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Non-Lethal Weapons Research in the US: Calmatives and Malodorants

This paper is the first in a series of three reports on United States government research on chemical and biological non-lethal weapons. Shaken by experiences such as its disastrous mission in Somalia, the US has concluded that it lacks appropriate weapons for peacekeeping and other "military operations other than war". To address this problem, the US has embarked on a program to develop new non-lethal weapons to control both armed enemies and civilians. Militaries and domestic law enforcement agencies in the United States and elsewhere are closely following this research and, in some instances, participating. The non-lethal weapons research detailed here raises questions about protection of civil liberties, particularly freedoms of thought and expression, and US compliance with arms control agreements including the Chemical Weapons Convention and Biological and Toxin Weapons Convention. The second and third reports in this series will be published over the course of 2001 and will address genetically modified anti-materiel agents and new riot control technologies, respectively.

This paper details research on two types of non-lethal weapons in the United States that threaten and could undermine important international arms control agreements and basic personal freedoms of thought and expression. Calmative and malodorant agents and their delivery systems are designed for use against armed enemies, riots, and "potentially hostile" civilians.¹

Calmative agents include an array of psychoactive substances whose effects range from inducing sleep to overpowering hallucinations. In the past, use of calmatives has been understood to violate the Chemical Weapons Convention; but new and dangerous interpretations of this agreement by US military strategists threaten to open the way for use of calmatives by armed forces or even police, especially in non-traditional conflicts such as peacekeeping. The United States Marine Corps and Army are researching delivery technology for calmatives and using computer models of calmative agents' effects in offensive wargames.

Malodorant agents ("stink bombs") have existed since the Second World War. Attempts were made as late as 1966 to develop malodorants that target particular ethnic groups. Disastrous military experiences such as that in Somalia and renewed interest from law enforcement has sparked a renaissance of interest in malodorants for use in riot control and, possibly, war. Use of malodorant agents, particularly by militaries, could promote use of chemical weapons in conflict and destabilize controls on both chemical and biological weapons.

¹ See A Joint Concept for Non-Lethal Weapons, US Marine Corps Combat Development Command, January 1998.
URL: <http://192.156.75.102/nonleth.htm>

Calmative Agents

Calmatives are chemical or biological agents with sedative, sleep-inducing or similar psychoactive effects. Chemical calmative weapons such as BZ (3-quinuclidinyl benzilate, a compound related to scopolamine) were developed during the Cold War.² Proponents of calmatives are creating a new and alarming legal ambiguity surrounding their use.

In the US, new weapons must undergo legal review by the Judge Advocate General (JAG) prior to development and again before production. In 1997, the Judge Advocate General of the Navy approved a list of proposed new, advanced, or emerging technologies for weapons research. Among these were gastrointestinal convulsives and calmative agents.³

The US Department of Defense (DoD) arguments imply the creation of two loopholes in the Chemical Weapons Convention: the possible definition of psychoactive substances as riot control agents,⁴ and a distinction between “military operations other than war” and armed conflicts. In the latter, DoD argues that even toxic chemicals would be of operational utility. In an article on legal aspects of non-lethal weapons, Lieutenant Colonel M.A. Coppernoll pointed out that:

“Calmative and gastrointestinal convulsives, if classified as riot control agents, can be acceptable. Once these technologies evolve into actual weapons or weapons systems, the Navy JAG will analyze them again as to their toxic properties and compliance with international laws, treaties, and domestic restrictions before final approval for series production, or rejection.”⁵

Another article published by military strategists highlighted the ambiguity concerning calmatives and similar agents in the US. In the view of the authors the use of calmative agents is not clearly prohibited by the CWC; but instead subject to decisions made by the Pentagon:

“NLWs [non-lethal weapons] such as neural inhibitors, gastrointestinal convulsives, neuropharmacological agents, calmative agents, and disassociative hallucinogens, and sedatives, may be considered ‘temporary incapacitants’ and therefore defined as toxic chemicals prohibited by the CWC for any purpose. (...) If the Pentagon interprets the term ‘toxic chemicals’ to include incapacitating NLWs, such as calmative agents, their utility in MRC [major regional conflict] is questionable. The sole operational utility of chemical-based anti-personnel NLWs will then be in MOOTW [military operations other than war], not MRC.”⁶

The US debate over use of calmatives is not only a theoretical and legal exercise. The US armed forces are conducting ongoing research on calmatives. In the 1999 Annual Report of the US Joint Non-Lethal Weapons Program (JNLWP), calmatives are included as potential candidates for non-kinetic weapons (i.e. those that do not use blunt trauma). Last year, a wargaming exercise (“Limited Objective Experiment 001”) was planned to investigate the use of non-kinetic weapons, including ***“calmative and malodorant payloads”***. The purpose of the calmatives experiment was:

“... to identify alternate means of offensive operations that will provide the National Command Authority (NCA) and Joint Force Commanders (JFC) additional operational options when executing a coercive campaign.”⁷ (Emphasis added)

² Destruction of the US Cold War-era BZ stockpile began in 1988. See the Medical Management of Chemical Casualties Handbook. URL: <http://ccc.apgea.army.mil/Documents/RedHandbook/001TitlePage.htm>.

³ Coppernoll MA (1999). The Non-Lethal Weapons Debate, Military Press, Spring 1999. URL: <http://www.nwc.navy.mil/press/Review/1999/spring/art5-SP9.htm>

⁴ Toxic chemicals are defined in CWC Article II.2. as causing, inter alia, “temporary incapacitation”, while in Article II.7. riot controls are defined as producing, inter alia, “disabling physical effects”. This distinction is obviously less scientific than it is political.

⁵ Coppernoll MA (1999). The Non-Lethal Weapons Debate.

⁶ Coppernoll MA, Maniyama XK (1998) “Legal and ethical guiding principles and constraints concerning non-lethal weapons technology and employment.” Presentation at the Non-Lethal Defense III Symposium. URL: <http://www.dtic.mil/ndia/NLD3/copp.pdf>

⁷ JNLWP 1999 Annual Report, page 20. URL: <http://www.jnlwd.usmc.mil/Documents/1999AnnualReport.pdf>

Weapons with calmativ payloads were modeled for wargames on the Joint Conflict and Tactical Simulation (JCATS) computer simulation developed by Lawrence Livermore National Laboratory for the US military.⁸

JNLWP work to date has been based on the assumption that calmatives are legal weapons for use in military operations. The outcome of the wargame exercise has not been released.⁹

In another project, the US Army is testing aerosolized ketamine,¹⁰ an anesthetic and psychoactive substance similar to BZ that has been identified as a potential chemical weapon agent.¹¹ Currently, the US Army is funding a clinical Phase I/II trial for aerosolized ketamine through a "Dual Use Science and Technology Grant". Innovative Drug Delivery Systems, Inc. (IDDS), a recently founded pharmaceutical company in New York City, is working on special drug delivery platforms such as metered nasal sprays. In 2000, IDDS was awarded a grant by the US Army to support clinical trials for transmucosal ketamine use in acute orthopedic/traumatic injury. The trial will be performed at Johns Hopkins University Medical Center.¹² While this trial's objective is to evaluate medical uses of ketamine, it will in any case generate also data and know-how on the use of ketamine or other calmatives as sprays for non-lethal weapon purposes.

Malodorants

Why would somebody patent the odor of human feces? In June 2001, Ecological Technologies Corporation, a small Texas company run by a retired US Navy Commander and former Naval Laboratories researcher¹³ obtained US patent 6,242,489 on "malodorant compositions". Ecological Technologies claims the use of organic sulfur compounds and skatole – the compound that makes feces stink – to produce the perfect "stink bomb". The rationale behind the invention is clarified in the patent:

"The use of obnoxious olfactory stimuli to control and/or modify human behavior in this way is an attractive concept for modern warfare ... Heretofore malodorant compositions have been too toxic for use when seeking to incapacitate and/or disperse an individual, or group of individuals ..."¹⁴ (emphasis added)

Malodorants are high on the list of non-lethal research priorities. US strategists have concluded that odor-producing chemicals ***"are likely to be permitted under the CWC"***.¹⁵ The Joint Non-Lethal Weapons Program sponsors a project that ***"investigates odorants and their effects on behavior. It can be used for riot control, to clear facilities, to deny an area, or as a taggant"***.¹⁶ At the US Army Edgewood Chemical Biological Center in Maryland, sophisticated experiments were performed to identify the most obnoxious smells, one of which turned out to be "US Government Standard Bathroom Odor".¹⁷

⁸ For more information on JCATS, see <http://www.llnl.gov/nai/group/JCATS.html>.

⁹ At time of writing, Limited Objective Experiment 001 is the subject of a Sunshine Project Freedom of Information Act request.

¹⁰ Ketamine is a powerful dissociative anesthetic and hallucinogen provoking "out of body" experiences. Related to phencyclidine (PCP), ketamine was used to treat combat casualties in Vietnam. It remains in use by doctors and veterinarians (to tranquilize large animals). Ketamine is also abused as an illegal recreational drug. It is a controlled substance in the US, where possession carries a federal first offense penalty of up to five years in prison. See: <http://www.usdoj.gov/dea/concern/concern.htm>.

¹¹ Bunker R J (1995). *Non-Lethal Weapons: Terms and References*, INSS Occasional Paper 15, USAF Institute for National Security Studies, USAF Academy, Colorado. URL: <http://www.usafa.af.mil/inss/ocp15.htm>

¹² See information at IDDS's website: <http://www.idds.com/corporate/profile/>

¹³ "A Body by Any Other Smell" in *Techbeat*, National Law Enforcement and Corrections Technology Center, Spring 2001.

¹⁴ US Patent 6,242,489.

¹⁵ Coppernoll MA, Maniyama XK (1998) Legal and ethical guiding principles and constraints concerning non-lethal weapons technology and employment. Presentation at the Non-Lethal Defense III Symposium. URL: <http://www.dtic.mil/ndia/NLD3/copp.pdf>

¹⁶ JNLWP 1999 Annual Report, Annex. URL: <http://www.jnlwd.usmc.mil/Documents/1999AnnualReport.pdf>

¹⁷ Bickford L et al. *Odorous Substances for Non-Lethal Application*, slide No. 9. Presentation at NDIA Non-Lethal Defense IV, 20-22 March 2000, URL: <http://www.dtic.mil/ndia/nld4/bickford.pdf>

Malodorants and Ethnic Warfare

Modern military use of malodorants dates to the Second World War when the US Office of Strategic Services (OSS), precursor to the Central Intelligence Agency, developed tubes of foul-smelling substances for use in espionage. Malodorants have since been studied for use in riot control and other military operations.¹⁹

The most disturbing of these studies was a 1966 effort by the United States to identify culturally specific malodorants. A study on this kind of ethnic weapon was commissioned by US Defense Advanced Research Projects Agency (DARPA) and conducted by the Battelle Institute in Ohio. The purpose was ***"to determine whether intercultural differences in olfaction exist, particularly with respect to offensive smells, and if they do, to what extent they can be utilized in psychological warfare."***²⁰

Intercultural Differences in Olfaction is deeply imbued with racist ideas and contemplates the questions ***"Would an obnoxious odor precipitate flight from a contaminated area... [and] ... Would it prevent access to this area on a culturally selective basis?"*** The idea was to disrupt Vietnamese guerillas, control strategic areas, and capture pockets of resistance (e.g., urban conflict zones, caves, bunkers) by using a carefully selected odor that overwhelmed Vietnamese; but left US troops unaffected.

DARPA scoured anthropological literature on Asia, and particularly its indigenous peoples, to find possible weapons and ways to use them. One conclusion was that malodorants might be used in conjunction with anti-personnel bombing to manipulate the behavior of large, apparently civilian, populations: ***"... it might be possible to condition adverse behavior to specific odors... For example, if bombs emitted a given odor upon explosion, the odor itself should become a fear-producing stimulus because of its association with the fear experienced during the bombing."***²¹

The researchers concluded that there was much work to do before effective ethnically targeted malodorant weapons would exist. Fortunately, it appears that DARPA proceeded no further. The report, however, indisputably confirms that the United States considered developing ethnically specific weapons as late as 1966.

The resurgence of military interest in malodorants presents the danger that some may attempt to pick up where DARPA's work left off. Scant publicly released details from recent studies of malodorants at the US Army's Edgewood Chemical Biological Center may indicate that there is new interest in ethnically tuned malodorants.²²

Interestingly, one of the key criteria for odorant selection was that they be ***"not incapacitating or a sensory irritant"***,¹⁸ an attempt to lay the groundwork to evade the CWC by preemptively and unilaterally defining military malodorants as anything but chemical weapons. But the Army's criteria are clearly faulty. The key function of malodorants is to irritate the chemical sense of humans. Malodorants could indeed be seen as sensory irritants and thus as riot control agents. Article II of the CWC defines riot control agents as follows:

7. "Riot Control Agent" means: Any chemical not listed in a Schedule, which can produce rapidly in humans sensory irritation or disabling physical effects which disappear within a short time following termination of exposure. (emphasis added)

Thus, malodorants used in military operations would clearly violate the Chemical Weapons Convention, although law enforcement might be tempted to argue that they could be used as riot control agents, falling into the same category as tear gas or pepper sprays. But there are at least three major arms control problems that would result from the development and use of malodorants. First, on a battlefield, malodorants pose the same escalating risk as riot control agents, which have been deemed

¹⁸ *ibid.* Slide No. 6

¹⁹ Bickford L et al (2000). Odorous Substances for Non-Lethal Application, Presentation at NDIA Non-Lethal Defense IV, 20-22 March 2000, URL: <http://www.dtic.mil/ndia/nld4/bickford.pdf>. Bickford and three co-authors are researchers at the US Army Edgewood Chemical Biological Center.

²⁰ Albert S and Hitt W. (1966) Intercultural Differences in Olfaction, Remote Area Conflict Information Center, Battelle Memorial Institute, 2 May 1966. Part of DARPA's "Project Agile", Sunshine Project DOD Freedom of Information Request 01-F-1021.

²¹ Albert S and Hitt W., page 4.

²² See Bickford L et al (2000). This presentation and related work is the subject of a current Sunshine Project Freedom of Information Act request.

unacceptable in armed conflict because they could easily be confused with chemical weapons of a more lethal nature. This could tragically turn a conventional conflict into all-out chemical war.

Secondly, development and weaponization of malodorants threatens the Biological and Toxin Weapons Convention (BTWC). This is because many of the most offensive smells are produced by living organisms or are toxins derived from them. Even synthetic malodorants often mimic biologically produced foul-smelling substances. Biologically based malodorants that are toxic are unquestionably biological weapons. While malodorants typically pose little threat to human life, especially when compared to pathogen weapons, there is considerable danger that malodorant development will encourage lax interpretation and violation of the Bioweapons Convention.

Thirdly, at the development stage, malodorants could be used as a disguise for the development and production of large scale and long distance chemical or biological weapons payload-dispensing devices. These systems could be used with no further adaptation to deploy any other chemical (riot control agents, calmatives or even lethal substances). No distinction will be possible between permitted delivery devices for non-lethal malodorants and prohibited ones.

Finally, like all non-lethals, malodorants are not necessarily stand-alone weapons and might be used as a "force multiplier" in an insidious combination with lethal arms (see box above).

Delivery devices

Malodorants have been used as a lead example agent in the development of microencapsulation techniques, including binary compounds.²³ Microencapsulated weapons are very small pellets of an agent coated with a shell that acts as a wall, protecting the active ingredient from the environment. The agent is released when the pellet is crushed, in response to an environmental stimulus (e.g. a rise in temperature or exposure to moisture) or, in one case of binary weapons, when the pellets are exposed to a chemical that breaks down the protective wall. Alternatively, two precursors to a chemical weapon could be pelletized together. When physical pressure (e.g., a footfall) is applied, the chemicals mix and become active.

Other delivery devices currently under development by the US Joint Non-Lethal Weapons Program that go beyond domestic riot control purposes are chemical land mines,²⁴ 81mm chemical mortar shells with a 1.5 km range, and a 120mm frangible mortar.²⁵ The development of one new chemical mortar round, called the "Overhead Chemical Agent Dispersal System" (OCADS), has been contracted out to the Primex subsidiary of General Dynamics, a major US weapons builder. According to the JNLWP, the mid-air exploding OCADS is to "**rapidly disperse non-lethal chemical agents over large areas... for crowd control or to provide a remotely generated protective barrier.**"²⁶

In November 2000, the US Navy was granted a patent on "**frangible payload-dispensing projectile**". Frangible projectiles, such as bullets, do not use kinetic energy to incapacitate a target; but instead break open upon impact and spray a chemical payload. The Navy's new patent on frangible bullets contains detailed descriptions of using irritant and inflammatory rounds containing CS, CN and OC.²⁷ While this projectile with a delivery range of 10-50 meters has application in riot control, the question remains why the Navy is involved in R & D pertaining to the delivery of chemical riot control agents.

²³ Durant Y, Thiam M, Petcu C, Vashista N : Developing microcapsules for NLW applications. Presentation at the NTAR II Symposium, November 2000 at the University of New Hampshire. URL: <http://www.unh.edu/ntar/PDF/Durant2.pdf>

²⁴ See Alternative anti-personnel land mines: the next generations, a report by the German Initiative to Ban Land Mines and Landmine Action (UK). URL: http://landmine.de/fix/english_report.pdf

²⁵ Annual Report 1999 of the JNLWP, Annex. URL: <http://www.jnlwd.usmc.mil/Documents/1999AnnualReport.pdf>

²⁶ Joint Non-Lethal Weapons Program News, v.2, n.2, February 1999, page 4. URL: <http://www.jnlwd.usmc.mil/default2.htm>.

²⁷ US patent 6,145,441, granted on November 14, 2000 to the US Secretary of the Navy.

Importantly, the general prohibition of chemical weapons in the CWC does not only include toxic chemicals, but also munitions and delivery devices. The definition of chemical weapons in the CWC (Article II, 1. (b)) reads in part:

... (b) Munitions and devices, specifically designed to cause death or other harm through the toxic properties of those toxic chemicals specified in subparagraph (a), which would be released as a result of the employment of such munitions and devices;

If the development or production of prohibited chemical weapons systems was justified with malodorants or other purposes that some argue are permitted under the Chemical Weapons Convention, this important provision would become meaningless. This could result in opening the door to development of a range of chemical weapons that were previously banned.

Conclusions

International arms control treaties must unambiguously prohibit any military or other coercive use of psychoactive and malodorant substances. Military use of calmativ agents not only violates the Chemical Weapons Convention; but by virtue of the way calmativs work – manipulating the consciousness of victims – pose threats to fundamental human rights including freedom of thought. Malodorants, while comparatively benign in terms of psychological effects, are also destabilizing because they can be easily confused with other, more deadly, chemical weapons, might be detrimental to biological weapons controls, and could be used to multiply the effect of conventional lethal weapons.

The research and development of calmativ and malodorant weapons systems by the United States thus creates serious challenges for arms control. Unfortunately, US military strategists are already doing serious damage to the international consensus against these weapons by defining them as riot control agents, thereby promoting a loosening of controls on these weapons.

The development of calmativs, malodorants and long-range delivery devices for chemical substances threatens to open the way for use of chemical weapons in warfare. By deliberately pushing this line, the US is threatening to undermine and severely weaken international arms control agreements, particularly the Chemical Weapons Convention.

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