

# PENN STATE &

# THE WAR MACHINE



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PENN STATE  
AND THE WAR MACHINE

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The Pennsylvania State University  
Institute for Science and Engineering  
ORDNANCE RESEARCH LABORATORY  
University Park, Pennsylvania

OCT 16 1968

NAVY DEPARTMENT · NAVAL ORDNANCE SYSTEMS COMMAND

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...but what does that mean?

Since 1945, the U.S. has invaded, occupied, or attacked 24 different countries in 34 separate campaigns. As of 2020, the United States has active duty military troops in more than 150 countries (that is, in 75% of sovereign nations). If you add up military spending by every nation in the world, the U.S. claims about 37% of the total (that is more than the next seven nations combined). Every year, congress votes to spend 54% of the federal discretionary budget on the military—including our ongoing wars in the Middle East and Afghanistan.

None of this would be possible without universities like Penn State. Many of us think of the military merely as “boots on the ground,” but it also comprises a vast economic and logistical organization, one that requires immense amounts of money, manpower, and knowledge. Universities like PSU provide leading research to support the military’s ability to police the globe—and the military, in turn, provides extensive investments to support PSU’s ability to conduct research. **This partnership has become so intimate that the U.S. Department of Defense is now PSU’s single largest source of research funding.** Last year the DOD spent \$258 million on research at PSU; for comparison, PSU only spent \$210 million of its own money on research. According to one investigation, Penn State ranks 15th in a list of the 100 most militarized universities in America. That makes PSU the second-highest position of any major research university outside of the Washington, DC area.



## HOW THE MILITARY MADE PENN STATE “PENN STATE”

The Department of Defense didn’t always fund research at Penn State—or at any other university, for that matter. Prior to the 1940s, military research was almost exclusively conducted at small government laboratories, and in many cases scientists who worked on military projects actually had to join the military.

This changed during World War II. The urgent technological breakthroughs accomplished during this war—in radar, rocket propulsion, proximity fuses, electronic digital computing, and, most notably, nuclear physics—could not be sustained by small, ad-hoc labs. The Manhattan Project, for instance, required a massive coordinated effort among 130,000 employees dispersed at factories, government institutes, and universities, including Berkeley, Columbia, the University of Chicago, Harvard, Cornell, the University of Wisconsin, and the University of Minnesota. This coordinated effort, in turn, required money.

The final bill for the world’s first atomic bombs came out to around \$2 billion, or the equivalent of \$30 billion today. This was far more money than the government had ever spent on academic research, and when the war ended, universities worked hard to maintain their connections to these robust sources of military funding.

Penn State was eager to get its hands on some of this new military cash, but it did not have the facilities or prestige to attract large military contracts. Prior to WWII, research at PSU was largely restricted to agriculture. During the war, PSU researchers dabbled in a handful of military projects—climatometers, high-altitude lubricant, as well as minor classified contracts at Pond Lab and the College of Science—but these paled in comparison to military projects at M.I.T., Stanford, and other elite universities. Simply put, PSU was not a well-respected research institution.

But as other schools began de-militarizing, PSU discovered an opportunity. In 1941 Harvard had established the Underwater Sound Laboratory to study submarine warfare; when the war ended in 1945 the lab closed, and PSU swooped in to hire the lab's associate director, Eric Walker, as the head of the Department of Electrical Engineering. Together, Walker and the Navy agreed to maintain the lab's ordnance division—i.e. its weapons division—at PSU. By the end of the year PSU had completed construction of the Ordnance Research Lab, a 100,000 square-foot laboratory with over 100 employees who primarily studied torpedoes: how to design, guide, detect, and conceal them.



According to historian Michael Bezilla, the ORL represents the "largest single addition ever to Penn State's research program." **Before WWII, PSU's annual engineering research budget never surpassed \$50,000. The first year after WWII, this budget grew to \$1.8 million—of which the ORL**

**accounted for 90 percent.** In 1949 the ORL built the \$2 million Garfield Thomas Water Tunnel, the largest circulating water tunnel in the world. For more than two decades the ORL used this tunnel to innovate and improve upon the Mark torpedo, designing the Mark 21, 27, 30, 32, 37, 39, 42, and its final iteration, the Mark 48. During this same span PSU grew from a modest agricultural college with 5,000 students into a top-40 research university with 40,000 students. The influence of the ORL on PSU's direction and growth was solidified in 1956 when its original director, Eric Walker, became president of the entire university.

**Ordnance.** (1) Mil. supplies—art., ammunition, mines, torpedoes, rifles, mountings, spare parts, etc. (2) Branch of the Service administering the storage and distribution of arms and ammunition.

*From Surgeon Rear-Admiral C.M. Bucknell's 1943 An Encyclopaedic Dictionary of Science and War*

## IS IT WRONG FOR PENN STATE TO SEEK SO MUCH \$\$\$ FROM THE DEPARTMENT OF DEFENSE?

*Some people say no.*

In fact, some researchers and administrators believe that PSU has a patriotic duty to assist the DOD. They argue that, if the United States wants to protect freedom at home and democracy abroad, then it needs a strong military. By helping the military, PSU is promoting freedom and democracy—and expanding its own budget in the process.

*Many people aren't sure.*

Even students who oppose violence don't always have an opinion about PSU's extensive military ties. After all, if you aren't personally working on military projects, then what are you supposed to do about it? If PSU doesn't conduct military research then surely some other university will—so why not bring the money to PSU?

***We believe it is wrong.***

Universities are responsible for safeguarding academic freedom. While PSU researchers are technically "free," we believe that PSU's overwhelming output of DOD projects reflects the available funding more than it reflects the desires of individual researchers. If we are forced to accept these financial limits to academic freedom, then we suggest a moral limit, too: that nobody should research how to kill people. The United States would better serve itself if the trillions of dollars it spends on military R&D instead went into research for addressing climate change, income inequality, racial injustice, and countless other comorbidities alongside the military-industrial-academic complex.

# A BRIEF HISTORY OF PROTEST AT THE ORDNANCE RESEARCH LAB



Four Arrested On Charges Of Obscenity Out on Bail



Bunny and seasonably mild heavy, Wednesday light in the upper 40's and low 50's. Fair and cold tonight. Low in the upper teens and twenties.

## The Daily Collegian



The 'Threat'—Marching to a Dark Day —See Page 2

VOL. 69, No. 79 UNIVERSITY PARK, PA., TUESDAY MORNING, FEBRUARY 18, 1969 6 Pages SEVEN CENTS

### 500 Protesters March on Old Main; Charge Complicity in 4 Tunnel Arrests



**Students Crowd in Old Main Lobby**  
MORE THAN 500 students gathered in the lobby of Old Main yesterday afternoon to protest the arrests of four University students. The students were arrested on charges of obscenity in connection with the sale and distribution of the underground student newspaper, the Water Tunnel. A high school student and a sales clerk were also arrested. All six were released on bail.

#### Faculty Members Urge Students To Leave Old Main Without Damage or Disruption

If this sounds idealistic, then we will remind you that PSU students have agreed with us in the past. As the Vietnam war reached its peak in the late 1960s, students staged massive protests outside the ORL to demand that PSU sever its ties with the military.

**Spring 1969:** In January a handful of Penn State students started an anti-war newspaper titled *The Garfield Thomas Water Tunnel* in mock homage to the ORL. The university administration immediately banned the *Water Tunnel* from campus, and on February 17th four PSU students were arrested for selling it in downtown State College. The next day, 500 angry students staged a sit-in at Old Main, chanting "We Want Eric [Walker]!" and vacating only after police served a court injunction.

\$11.7 Million from Defense Department

## PSU: Chemical Warfare-Related Work

By STEVE SOLOMON  
Collegian Staff Writer

Copyright 1969 by Steve Solomon

ite: This is the second of a seven-part series of Defense-sponsored research at the University of Pennsylvania. The first installment will appear tomorrow. It is an impressive sight. The green, roller of central Pennsylvania surrenders for a moment to a space of thick buildings and green and magenta forest rushes around it in a sweeping river of idleness on the other side and continues unbroken occasional town and the patchwork of a farmer's

ago has evolved into a multiversity which just as eagerly entertains overtures from government and industry as it concentrates on its traditional craft of scholarship. The hand of outside interests is heavy at Penn State, although certainly not as crushing as at other institutions such as Johns Hopkins or the Massachusetts Institute of Technology, where research contracts and grants and the administration of special defense laboratories may account for as much as 75 per cent of the university's revenue. Yet, at University Park, the specter of intrusion, is as wide and as holy colored, if not as militantly contested, as those at the largest research-oriented institutions.



Most of the controversy, in large part an outgrowth of student dissatisfaction with the draft, the Vietnam war and the supporting governmental and industrial bureaucracy, has centered around the university's relationship with the Department of Defense. Penn State, only one of hundreds of university technological centers for the military, conducts millions of dollars worth of research for the Defense Department every year and, since 1946, has administered the Ordnance Research Laboratory (ORL), a major military research facility which is officially a part of the University. Like other research centers for the Pentagon, Penn State's

The question of a university involving itself with warfare systems developments is constantly being raised and John C. Johnson, ORL director, admits that some professors here have questioned the University's involvement. "But," he said, "we have never considered our activities humane or inhumane. Antisubmarine warfare has never been considered a humane question; we instead, consider it a question of machine versus machine rather than a man to man conflict."

Whatever the moral issue happens to be, the University's Ordnance Research Laboratory has been, and remains intimately involved in the defense of this country.

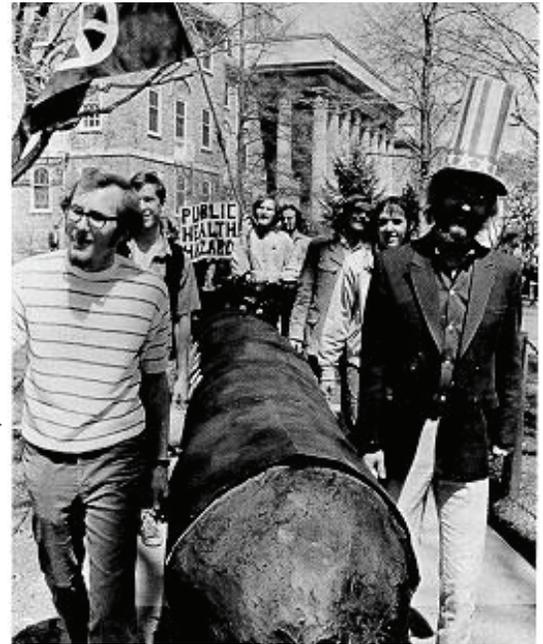
From the Daily Collegian, May 5, 1967

### Thrown Bottle Causes Fire in Ordnance Lab

A bottle filled with a flammable liquid was thrown through a window of the main laboratory building of the Ordnance Research Laboratory shortly before 2:30 a.m. yesterday.

The bottle landed on the floor of the lab and started a small fire. It was extinguished quickly by laboratory security personnel with only minor damage resulting to the floor. State Police are investigating.

**Fall 1969:** In October the Daily Collegian ran a six-part investigative series into ties between PSU and the DOD, dedicating the final, capstone entry to torpedo research at the ORL. On October 15, five thousand students boycotted classes to protest the Vietnam War. That evening a total of four thousand people marched through downtown State College to hold an anti-war vigil outside the Garfield Thomas Water Tunnel. Later that night, someone threw a molotov cocktail into the ORL, causing a small fire.



**Spring 1970:** In March an episode of the popular CBS program 60 Minutes exposed budgetary problems surrounding the Mark 48 torpedo. Development of the Mark 48 had begun back in 1964 at the projected cost of \$680 million, but six years later this cost had ballooned to a staggering \$4 billion. 60 Minutes used the Mark 48 to illustrate the dangers of unbridled military spending, and Pentagon officials directly accused the ORL of concealing early design flaws. A writer for the Daily Collegian accused Penn State of betraying the public: the ORL had a duty to disclose these design flaws to Congress, but instead it decided to keep quiet and cover up the Navy's fiscal mismanagement.



## Moratorium March Escalates to Riot: 18 Troopers Hurt, 29 Arrests Made

By CURT HARBER & TINA HONDORAS  
 "Collegian Staff Writers"  
 A general demonstration which began as a peaceful march on the campus of Pennsylvania State University today turned into a riot as 18 State Troopers were killed and 29 students arrested. The demonstrators, who were protesting the University's support of the Vietnam War, were met by a line of troopers. One trooper was hit in the temple with a rock and taken to the General Hospital. Another trooper was hit in the chest and taken to the General Hospital. The demonstrators were held overnight in the University's detention facility. The riot was the largest in the history of the University.

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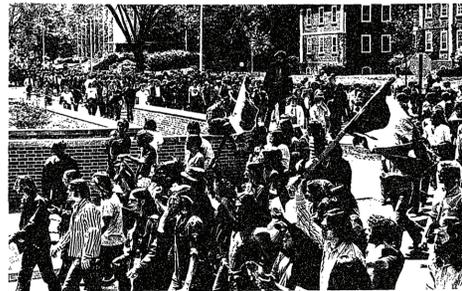
## 200 Protesters March Against Ordnance Lab

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On April 15, hundreds of students marched from Old Main to the ORL with a model Mark 48 torpedo and demanded that PSU dissolve ties with the military. After their demonstration the students returned to Old Main and staged a sit-in. At 4pm the administration sought a court injunction, but when borough police arrived the demonstrators became hostile, and at 730pm the state police arrived for support. The troopers infiltrated Old Main and began leading the occupiers toward several buses outside the building, but the buses had been surrounded and blocked by angry students. The troopers regrouped and headed toward different buses parked on Pollock Road, but students barricaded these buses with lumber, street signs, and other materials. Meanwhile, protestors barraged the troopers with rocks and glass bottles. By the end of the riot, twenty-four students were arrested and eight troopers were hospitalized.

# Official charges cost coverup, complicity with Westinghouse ORL hit again on Mark 48 torpedo

**Spring 1972:** On May 9 the U.S. Navy began Operation Pocket Money, a campaign to drop explosive underwater mines into North Vietnam's Haiphong harbor. The next day 2,000 PSU students marched through downtown State College in protest. They stopped all traffic and business for several hours, until they dispersed for a vigil at the ORL. The day after that, more than five thousand students marched on the ORL and the Garfield Thomas Water Tunnel to demand that the university sever ties with the military. Hundreds of students camped outside the ORL overnight and physically barred the employees from entering the next morning. The governor of Pennsylvania ordered the ORL to close for the next three days in order to avoid a violent showdown.



Follow the yellow brick road  
 Student demonstrators, after marching down College Avenue and Atherton, decided to enter the campus and ask students in dorms to join them.

## 5,500 students protest war ORL closed today

By MIKE PECK, BETTY HOLMAN and KAREN CARABUCCI  
 The announcement came after a one-hour conference in a state police bus between Kline, demonstration leaders, student leaders and police. Wells Keddie, assistant professor of labor studies and one of the prime directors of the march around campus called the shutdown the "first positive action by any governor of this state." He advised students to "not sell themselves short."  
 "This is just a start," Keddie said. "We're not done until this University is completely separated from the war machine." He suggested that they use the rest of the afternoon to celebrate their victory. "Let's get on campus, we've got a victory march."  
 "Today protestors plan a silent vigil at 11 a.m. on Old Main lawn while they await the results of a conference between University President Oswald, Undergraduate Student Government President Michael Shields and USG Vice President Eric Walker.  
 Earlier in the morning campus patrolmen ordered about 40 demonstrators to leave the vicinity of the ORL on the grounds that they were violating trespass laws by blocking the entrance of ORL workers.  
 However, the police retained enough control of the situation to prevent a forced march on campus through the residence areas.  
 The march continued west on College Avenue toward the ORL where the state police avoided a confrontation with the police by moving up Burrows Road to Pollock Road and out to a sit-in on Atherton Street.  
 After hearing that Kline was meeting with student representatives including Shields, Trustees Bettman, Lichtig, Walker, Keddie and protest leaders Tom Bamberidge, Garrett and George Terrell, the demonstrators massed in front of the Water Tunnel.  
 Garrett, who met with Oswald with other student leaders yesterday afternoon, said later that Oswald said there were two conditions which would cause him to call in the state police: riotous behavior or blocking ingress or egress of any campus building.  
 When Kline announced to the crowd that the ORL would close operations and that he came with no conditions for the students, he was initially jeered. Several students shouted "bullshit," "hell!" and "We don't want your racist war," when Kline told them that

# Editorial Opinion Charges Against ORL Must Be Answered

TO: JOHN W. OSWALD, president of the University  
 JAMES B. BARTOO, acting vice president for research  
 JOHN C. JOHNSON, director of the Ordnance Research Laboratory

rejected the invitation; no one else has commented. This newspaper feels that ignoring charges of such major proportions shows a gross lack of responsibility. Officials of this University have been charged with acts of dishonesty. If the University project and that Westinghouse and the ORL acted to protect each other's interests. And the University must order an immediate investigation into Johnson's claim that, while the project was underway, the ORL received no correspondence from

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# TORPEDO TURBULENCE

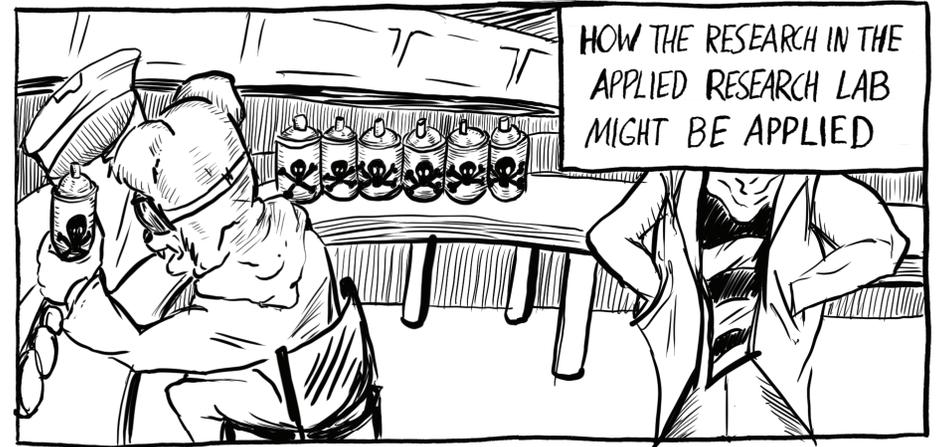
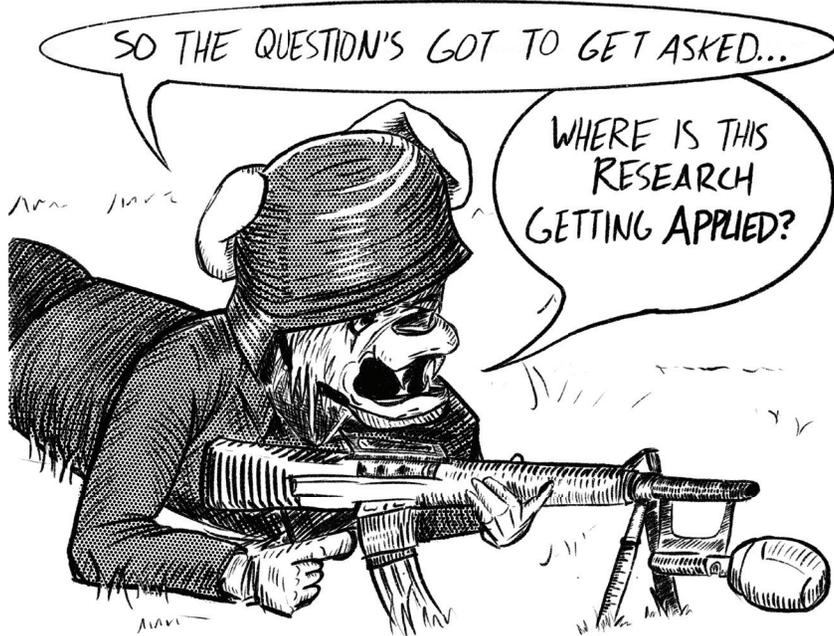
Tunnel tests make missiles quieter and deadlier

In the world's largest water tunnel at Pennsylvania State College, the 31-knot stream rushing past a torpedo model (above) forms a pattern of turbulent bubbles. Scientists watching know that the more bubbles they see the less efficient the torpedo is. A perfectly shaped torpedo would leave no turbulent wake at all, for water would flow around it smoothly. As in aircraft, turbulence produces drag, slowing the missile. More important, in torpedoes, it also produces noise. For a decade the Navy has been experimenting with deadly homing torpedoes which reach their targets by pursuing the sound of a ship's propellers, but many of these missiles proved so noisy they chased themselves as readily as chum. To discover quieter



**Fall 1973:** In response to the three-day shutdown the previous May, two major changes occurred. In January, PSU's Board of Trustees voted to change the lab's name from the "Ordnance Research Laboratory" to the "Applied Research Laboratory." According to the Daily Collegian, PSU President John Oswald explained that "the original name gives the implication the lab is working purely with weaponry, when actually it is working with applied research, which sometimes includes weaponry." Then, in February, PSU's Faculty Senate passed a resolution to reform the ARL's review board. Although the resolution seemed promising, its impact was ultimately limited. The ARL continued to conduct classified research, and only nine months later the ARL's assistant director could confidently affirm: "People sometimes get upset that a lot of the things at the ARL are hidden from the public. Some things are just inappropriate for people to see."

Seeking reform, transparency, and social responsibility from the ORL, protesters got the opposite: a name change to obscure the lab's research goals.





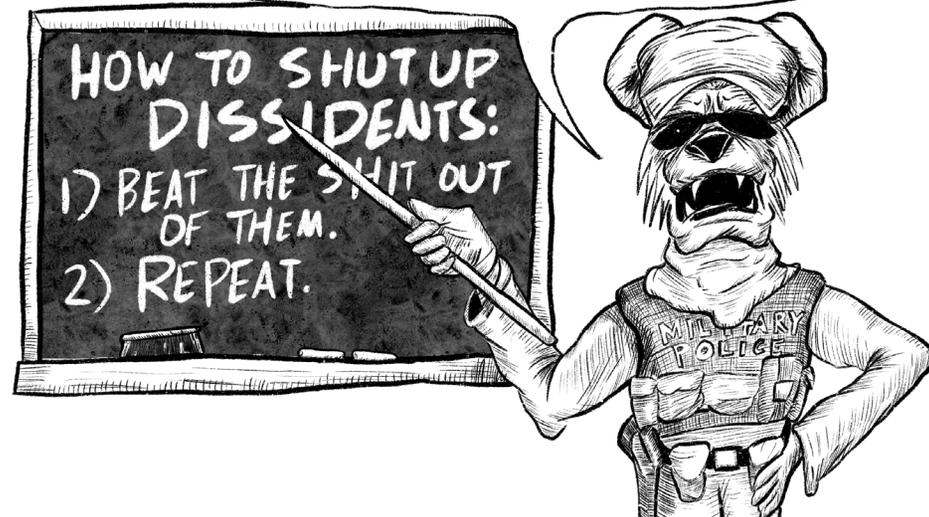
# NON-LETHAL WEAPONS

Since the 1970s the Applied Research Lab has continued to improve on torpedo design through research in underwater acoustics and fluid dynamics. It has also expanded to include DOD-sponsored research in the fields of materials science, laser processing, drivetrain technology, and additive manufacturing (industrial-level 3D printing). Most of these programs tackle obscure issues, such as the tiny gears in automotive transmissions, or “cold spray” bonding of particles. Although the military relevance of these projects may not be quite as obvious as a torpedo design, there is at least one new ARL project for which the “relevance” is absolutely clear: the Institute for Non-Lethal Defense Technologies (INLDT).

Established in 1998, the INLDT has accepted millions of dollars to research and promote the use of military-grade weapons against civilians. It has hosted international conferences to share tactics and practices with other nations—many of which, like Northern Ireland and Israel, have trouble dealing with their own “unruly” populations.

PENN STATE HAS THE PRIVILEGE OF TEACHING THIS “OPERATIONAL ART” AT EVERY PROFESSIONAL MILITARY INSTITUTE IN THE COUNTRY.

HOW TO SHUT UP DISSIDENTS:  
1) BEAT THE SHIT OUT OF THEM.  
2) REPEAT.



PSU loves to be on the *bleeding edge* of research. And when it comes to far-out ways to injure peaceful protestors, the INLDT has really pushed the envelope. First, the “Distributed Sound and Light Array” a.k.a the “Puke Ray,” which the INLDT first began researching in the 2000s. Next up: the LED Incapacitator, something like a lightsaber that makes you nauseous, was tested here in 2007.

But the real gem in our collection has got to be PSU’s interest in developing a “non-lethal operational anesthetic,” that is, pepper spray spiked with depressants (anything from Valium to fentanyl). In 2001, a writer for *Science* magazine mentioned that the Chemical Weapons Convention of 1997 banned the use of sedatives in combat. Was PSU breaking international law? No, said the director of the INLDT, we weren’t researching weapons for the battlefield...we were researching weapons for cops!

*“The literature search was never a part, nor ever considered a part, of any effort to create military weapons for the battlefield. Rather, it was intended to list possible humane alternatives to deadly force for crisis situations...In fact, we are conducting a 6-month feasibility study to investigate whether combining a state-of-the-art anesthetic in small, harmless doses with pepper spray might reduce the very violent reaction that often occurs when it is used in domestic law enforcement.”*

Uh oh! What happened in 2002 when Russian security forces ended a hostage crisis by releasing this kind of anesthetic gas? 244 people died. How did PSU respond to that news? Surely that put an end to their research? Nope! Again, the head of the INLDT wrote to the *Washington Post*: “what

we saw in Russia almost cries out for more rather than less research into this.” Yikes!

Why did PSU get into the “non-lethal weapons” game? The answer is: \$\$\$.

Since the end of the Cold War, crowd control technologies have taken up a larger share of the market for weapons research. Our little Institute was founded with a massive grant from the Department of Defense’s new Joint Non-Lethal Weapons Program, just when rubber bullets and the like were becoming hot commodities. Like any investor, the DOD seeks to fund research and tech that can one day be applied in a practical sense. They also need a sense of urgency to keep their massive budget intact. With the declining likelihood of a conventional war, they changed revenue streams. In other words, although they’re used by cops, non-lethal weapons are the result of the military-industrial complex bringing America’s war machine home—changing its targets from enemy soldiers to fellow citizens.

In a year like 2020, the consequences of this shift have become painfully evident. Following the police killings of George Floyd and Breonna Taylor in March, U.S. police officers have seriously injured at least 63 protestors with so-called “non-lethal weapons.” That category includes tear gas, flash-bang grenades, rubber bullets, and bean bag rounds. And while non-lethal weapons are not designed to kill, they occasionally do and they frequently cause serious damage. For example, of those injured during the 2020 protests, 13 protestors have lost their vision. That should not be surprising. In 2017, one academic study found that among people injured by “less lethal” weapons, more than 70% suffered severe injuries. Lethal or not—weapons are weapons.

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**Perhaps this is all just one big coincidence.** The fact that the DOD spent massive funding on counter-insurgency techniques designed for large, non-combatant populations in Latin America and the Middle East; the fact that these techniques have been turned against American citizens; the fact that these citizens have been protesting the systematic, state-sanctioned brutalization of Black lives—perhaps these developments have nothing to do with one another. But we believe they are deeply related.



Hallelullah!

It works.

We blew the shit out of them.

We blew the shit right back up their own ass  
And out their fucking ears.

It works.

We blew the shit out of them.

They suffocated in their own shit!

Hallelullah.

Praise the Lord for all good things.

We blew them into fucking shit.

They are eating it.

Praise the Lord for all good things.

We blew their balls into shards of dust,  
Into shards of fucking dust.

We did it.

Now I want you to come over here and kiss me  
on the mouth.

*"American Football"*  
by Harold Pinter

