



Rumsfeld's Ray Gun

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A tough-talking Texan named Edward Hammond has to be a key element of any accurate study of the spooky history of what the military calls the "Active Denial System."

The head of [The Sunshine Project](#), a Texas-based group opposing biological weapons, Hammond shows his disdain for military excesses through swear words and federal disclosure suits that seek to lift a window on military science projects. Two times now, he says, Marine Corp staff handling his Freedom of Information Act claims have mailed him the wrong envelope, mistakenly sending him materials meant for another military office, envelopes that contained classified information.

One of those times, he says, was in May when he received 112 pages of files on the Active Denial System, or ADS, a crowd control weapon built by Raytheon Corporation and slated for military deployment in Iraq in 2006. The documents included descriptions of tests conducted on volunteer subjects at Kirtland Air Force Base in New Mexico. Hammond, who had requested the documents, noticed something odd. "I saw some of the documents that were marked classified should have been redacted," he said in a telephone interview.

The Secrets of 'Active Denial'

The Active Denial System is a Pentagon-funded, \$51 million crowd control device that rides atop a Humvee, looks like a TV dish, and shoots energy waves 1/64 of an inch deep into human skin. It dispenses brief but intolerable bursts of pain, sending bad guys fleeing but supposedly leaving no lasting damage. (During a Pentagon press briefing in 2001, this reporter felt a zap from an ADS prototype on his fingertip and can attest to the brief but fleeting sensation that a hot light bulb was pressing against the skin). ADS works outside the range of small arms fire.

After a decade-long development cycle, the ADS is field ready but not free of controversy. Military leaders, as noted in a recent [USA Today](#) article, say it will save lives by helping U.S. troops avoid bombs and bullets in urban zones where insurgents mix with civilians. Temporary pain beats bullets and bombs, but Edward Hammond's files have rekindled scientific questions about how the classified system works, what it does to the body and how it will be used in the streets of Basra or Baghdad or, one day, Boston.

As key scientific questions go unanswered, a version of the Active Denial System is being developed by the Justice Department for use by U.S. police departments. The [National Institute of Justice](#), the research arm of the Department of Justice, has issued a half-million dollar grant to Raytheon Corporation for a "Solid-State Active

Denial System Demonstration Program," according to the NIJ website. Alan Fischer, a Raytheon spokesperson, said the company is "working on a number of active denial projects, with various ranges. ADS may some day be miniaturized down to a hand-held device that could be carried in a purse or pocket and used for personal protection instead of something like Mace. The potential for this technology is huge."

The DOJ isn't the only one excited. The Department of Energy is experimenting with ADS as a security device that would "deny access" to nuclear facilities.

For most Americans, zapping Iraqi insurgents in Baghdad with a potentially unsafe weapon is one thing; cooking political protestors in Boston or Biloxi will surely be another. Against this backdrop, observers say, Hammond's files become particularly important. "Right now the press really isn't on this," says Hammond. "But that will change when the first videos are released showing this thing being used on people."

Far from a national security breach, Hammond's documents do offer a small but worrisome glimpse inside a weapon that appears to be slipping beneath the scrutiny of a lethal world with bigger priorities. In July, New Scientist magazine reported on the files, citing red flags that troubled some scientists. Though the ADS, for example, will be face chaotic, unruly situations, the reports said volunteers were banned from wearing glasses and contact lenses to prevent possible eye damage. In other tests, volunteers were told to remove metallic objects such as keys to avoid "hot spots" that might burn skin.

Neil Davison, an expert in non-lethal weapons at Bradford University in England, reviewed the files and questions how ADS would perform in live conditions. In email interviews with AlterNet, Davison, a social researcher with biology training, pointed out that one section on medical risk analysis states that "...exposure levels [of energy waves] may exceed permissible exposure limits specified by the relevant safety standard by as much as 20-fold..."

What millimeter waves (MMW) do to the body depends on the dose. And about that, Davison and other experts have questions, lots of them. How do operators control the dose that an individual receives? What is the safety margin, rather, the difference in exposure time between it being an effective weapon and it being harmful? Does the weapon cut out after a certain time to prevent overexposure? What about people targeted at different distances? How do operators avoid unintentionally overexposing people at short ranges when aiming at long range? And what of individual differences in health, age, and sensitivity to MMW?

"What public information will be required before it is deployed to control riots on the streets of Seattle or Boston?" Davison asked.

Military spokespeople are hush about the weapon's specifications but dismiss claims that glasses and other everyday objects present dangers. Rich Garcia, press officer at Air Force Research Laboratory's Directed Energy Directorate at Kirtland Air Force Base, said he was safely zapped by the weapon while wearing contact lenses and clothes with zippers. When asked about the weapon's safety margin, Garcia said he could not give specific times or exposure levels but added that "the safety margin is

determined by a variety of factors, including the power of the system and the amount of time for each exposure. The operator is key to ensuring that a person is not over exposed."

But what about the eyes? The military's fact sheet for ADS cites a low risk for blindness. Experts such as Dr. Henry Lai, a bioengineer at The University of Washington in Seattle, agree the possibility exists. "Hitting the eyes of a subject and causing corneal damage could be a concern," he said. "I doubt very much a subject once hit can close his or her eyes fast enough to prevent extensive damage, since the reflex is triggered by pain. That means the response would be too late."

Long Term Problems

Aside from thermal injuries like blindness or burns, could a protestor who got zapped by an overzealous ADS controller eventually wind up with disease such as cancer? Another way of stating it: Do millimeter waves at the frequency of 95 gigahertz cause long term biological changes that are not related to heat?

The military says no. Others aren't so sure. And these things are often hard, if not near-impossible, to prove.

In 2004, a North Atlantic Treaty Organization report on non-lethal weapons raised warnings. "The long-term physiological effects of the microwaves received by an individual are still being studied (maximum acceptable dose, cumulative effect of successive exposures)," the report states. "The absence of definitive results is the main obstacle to the use of radio frequencies". The report goes on to note that "excessive power levels can have serious consequences for human targets."

Those concerns were already planted. In 2001, days after ADS was unveiled, Professor Ross Adey, one of the world's leading bio-electromagnetic researchers, told UPI (in an [article written by this reporter](#)) that he believed the device could lead to cancer or cataracts, especially if the subject already carried an illness made worse by the beams. Adey, who died last year, was a professor of physiology at Loma Linda University Medical Center in Loma Linda, Calif, a fellow of the American Academy of Arts and Sciences and a former professor of the Royal Society of Medicine. He said Russian studies in 1980s, as well as his own research, showed that millimeter waves at some frequencies have a non-heat related impact on white blood cells.

Adey noted that Soviet researchers have used millimeter waves in experiments designed to treat diseases including skin disorders, heart disease and cancer, suggesting that therapeutic benefits raises the specter of potential hazards if a subject is overexposed. Specifically, Adey said his work showed that radio frequency and the lower microwave range effected enzyme systems that regulate growth and division of white blood cells. He added that while the ADS does not employ those specific wavelengths, no scientific evidence exists to prove that millimeter waves could not cause similar damage.

Marvin Ziskin, a medical doctor and researcher at Temple University who studies the bioeffects of millimeter waves of different frequency said the weapon's 94 GHz

"could affect enzyme systems within the skin on a short term basis," adding, however, that there are no known long term effects. Ziskin said the military can't say for certain that the device has no long term bioeffects, adding, however, that "this could be said about anything. Science can not rule out the possibility of future harm from any environmental stress. Nothing can be claimed to be absolutely 'safe.'" Ziskin also said it is "probably true" that the vast majority of the scientific literature on bioeffects research on 94 GHz comes from researchers associated with the Pentagon's weapon development program.

He says, she says. Who can know? Can the Pentagon's claims be verified?

Davison, for one, says not likely. That's because the majority if not all literature detailing research on bio-effects of the weapons' specific wavelength (95 gigahertz) appears to have been conducted by researchers linked to the Pentagon's weapon development program. In an [ADS fact sheet](#), the Air Force says a panel of non-governmental scientists and medical experts reviewed bio-effects tests on humans. When asked for the names of those experts, a press official at the Air Force Research Laboratory's Human Effectiveness Directorate at Brooks City Base, Texas, said experts were not immediately available to answer. The Air Force's Garcia said he knows of no independent research. A Marine Corp spokesman said the Joint Non-Lethal Weapons Directorate, the military organization in charge of ADS, is "unaware of any release of classified documents or information relating to Active Denial System."

Kelly Hearn is a former UPI staff writer who lives in Washington DC and Latin America. His work has appeared in the Christian Science Monitor, American Prospect, and other publications.

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