

Senate Democratic Policy Committee

“Are Burn Pits in Iraq and Afghanistan Making Our Soldiers Sick?”

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Good morning. My name is Dr. Anthony Szema. Thank you, Senator Dorgan, for the opportunity to testify. I am the Head of the Allergy Diagnostic Unit at Stony Brook University Medical Center in New York. I also serve as an Assistant Professor of Medicine and Surgery at SUNY Stony Brook School of Medicine and the Chief of the Allergy Section at the Veterans Affairs Medical Center in Northport, New York. I received my undergraduate degree in Industrial and Management Engineering from Rensselaer Polytechnic Institute in Troy, NY and my medical degree from Albany Medical College in Albany, New York. I completed three fellowships at Columbia University in pulmonary diseases, critical care medicine, and clinical and adult and pediatric allergy/immunology.

I am testifying today in my personal capacity and do not in any way represent the interests, beliefs or opinions of my employers.

It is common sense and widely known that smoke from any fire can affect health. There is an extensive body of research on the dangers of smoke inhalation. Trash should not be burned because it can cause harmful air pollution. The contents of smoke depend on the trash, temperature and oxygen available. There are short and long-term health consequences associated with exposure to fire, smoke and fumes. The synergistic impact from the combination of burning chemicals is unknown. Soldiers acutely exposed near the burn pits may have burning eyes and nose, nausea, headaches and asthma-like symptoms.

Incinerators may provide a healthier alternative to burn pits in Iraq and Afghanistan because they burn trash at higher temperatures, which create less harmful smoke than the burn pits. Ten pounds a day of trash from a household burn barrel may produce as much pollution as a modern, well-controlled incinerator burning 400,000 pounds of trash a day. Harmful smoke may also be reduced by recycling plastic, paper, metal, glass, ink cartridges and by installing EPA-compliant biohazard waste measures for medical waste.

Burning anything leads to particulate matter (PM) which is inhaled and toxic to the lungs and heart. The size of particulate matter is important to consider because the particles act as a carrier of various harmful chemicals in the air. The smaller the particulate matter, the deeper the particles are able to travel into the lungs. PM 10 are larger particles which can be trapped in the nose, whereas PM 2.5 and ultrafine PM are able to enter the lung alveoli or air sacs. PM 2.5 and ultra-fine PM are particularly harmful to human health. Not only is there a risk of asthma, bronchitis, and emphysema with ultrafine PM, but there is also an association with respiratory and cardiovascular mortality—death—from inhalation of ultrafine particulate matter. Particulate matter levels are especially bad if they are high, but particulate matter may even be worrisome if levels are low. The toxicity depends on the composition of the particulate matter itself. For example, is the particulate matter acting as a carrier of black carbon or arsenic? Particulate matter levels should always be considered when performing air sampling to measure air quality.

The US Army Center for Health Promotion and Preventive Medicine (CHPPM) did not include data about particulate matter PM 10, PM 2.5 or ultra-fine PM levels in their May 2008 analysis of the air quality at Balad Air Base in Iraq. PM 2.5 and ultra-fine PM should have been a large component of CHPPM's analysis. CHPPM also failed to conduct comprehensive testing

at any other bases using burn pits in Iraq and Afghanistan, so we do not have information about air quality at those bases.

When I think of air pollution, the first issue I think of is the level of PM 2.5 and the potential toxins these could be carrying. Inhalation of PM air pollution can lead to premature death from respiratory and cardiovascular causes, including strokes. Inflammation and reduced lung function may even be seen in lung tissue from healthy adults. Year-round exposure to PM has been associated with small airway disease and increased risk of dying from lung cancer and cardiovascular disease. Reduction in PM 2.5 by $10 \mu\text{g}/\text{m}^3$ is associated with reduced mortality risk.

Individuals have reported uncontrolled burning of waste in the burn pits in Iraq. The chemicals generated from slow, low-heat burning present a variety of health risks. The type of plastic (PVC) used to make plastic bottles produces dioxin and hydrochloric acid when burned. These chemicals are associated with immune dysfunction, IQ deficit, and reproductive abnormalities. Polystyrene foam cups can be a source of carcinogens including dioxin, benzene, styrene and furans when burned. Chromated copper arsenate (CCA)-treated wood contains pro-carcinogenic arsenic. Bleached or colored paper contains harmful chemicals. Bleached paper contains halogenated hydrocarbons and furans associated with leukemia and liver disease. Colored paper contains heavy metals like lead and cadmium associated with blood, liver and kidney disease. Particle board and plywood release formaldehyde when burned; this is associated with nose and throat cancer, as well as liver and kidney disease and airway inflammation. Cardboard used for packaging of foodstuffs may contain fungicides which are associated with neurological disorders. The variety of materials burned at the burn pits in Iraq

produces an enormous array of chemicals which may plausibly combine when burned to produce unknown dangers.

The location and time during which air sampling occurs can largely impact the results and reliability of those tests. I think of this as garbage in, garbage out. If the sampling equipment, location of testing and timing are not performed properly, one will not gather accurate information and will not be able to provide a confident analysis of the results. The May 2008 CHPPM report included analyses based only on testing conducted from January to April 2007. This was partly conducted during Iraq's rainy season and did not include any measurements from the summer. The results could not reflect a year-long exposure to the smoke from the burn pit because of the changing weather conditions. This would be like testing for snow in Albany, NY during the summer. Testing will not detect any snow, but this does not mean that it does not snow in Albany.

With regard to location, if the wind typically blows the fumes away to the north, this does not mean that a lack of detection in monitors placed to the south means that the air is safe to breathe. The timing of the testing is also relevant because numerous materials were burned in the pits. If you tested during a time when medical trash was not burned, then you would not detect the toxins emitted from this type of burning, including lead, mercury, and furans. The testing does not tell us anything about the air quality before or after the burning occurred. Individuals exposed to burn pit fumes in 2004 may have experienced worse conditions than those in 2007. It is also important to analyze the ashes and dust in a burn pit pile after materials have been burned. This dust may contain toxins which are not detectable by airborne collection methods.

In my practice as an allergist and pulmonologist at the Veterans Affairs Medical Center in Northport, NY, the demographics of the patients I typically see have changed since 1997. Until 2004, I mostly saw 80-year-old veterans. However, from 2004 to the present, I have begun seeing young women and men who were previously healthy athletes capable of passing basic training and performing combat duty. Now these individuals suffer from a variety of respiratory illnesses, including asthma and difficulty breathing during exertion, and are not fit for continued military duty. This is an alarming trend.

In 2008, I presented data at the American Thoracic Society International Conference showing high new-onset asthma diagnosis rates among soldiers deployed to Iraq. I performed a study of veterans who served in Iraq and were treated at the Veterans Affairs Medical Center in Northport, NY from March 2004 to May 2007. Our study was prompted by the fact that 13 percent of U.S. Army Medic visits in Iraq are for new-onset acute respiratory illness. We compared veterans who served in Iraq with those who served in the United States. After studying more than 6,000 veterans, we found that deployment to Iraq is associated with new-onset asthma. Individuals who have asthma are not allowed to serve in the military, but our data of soldiers returning from Iraq indicates new-onset adult asthma is diagnosed at twice the rate (10%) compared to stateside-based troops (5%). Even when stratified by age groups, the higher risk for asthma still holds. Our findings are not surprising given that a survey of 15,000 military personnel deployed to Iraq and Afghanistan found that nearly 70 percent reported experiencing respiratory illness during their service. Of these, 17 percent required medical care.

It is important to understand that occupational asthma from phthalates is subtle and is not detected with PM monitors. It may be assessed by known exposure, clinical symptoms, and physical examination of patients, physiology and skin testing. Also, many of the tests typically

given to determine respiratory illness, such as spirometry, a pulmonary function test, are insensitive and may not detect the true nature of the illness. Dr. Robert Miller, a doctor at Vanderbilt University, has performed a study of individuals exposed to a fire in Iraq in 2003. These individuals had normal CT scans and pulmonary function tests. Only by performing a lung biopsy was he able to properly diagnose most of his patients with constrictive bronchiolitis, likely from exposure to toxic smoke fumes.

Additional funded research is needed to fully understand the health implications for soldiers breathing the fumes from burn pit smoke, such as: 1) a university-based health research network, utilizing more sophisticated tertiary-care testing; and 2) basic research institutes at these health research sites to study the mechanisms of these new diseases in animal models and develop novel drugs to treat new, deployment-related diseases. These efforts may lead to health benefits for not only our military personnel but also for the general population.

In summary, you should not burn trash or inhale burning trash. There are short- and long-term health consequences associated with exposure to fire, smoke and fumes.