Toxic and Deadly, the Human and Environmental Toll of Open Burning

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By Daniel Ross (/author/itemlist/user/49490), Truthout | News Analysis

Soldiers who worked at open burn pits had higher instances of respiratory diseases like chronic obstructive pulmonary disease, emphysema and chronic bronchitis. (Image: Pixabay; Edited: JR / TO)

The open burning and detonation of munitions is highly toxic to humans and the environment, and is banned in Canada and many European countries. Now, a decades-long effort by campaigners to end the practice in the United States could soon bear fruit.

Last month, the Senate approved (http://www.truth-out.org/news/item/36504-following-truthout-investigations-senate-calls-for-study-on-alternatives-to-burning-military-waste-in-open-air) a version of the National Defense Authorization Act that includes an amendment directing the National Academy of Sciences to study alternatives to open burning. Approval of a final version of the bill is expected to come in late September, before the end of the fiscal year.

In the meantime, at military bases across the country, a range of munitions including small arms cartridges, rockets, mortars, artillery shells and tactical missiles no longer considered of use to the military are burned on large trays out in the open, causing toxic clouds to blow over surrounding communities, and allowing contaminants to leach into the soil and groundwater, with the potential to impact nearby drinking water systems. At some facilities, the practice has been ongoing for many decades. The amount of munitions the military is seeking to dispose of is staggering -- a 2015 Governmental Accountability Office Report (http://www.gao.gov/assets/680/671535.pdf) estimates that by 2020, the stockpile

could exceed 1.1 million tons.

The military's open burning and detonation of chemical weapons, explosives and other toxic wastes in places like Afghanistan and Iraq has long been a hot-button topic. According to data drawn from the Veterans Affairs Airborne Hazards and Open Burn Pit Registry (http://www.publichealth.va.gov/docs/exposures/va-ahobp-registry-data-report-june2015.pdf) published last year, soldiers who worked at open burn pits had higher instances of respiratory diseases like chronic obstructive pulmonary disease, emphysema and chronic bronchitis. Earlier this year, Joseph Hickman, a former U.S. Marine and Army sergeant, published a well-received book positing a link between a range of chronic illnesses, including cancer, and exposure to open burn pits, gathering evidence from individual cases, scientific studies and expert opinions.

The VA (http://www.publichealth.va.gov/PUBLICHEALTH/exposures/burnpits/index.asp), however, claims that there's currently insufficient evidence to determine the long-term health problems from exposure to burn pits.

Campaigners belonging to the Coalition for Justice, Blacksburg, gather at the town's July 4 parade to protest the open burning of munitions at the nearby Radford Army Ammunitions Plant (Photo: Coalition for Justice, Blacksburg)

In the US, a public spotlight was recently shone on the dangers of open burning through a series (http://www.truth-out.org/news/item/28826-an-explosive-crisis-government-bickering-clouds-cleanup-effort-at-camp-minden) of investigations (http://www.truth-out.org/news/item/34477-why-is-the-us-military-still-burning-

its-explosive-waste-in-the-open-air) by Truthout (http://www.truth-out.org /news/item/36504-following-truthout-investigations-senate-calls-for-study-on-alternatives-to-burning-military-waste-in-open-air) of the Camp Minden military facility in Louisiana. Investigators found 15 million pounds of hazardous artillery munitions waste at the camp, and officials originally planned to dispose of them through an open burn. Public pressure forced a switch in the plan.

Records show that concerns over the health implications from open burning is nothing new. A study (http://public.dep.state.ma.us/fileviewer /DefaultScanned.aspx?documentid=100883) published in 1991 suggested a slightly elevated risk of breast, lung and pancreatic cancer for those who lived within close proximity of an open burn site on the Massachusetts Military Reservation. Still, the full environmental and human health impact from open burning is hard to quantify.

Around many open burn facilities, limited monitoring makes it difficult to map the full reach of contamination. In the case of air monitoring, the equipment used is often too crude to detect certain fine particulates -- experts decry the use in some cases of decades old equipment, when newer more sensitive technology is available. And where health studies indicate higher instances of serious illnesses in areas surrounding open burn pits, a variety of factors could explain these patterns -- other nearby industries or processes within the same military facility adding to pollution levels, for example, or factors peculiar to the demographic.

What is known, however, is that open burns pits across the country are throwing out a vast spectrum of highly dangerous pollutants into the environment, including dioxins and furans (some of the most toxic chemicals known to science), polychlorinated biphenyls(PCBs, the manufacturing of which was banned in the 1970s due to its toxicity), chromium (a carcinogen), dinitrotoluene (DNT, a probable carcinogen), and perchlorate (linked to chronic thyroid problems).

According to Dr. Brian Salvatore, a professor of chemistry at Louisiana State University, it's very hard to gauge just how far these particulates can be carried in the air.

"What they're burning when they burn this stuff isn't being destroyed -- especially the metals. Instead, these chemicals are transformed into other things, and then dispersed in very tiny particles that can get into the lungs and the blood-stream directly," he said.

Salvatore pointed to Clean Harbors' Colfax munitions plant in Louisiana, the recipient of multiple open burn pit violations over the years. Through push back by local campaigners, attempts earlier this year to increase by approximately 500,000 pounds the amount of munitions burned there annually were thwarted. "Authorities within the EPA and the [Louisiana Department of Environmental Quality] are not acknowledging the dangers," he said.

An Island Full of Munitions

A small, sunny and in many ways picturesque island off the east coast of Puerto Rico, Vieques is only 52 square-miles in size with a population of less than 10,000. From the end of World War II up until 2003, the US Navy used Vieques as a firing and bombing range, pummeling the island with an estimated 300,000 munitions, including experimental weapons. In 2005, Vieques was placed on the National Priorities List, and has been the scene of an environmental cleanup ever since. During this time, approximately 95,000 munitions and explosives discovered across 180 acres of land have been destroyed.

Officials argue that open detonation is the safest way to dispose of the munitions on Vieques, citing the risks involved with moving unexploded weapons.

Though the cleanup now switches focus to the waters around the island, the full environmental impact has still not been fully mapped. Several investigations are ongoing, officials say.But multiple health studies have been conducted at Vieques over the years, each highlighting how the residents of Vieques are disproportionately impacted by chronic health problems. Tests (http://jech.bmj.com/content /58/9/756.ex..) conducted in 2003 show that 26.8 percent of women of reproductive age in Vieques had enough mercury in their blood to impact fetuses, causing autism and intellectual disabilities, compared to neighboring Puerto Rico -- of which Vieques is a municipality -- where only 6.6 percent of women had comparable levels of mercury in their blood. An earlier study found that the mortality rate through cancer was 30 percent higher in Vieques than in the rest of Puerto Rico.

Dr. Victor Marcial-Vega, a clinical assistant professor at the Universidad Central del Caribe School of Medicine, Puerto Rico, conducted the most recent health study in Vieques -- a health survey and treatment program that ran between January of 2014 and the summer of 2015. As part of the program, Marcial-Vega tested the urine of 31 Vieques residents for heavy metals, and compared them to the samples of 58 people who live at neighboring Puerto Rico.

Of those tested in Vieques, 77 percent had uranium in their urine, compared to 26 percent in Puerto Rico. He said that the levels of lead, arsenic, uranium, cadmium and mercury were "at least two to three times higher" in Vieques than in Puerto Rico. "There's no normal amount of these metals that should be in your body -- that's not a healthy thing," he said.

Following their own review of data, the US Agency for Toxic Substances and Disease Registry (http://www.atsdr.cdc.gov/news/displaynews.asp?PRid=2553)(ATSDR) found in 2013 no relationship between military activities and the health of the island's residents. But those same island residents speak of the smoke from open detonations drifting over their homes and communities, and they're alarmed by the thought of what chemicals they could be inhaling.

"We're exposed to everything," said Diane Rivas Serrano, 58, who has lived on Vieques for roughly 55 years. For 12 years until 2002, Serrano worked as a guard for the military on the island -- work that exposed her to the worst of the pollution from the military bombardment, she said. In 2010, Serrano was diagnosed with breast cancer.

"Instead of collecting and dealing with these pollutants in a contained manner, they're just spreading it all over the island," said Dr. Carmen Ortiz Roque, an epidemiologist and physician who conducted the 2003 health study. "These toxins bio-accumulate in the body."

Radford Army Ammunitions Plant

Open burning is still very much alive on the US mainland, as well. Protesters took to the Virginian streets of Blacksburg during the town's latest July 4 march calling for an end to open burning at the Radford Army Ammunitions Plant in Virginia. It was the latest episode in a protracted struggle between local residents, activists and operators at the Radford Army Ammunitions Plant -- a struggle that has recently intensified as the facility seeks to renew its open burn permit.

Radford was built in 1940, a sprawling 7,000-plus acre munitions manufacturing complex in a loop of the New River. Today, 14 companies currently conduct business at Radford, including BAE Systems, an aerospace company and the sole North American supplier of TNT and nitrocellulose, a propellant, to the Department of Defense (DoD). Radford, which straddles both Montgomery and Pulaski counties, is permitted to burn more than 2.9 million pounds of munitions a year.

Radford is listed in the federal Toxic Release Inventory as the worst polluter in Virginia, and tests conducted during a cleanup there show that groundwater beneath the facility has been impacted with an array of highly toxic contaminants -- such as perchlorate, chromium and dioxin/furan compounds -- at levels well above drinking water standards (though the plant itself isn't currently a source of drinking water). Meanwhile, the soil around the open burn pit is saturated with a range of chemicals including lead, arsenic, nitroglycerin, chromium and dioxin/furan compounds.

The open burning ground is perched on the bank of the New River. An Environmental Agreement (https://www.sec.gov/Archives/edgar/data/866121/000104746903021547/a2112669zex-10_21.htm) filed in 1994 states that the burning ground was built too close to the river, and speculates that it might not meet minimum regulatory requirements. Though to date, no direct action has been taken to move it further back from the river's edge.

Officials at the plant have repeatedly argued that Radford isn't responsible for any human health or environmental issues in the surrounding community -- an assertion bolstered by the findings of an ATSDR (http://www.atsdr.cdc.gov/hac/pha/RadfordArmyAmmunitionPlant

/Radford%20Army%20Ammunition%20Plant_HC_Final_01-28-2015.pdf) report published at the beginning of 2015 that states how releases from Radford do not affect public water systems or private wells. However, the same report acknowledges a number of uncertainties, including the lack of "air sampling results as a data."

Local residents and environmentalists believe the ATSDR's report to be misleading about toxic releases from Radford, and point to a lack of comprehensive testing done beyond the perimeter of the plant in an area where a fractured karst geology makes groundwater flow difficult to assess and predict. That's not to say seemingly pertinent tests haven't been conducted in the area. A 2008 Virginia Department of Health study that found how children between the ages of 0 and 15 in the nearby City of Radford had elevated blood lead levels at more than twice the rate of children in Virginia in general.

According to the National Cancer Institute (http://statecancerprofiles.cancer.gov /incidencerates/index.php?stateFIPS=51&cancer=080&race=00&sex=0&age=001& type=incd&sortVariableName=rate&sortOrder=default#results), Pulaski County has the second-highest thyroid cancer incidence rate in the state. Adjusted for women only, Giles and Pulaski counties have the second and third-highest thyroid cancer rates in the state respectively. Giles County sits adjacent to Pulaski County, downstream of Radford, and a little over four miles from the plant as the crow flies.

In May of this year, Virginia Tech released the findings of tests it conducted of irrigation wells at Kentland Farm, nestled on the opposite side of the New River to Radford. Two of the wells were contaminated with low levels of perchlorate, dioxin/furan compounds, chromium and barium. Produce grown at Kentland Farm ends up on dining tables at Virginia Tech. Officials suggested that the perchlorate might have come from fertilizers, but no further testing has been done to verify the source.

Earlier this year, tests conducted by Montgomery County at two separate municipal water systems within five and nine miles of the Radford plant returned with perchlorate in three of the four wells tested. Because the levels of perchlorate were all below the reporting limit of 2 parts per billion, authorities decided that no further testing was needed. In 2013, the local Sierra Club tested five private wells adjacent or close to Radford. Perchlorate was detected in four of the five wells tested, but again at levels below the reporting limit.

A number of residents who live in the shadow of Radford -- some within a mile of the plant -- reached out to Truthout to share their stories. Sarah Garst, 33, lived and worked within a seven-mile radius of the plant between 2000 and 2015. A keen runner -- she said she's completed nine individual marathons -- Garst was diagnosed with thyroid cancer last year, and had her thyroid gland removed last December.

Erin Card lives with her husband and three young children about a mile-and-a-half away from the plant, in a house where smoke plumes from the open burning are

visible. Card, 36, and her husband, 37, have lived within five miles of Radford for 10 years and 15 years respectively. Both have always been healthy and active, she said.

Earlier this year, Card's husband -- a computer programmer who, for a couple of years in his 20s, worked for a contractor at the Radford plant -- was diagnosed with testicular cancer.

"The more I look into open burning, the more I'm concerned about my family's health," said Card, adding that their oldest child was three-and-a-half years old when he had a non-cancerous lump adjacent to his thyroid gland removed. "But it's such a beautiful area. I don't want to move."

The plant has received in recent years warning letters by the state's Department of Environmental Quality for burning quantities of lead and chromium well above permitted levels. In an episode unrelated to open burning, the plant was fined (http://www.roanoke.com/news/local/pulaski_county/raap-fined-again-by-deq/article_16322a30-95ba-11e3-a5a7-001a4bcf6878.html) nearly $20,000 for two separate spills in 2012 of sulfuric acid and diethyl ether into the New River.

"They know that they're adding to the toxic burden every single day with production and waste disposal," said Devawn Oberlender-Bledsoe, a local resident and a vocal campaigner against open burning at Radford.

According to Justine Barati, the director of public and congressional affairs for the Army's Joint Munitions Command, Radford is currently in the process of designing a new incineration facility to reduce or eliminate the need for materials to be open burned. "This facility has been in the installation's plans for years and the design began in April of 2016," she wrote.

Read the army's full response to questions here. (http://truthoutdocs.cloudaccess.net/documents/2016-0719-army-response-to-truthout-questions.pdf)

Holston Army Ammunition Plant

BAE Systems run a sister facility at the Holston Army Ammunition Plant in Kingsport, Tennessee, just a hop, skip and jump over the Virginia border from Radford. Holston is the sole supplier to the US Army of Research Department Explosive (RDX), a compound used in the manufacturing of explosives. Roughly 1,672 (http://www.arcgis.com/apps/Viewer/index.html?appid=10cb5f3ea14d44aa93a4f924aadc6ada) people live within a mile radius of the facility, which is permitted to dispose of 1.25 million pounds of munitions a year.

BAE Systems and the US Army were recently embroiled in a lawsuit (http://www.tcwn.org/wp-content/uploads/2015/07/1-complaint_0.pdf) for dumping RDX -- a possible carcinogen -- into the adjacent Holston River, contaminating a municipal drinking water system ten miles downstream from the

plant. The lawsuit, brought about by the non-profit Tennessee Clean Water Network, claimed that RDX had been dumped every month for a little over two years at levels well above their permitted threshold. In exchange for dropping the suit, the US Army recently agreed in a consent decree (http://www.tcwn.org/wp-content/uploads/2015/09/25-1-proposed-consent-decree.pdf) to take a number of measures to improve pollution controls at the plant by 2020.

A number of production and disposal practices at Holston contribute to the RDX contamination of the Holston River, but the plant's open burning procedures have come under close scrutiny in recent years, especially in regards the burning of bulk waste -- like building materials and transformers -- containing highly toxic PCBs.

The Tennessee's Division of Solid Waste Management Toxic Substance Program inspected the plant last August, and the findings of the visit are damning. "The site is burning possible PCB Bulk material and oil being burned in open pans and burn piles," the report states, listing a host of non-compliance violations.

Previous studies have highlighted the poor air quality around Kingsport. Five schools, for example, within a thirty-mile radius of the plant scored among the 423 worst schools nationwide (out of a total 127,800 schools) in terms of their proximity to outside pollutants, according to a 2008 USA Today study (http://content.usatoday.com/news/nation/environment/smokestack/index). The study lists Holston among a number of other local industries possibly contributing to air pollution in the area.

Mark Toohey, a judge in juvenile court, lives within a mile and a half of Holston. He and his wife, Connie, have for a number of years been beating the drum to draw attention to activities at the Holston plant. Toohey, 61, was diagnosed with prostate cancer in 2011. His wife, 61, suffers from asthma and chronic sinusitis. They have two daughters, one who lives at home. She also suffers from chronic sinusitis, said Toohey.

With video recorder and camera, Toohey has documented the open burning at Holston, and he describes seeing "thick plumes" like "tornadoes" that move quickly across the ground, enveloping nearby homes. "When you see these burns, especially at night time, it's roiling, not just a nice little plume that rises into the sky -- they're huge rolling fires that move at great speed," he said. The open burning can continue for up to three or four days at a time. When the smoke has gotten especially bad, the Tooheys have left town.

"What they're doing by doing those huge open burns is affecting the health of the people in the area who come into contact with the smoke, and I just don't see the point in it," Toohey said. "They're definitely making some people sick."

According to officials from the Tennessee Department of Environment and Conservation, the nearest fine particulate air monitor to the plant lies 6.76 miles east

of the facility boundary.

Badger Army Ammunitions Plant

Monitoring matters. Pollutants from open burning can migrate well beyond facility boundaries and on into surrounding communities, sometimes affecting drinking water wells lying in the path of the contamination -- such as at the now-defunct Badger Army Ammunitions Plant, situated about 30 miles northwest of Madison, Wisconsin.

Intermittently between 1942 and 1975, the plant produced nitrocellulose-basedpropellants for cannons, rockets and small arms ammunition. In 1990, groundwater monitoring beneath and around the plant revealed that three private drinking water wells south of the plant boundary contained elevated levels of carbon tetrachloride and chloroform. Carbon tetrachloride is a compound highly toxic to the liver and kidneys, and as such is not often used in modern manufacturing.

Alarmed residents called upon the Wisconsin Division of Health (http://www.atsdr.cdc.gov/hac/pha/pha.asp?docid=740&pg=1#backa) (WDH) to conduct a cancer rate review in the area. The WDH concluded that people exposed to groundwater contaminants had a "slight increased risk of developing cancer" (though a follow-up health assessment nearly a decade later found that contaminant levels had been reduced and no longer posed an unacceptable level of cancer risk). In 2003, DNT and nitrates were found in three private drinking wells (https://www.dhs.wisconsin.gov/environmental/baderarmydntinprivatewells-hc093006.pdf) around the facility, again at levels above enforcement standards.

As of today, extensive monitoring follows three large groundwater plumes containing a host of contaminants including DNT and chlorinated solvents as they extend away from the perimeter of Badger before leaching into the Wisconsin River, a protected waterway. Two of the plumes, the largest of which is roughly three miles in length, extend from former open burn sites. Where one plume extends into the Wisconsin River, the water has turned a strange bright green color, said Laura Olah, a local resident and co-founder of the CEASE FIRE Campaign (http://cswab.org/resources/cease-fire-campaign/), an organization that has been at the vanguard of the push to end open burning at the federal level for years.

The problem with groundwater monitoring is that it only measures the contaminants, Olah said. "It does not prevent contamination, it does not slow down contaminant movement, and it does not remediate the damage that has been done."

Alternate Methods of Disposal

The overarching question marks and concerns that hover over the four locations described above are replicated in communities around other open burn sites across the nation, from California to Utah to Florida. The thing is, for the past 25 years, the US (http://www.peoacwa.army.mil/) has poured millions of dollars looking into,

researching and developing new technologies that are capable of disposing of explosives without harm to humans or the environment, like Gas Phase Chemical Reduction, Supercritical Water Oxidation, and "hold, test, and release" detonation chambers.

Given the amount of munitions that need to be destroyed, new munitions-disposal factories would need to be built in order to carry out these processes thoroughly and effectively. And they don't come cheap -- one expert estimated that a single facility could cost upwards of $10 million, not factoring in operating costs. But for Olah, the decision is simple.

"Open air burning, open detonation and incineration fail in every way and at immeasurable cost to those most vulnerable to harm," she said. "We have the technology -- it's time to use it."

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