in all 50 states. We supply the commercial aviation and air cargo industries, maritime, critical infrastructure, ports and borders and first responders. The company's portfolio includes a vast array of technologies based on X-ray scanning as well as numerous analytical chemical techniques for various security applications. Smiths Detection utilizes ion mobility spectrometry (IMS) in the IONSCAN product line to achieve detection of trace levels of explosive materials at a sensitivity so great that only small residue left behind from handling explosives, even after thorough washing, is sufficient to reliably trigger an alarm. These products were fielded to provide security to the commercial aviation sector in the 1990s following the Pan Am 103 incident. In the following decade, we successfully fielded Fourier-transform infrared spectrometry (FT-IR) in the HazMatID product line to create the first unknown field-portable analyzer, which was capable of identifying over 10,000 distinct chemicals as a response to the Anthrax crisis. In both cases, excellence in engineering and innovation leveraging laboratory technology created solutions to real world security threats, ensuring peace of mind and freedom of movement of people and commerce globally. All this equipment is in the field today.

Chemical hazards continue to persist in the world. Emergency responders are responsible for the control and clean-up of hazardous materials related to modern manufacturing. Firefighters and bomb technicians may also encounter hazardous materials in the form of

explosives or even potential chemical warfare agents. In both cases, these substances must be correctly handled and disposed of before they can do harm. By bringing chemical instrumentation technology into the field, first responders and warfighters gain the ability to quickly and confidently know exactly what they are dealing with and rapidly execute the correct process to address the threat and treat those who might have been impacted.

Currently, one of the greatest threats to the United States' national security is the epidemic of opioid misuse and abuse. Over-prescription of opioid-based medications for acute and chronic pain surged through the 1990s and millions of Americans have become addicted. Furthermore, because these substances produce effects similar to heroin, they have become common among those narcotics abusers as well.

Some opioids are derived from natural sources like the opium poppy while others, such as those coming from illicit Chinese labs, are completely synthetic. While all produce a similar physiological effect, these chemical compounds vary in potency and swiftness of action. Because of its extreme potency and relative low cost, the synthetic opioid fentanyl and its chemical analogues have surpassed other opioids as a threat to human life. With a median lethal dose (or LD_{50}) of less than 5 milligrams, even a small amount of airborne fentanyl particles, inadvertently inhaled, can cause serious injury or even death. For some analogues of fentanyl, this amount is even smaller. This adds an enormous complication to first response and medical treatment of individuals illicitly possessing or using this substance. Furthermore, individuals simply in the vicinity of fentanyl can be inadvertently exposed. There have been multiple incidents where law enforcement officers were exposed to fentanyl in the line of duty. In Ohio, a police officer suffered a near fatal fentanyl overdose after brushing off a small amount of fentanyl from his uniform after a traffic stop. In Harford County, MD, a Sherriff was hospitalized following exposure to airborne fentanyl after opening the drawer of a bedside table. Similar incidents have been reported in Wisconsin, Louisiana, Massachusetts and New Hampshire. Correctional facilities in Ohio and Pennsylvania have reported multiple exposure events sickening dozens of employees and inmates.

Working with the ER community, Smiths Detection has acknowledged the need to detect and identify these threatening materials in the field to safeguard to human life, including the first response personnel who risk exposure with every overdose or interdiction event. The ability to detect 'trace' amounts of fentanyl is possible and can warn responders and law enforcement personnel that larger amounts of the material may be present and to protect themselves accordingly. Additionally, once discovered, the capability to identify an unknown white powder can confirm if the material is relatively benign or a serious threat, allowing the proper and necessary remediation steps to be taken. Not wasting resources by treating every unknown sample as if it's pure fentanyl, but ensuring that proper decontamination steps are taken when warranted.

Smiths Detection is considering solutions by developing technologies and products to meet these needs, having invested over $450 million in research and development over the past ten years. Smiths expects to invest a similar amount in the next ten years. Government must drive our investment by forecasting requirements and need. As technology is employed to

address any security threat, the threats correspondingly evolve to overcome the security measures. Providers of chemical detection technology must constantly add capability to their portfolio to stay one step ahead of an ever-changing threat landscape. Furthermore, because of the long research and development process associated with bringing these products into the field, providers must create designs that are flexible, expandable and, when properly maintained, long-lasting, to justify the initial investment. The requirements for fentanyl detection and identification equipment are similar to those for other hazardous substances. Equipment must be rugged and reliable, easy to transport and operational via battery, resilient against environmental factors (such as moisture, heat, and cold) and lastly, easy to use with minimal training.

To this end, Smiths Detection has provided immediate solutions for fentanyl detection and identification by modifying and enhancing several existing products. Identification capabilities have been achieved by adding signatures of nearly thirty fentanyl analogues to the internal libraries of our HazMatID product lines. These devices were initially fielded to provide white powder identification capabilities to first responders during the anthrax attacks following 9/11. Some of our customers' equipment can be upgraded, however, others need new equipment to handle the increased library volume of hundreds of new threat substances.

While it is not yet possible to use field technology to determine the exact origin of illicit fentanyl, these devices have the ability to save chemical signatures from real world samples. This can inform trafficking and distribution patterns based on the signature of the cutting agents and the narcotic material. This information can be shared with other agencies to gain additional insight and help visualize larger trends and can serve as a critical piece of the interdiction puzzle when combined with intelligence and other forensic data. While defense against accidental exposure to fentanyl in the field is of paramount importance, detection technology can play a more major role in combating the fentanyl threat without slowing down the critical business of US points of entry.

Smiths Detection is actively developing a solution to raise the interception rate of fentanyl at package sorting facilities, where over one-hundred thousand parcels are processed each night. The current proposal would constitute a 'system of systems' approach- a multi-stage scanning installation where each successive stage presents more rigorous but slower interrogation of a given package. The first stage would leverage multi-view X-ray technology or a CT scanner, similar to current aviation security technology. If these scanners detect a signature which could be attributable to fentanyl or similar threat material, the package would be diverted to the second stage. This stage would be based on X-ray diffraction (XRD), or another technology which provides molecular-level information without opening the package, though at speeds far slower than the first stage. If at this stage the suspect signature is found to be benign, the package can be added back to the stream of commerce. However, if the XRD scan also produces a threat reading, the package can be diverted for immediate disposal or passed on to a third and final stage of detection. This stage would involve opening the package. At this level, an agent in proper protective gear could use any number of technologies to examine any suspicious material found inside the package, for instance the chemical screening technology previously referenced like infrared, IMS, or laser Raman. This layered approach, similar to an airport

security checkpoint, combines the best aspects of human interaction with the appropriate level of technological intervention - achieving maximal effect with minimal disruption.

It is unlikely that the public health threat posed by the opioid epidemic will be ameliorated anytime soon. Only a combination of law enforcement, community outreach, political overtures and medical intervention will eventually solve this massive problem. In the meantime, fentanyl and the potential harm it can cause to users, responders and the general public will persist.

Smiths Detection will continue to strive to move technology forward to provide flexible, innovative solutions to these and other threats, to safeguard society, protect life and support the free flow of trade. Smiths submits the following recommendations for your consideration to support the development and fielding of this equipment:

Recommendations:

1. Establish a Public/Private working group to disrupt foreign shipments. This should include, but not be limited to the Transportation Security Administration (TSA), U.S. Customs and Border Protection (CBP) and the US Postal Service (USPS). This working group should establish a baseline of requirements to mitigate the fentanyl threat from China and other countries. TSA is in a unique position to assist CBP and USPS given all its expertise in screening passengers and luggage over the past fifteen years. It makes sense to leverage this expertise and that of the private sector to help define a 'system of systems' approach. The working group should conclude its recommendations in about 180 days and make them public.

2. Support passage of S. 2763, "The Power Act" with a clear appropriation line for the next five fiscal years, instead of one year. This will create certainty in the market place and allow for private industry to plan engineering, and research and development resources appropriately. Introduced by Senators Sherrod Brown, Edward J. Markey, Marco Rubio, and Rob Portman. Funds for portable chemical screening devices are critical for law enforcement, and a major testing backlog continues to bog down state testing labs, which is delaying investigations and prosecutions for weeks and months. This challenge could be alleviated with an appropriate level of funding and certainty. The logical next step is protecting law enforcement as they encounter this in the field.

3. Budget for Operations & Maintenance (O&M) and refresh of technology must be a consideration with future funds or grants that are awarded to state and local authorities. This funding will ensure equipment is not only distributed, but utilized and maintained properly to protect the investment and sustain the capability long-term.