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# Bradford Non-Lethal Weapons Research Project (BNLWRP)

## Research Report 3

August 2001

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#### 1. Introduction

This third report from the Bradford NLW Project aims to give the reader a brief update of developments and debates within the NLWs field over the last few months. We hope that it will be of interest not only to NLW 'specialists', but also to those with a general interest in this area.

Interest in non-lethal weapons, which have been defined as being 'explicitly designed and primarily employed to incapacitate personnel or material while minimising fatalities, permanent injury to personnel, and undesired damage to property and the environment', has increased dramatically over the last five years as a result of non-lethal technology progress and increasing calls from military forces (especially those engaged in peacekeeping) and civil police for more sophisticated non-lethal responses to violent incidents...whilst there are evident advantages linked with non-lethal weapons, there are also key areas of concern associated with the development and deployment of such weapons. These include threats to existing weapons control treaties and conventions, their use in human rights violations (such as torture), harmful biomedical effects, and what some predict as a dangerous potential for use in social manipulation and social punishment within the context of a technology of political control.(1)

#### 2. Emerging Technology Developments

## 2.1. Electromagnetic Pulse Technology

In March 2001, at its base in Quantico, Virginia, the Joint Non-Lethal Weapons Directorate (JNLWD) unveiled its latest non-lethal weapon. The Vehicle Mounted Active Denial System (VMADS) consists of a radar dish mounted on the back of a vehicle that emits a high-powered electromagnetic energy beam.

VMADS works through a special transmitter that fires two second bursts of focused microwave energy that causes a burning sensation on the skin of people up to 700 yards away. The beam penetrates less than a millimetre under the skin, heating the skin's surface but causing no burn marks. This sensation triggers the body's defence reaction: pain as well as a certain amount of confusion as to the source of the pain.<sup>(2)</sup> When the subject moves out of the beam, the pain stops. Colonel George Fenton reported that:

"It's safe, absolutely safe. You walk out of the beam and the pain goes away. There are no lasting effects."<sup>(3)</sup>

The weapon has been developed by the Raytheon Corporation and several other US Defense Department contractors, and is presently being field-tested on goats and soldiers at the Kirkland Air Force Base in New Mexico. Initial tests showed that in over 6,500 tests on 72 individuals, only one exposure led to an injury, a nickel-sized burn on a person's back. However, some scientists have serious misgivings about the weapon, suggesting that at close range the microwaves could cook a person's eyeballs. Cataracts and cancer are among the possible long-term negative health effects of this kind of device, according to researchers at the Loma Linda University medical centre.<sup>(4)</sup>

## 2.2. Future JNLWD programmes

There are three areas in which the Directorate is currently supporting further research:

2.2.1. Thermobaric Technology for Non-Lethal Personnel Incapacitation - Examining the feasibility of using thermobaric technology (which produces light, overpressure and heat) to incapacitate humans.

2.2.2. Front-End Analysis of Potential Non-Lethal Anti-Personnel Weapons - To identify feasible non-lethal chemical materials for further testing which have minimal side effects for immobilising adversaries in military and law enforcement scenarios. This programme is looking at calumative agents for use against personnel.

2.2.3. Veiling Glare Effects of Violet Laser Exposures in Humans - To evaluate violet laser induced lens fluorescence in isolated human lenses For further information contact Dr. Ken Tiedge at 001-(703)-784-2997 x232.<sup>(5)</sup>

### 2.3. Unmanned Aerial Vehicles (UAVs)

In the first of our Research Reports we indicated that UAVs were receiving a great deal of attention in the US. This has continued. The US recently tested a combined lethal/non-lethal UAV. The Loitering Electronic Warfare Killer (LEWK) is sponsored by US European Command, with Marine Corps Systems Command acting as the technical managers. It is designed to carry a variety of lethal and non-lethal payloads weighing up to 90kg. Its intended roles are suppression of enemy air defences, engagement of time-sensitive targets, battle-damage assessment and information operations. The LEWK is nominally 2.92m long, with a body diameter of 35cm, and weighs about 295kg. Funding for the project is expected to exceed US\$30 million and it will come from all of the US armed services and other NATO countries.(6)

### 2.4. A3P3 'Supergun'

The A3P3 (A3: Aerosol Arresting Agent/P3: Pulse Projected Plume) combines many different NLWs in one system. It uses a combination of electric shocks, pepper spray and video surveillance technology to incapacitate a target. The weapon uses sensors to judge the distance of an attacker before automatically releasing the correct amount of pepper spray. It contains tiny video cameras which beam pictures back to a central control. The device can also be adapted to deliver an electric shock to a target, which subsequently forces them to inhale more of the pepper spray. If the user comes under personal attack, a switch on the gun can transfer the electric charge to pads on the user's protective clothing. The Non-Lethal Defence Corporation in the US is developing the A3P3. The weapon has received clearance from the US National Institute of Justice, which also helped fund the project.(7)

### 2.5. Non-lethal alternatives to anti-personnel mines

The 1997 Ottawa Treaty banned the use, development, production, stockpiling and transfer of anti-personnel mines. However, non-lethal alternatives are now being developed to the traditional mine:

- Modular Crowd Control Munition - This uses the existing Claymore mine to project rubber balls. It is intended for breaking up crowds and hostile personnel, temporarily incapacitating at 5-15metres.
- Incapacitating chemicals - Various mines have been developed to release incapacitating agents such as CN and CS gas. These mines can be remotely triggered or set off by a trip wire there is even a variant which is designed to float on water. They are intended for perimeter defence.
- Taser Area Denial Device - Two US companies, Tasertron and Primex Aerospace, are developing this device. It is triggered by a trip wire or through the use of sensors. Once activated barbed darts fire out in a 120-

degree multi-directional pattern. The darts have a range of 15-30 feet and 50,000 volts are pulsed through the target.

There are also rumoured to be developments in the incorporation of malodourants, directed energy weapons (e.g. laser and microwave technologies) and acoustic weapons into mine form. Many of these are perceived to contravene the Ottawa Treaty.(8)

### 3. Other Non-Lethal Weapons Reports in the Media

#### 3.1. Technology

In July the New Scientist reported on the Pentagon's search for the ultimate 'stink bomb'. This may sound like an amusing idea but the US is serious in its search for a malodorous compound which could be used by the military to deter or repel enemy troops or hostile crowds, and to enforce no-go zones around sensitive military installations. It could also help peacekeeping forces keep warring factions apart by creating stench-filled exclusion zones. The police could use the weapon for ending sieges, dispersing rioters or marking ringleaders so they cannot escape into the crowd. Research into the 'perfect' malodorous substance is being carried out at the Monell Chemical Senses Center in Philadelphia. The research centres around trying to find a smell that repulses people from all ethnic and cultural backgrounds, and, once the smell has been discovered how to deliver it without cross-contamination.(9)

#### 3.2. The Use of NLWs

During the last six months there have been a number of reports of NLWs being used, particularly in riot control situations such as at demonstrations by anti-globalisation protestors at world economic summit meetings.

In April leaders of 34 countries in the Americas laid the groundwork for the creation of The Declaration of Quebec free trade agreement. More than 400 people were arrested during three days of protests and over 120 people injured, including two policemen. The Canadian police were condemned by The Ligue des Droits et Libertés, a Quebec-based human rights watchdog, for firing plastic bullets and tear gas without provocation. Many protestors felt that an excessive amount of tear gas was used against mainly peaceful demonstrators. It was also reported that a police officer had use an electric stun gun against a protestor who was already on the ground.(10)

July saw clashes between police and protestors in Salzburg, Austria where the World Economic Forum was holding its annual European economic summit. Riot police, dressed in full body armour, armed with shields and side-handled batons, baton charged demonstrators arresting at least four people, one policeman was also injured during the disturbances.(11) Later in the same month saw some of the worst rioting ever seen in Europe during the past 50 years during the G-8 summit

in Genoa, Italy. Around 20,000 police, army and navy personnel were on alert. During its peak it was reported that around 250,000 protestors were on the streets with a violent minority present within them. The police tactics used to break up the protestors have been widely publicised in the world's media as being far from ideal. Police used tear gas, batons, shields and live ammunition. Various reports have revealed the police dropping tear gas canisters directly onto the demonstrators from an overhead helicopter, and then following up on the ground with police firing more volleys of tear gas before charging and beating people with batons. Other reports from protestors accuse the police of firing tear gas shells directly at them and in some cases at very close range.(12)

Also in July the British Military Police, dressed in riot gear, had used water cannon and tear gas near the British military base at Episkopi, Cyprus to break up a crowd of around 1000 Cypriots who were rioting at the detention of a Cypriot Member of Parliament. The crowd charged into the RAF compound, throwing paving stones, bricks and firebombs at the security forces. 43 soldiers and policemen were injured during the riots and £300,000 worth of damage was caused.(13)

#### 4. UK Police

The argument for the further arming of the police with new non-lethal weapons has been building over the past six months. This has been in response to two main triggers: (i). The widespread rioting across the north of England and; (ii) the incidences of people being shot dead by the police when a non-lethal option may have prevented fatality.

##### 4.1. Rioting

The past six months have seen serious increases of rioting in towns and cities of the north of England such as Oldham, Burnley, Stoke and Bradford. In the case of Bradford on Saturday the 8th July, the police confronted the worst inner-city riots since the early 1980s. The police were attacked for almost 11 hours by crowds throwing petrol bombs, fireworks, bricks, beer kegs, fire extinguishers, paving stones and had stolen cars driven at their lines. During this one evening around 120 police officers were injured as a direct result of the rioting.

Police who were involved in controlling the riots were dressed in riot protection armour and helmets, and equipped with shields and batons. Their main tactics were based around containing the riots rather than forcibly stopping them, and consisted of intermittent charges at the rioters' lines. However, the rioters managed to consistently force the police lines backward. Police use of force appeared minimal in relation to the force being used against them, however, it was later revealed that the police were on standby to use plastic bullets at the height of the riots. This would have been the first time that these weapons had been used on mainland Britain and would have marked a serious escalation of

force by the police, however, the decision was taken by West Yorkshire's Chief Constable, Graham Moore, not to use them.<sup>(14)</sup> The L21A1 type of plastic bullet which was only introduced on 1st June 2001 has already come under severe criticism in a report by the Defence Scientific Advisory Council <sup>(15)</sup> for being more deadly than the old type that it replaced. The report describes the bullet as 'lighter, faster, aerodynamically shaped and manufactured from a stiffer material'. When soldiers or police aim below the rib cage, as they are instructed, it is likely to 'increase the incidence of some intra-abdominal injuries' i.e. non-life threatening injuries. However, the report also went on to explain that in cases where the bullets did hit the head, they would cause more serious injuries than existing plastic bullets.<sup>(16)</sup> It has also been found through studies in the US that many of these types of munitions are in fact highly inaccurate. One study tested 79 types of munitions, including rubber and plastic bullets, and found that 56% or them could not reliably hit a circular target with a diameter of half a metre from 23 metres away.<sup>(17)</sup>

What is of concern here is that there are no appropriate weapons available to the police which do not equate to such a radical escalation of force. This was acknowledged by the Home Secretary, David Blunkett, who commenting on the riots in Bradford said:

We don't use water cannon and I'm not keen myself on upping the ante [but] in some parts of the world...the short and sharp treatment is applied.<sup>(18)</sup>

If the Health and Safety legislation which was put in place in April 1998 is examined one can see how this is contributing to the increased attention NLWs are receiving. Under the Act, health and safety is the responsibility of the management and the employee, who have duties to take care of him/herself as well as the safety of persons other than their employees. Under this legislation, individual managers can be found liable for any offences which are committed, or they can be charged jointly with the organisation they work for. Therefore, if a police officer does not receive adequate equipment appropriate to the situation he or she faces, then that officer can take legal action against his or her employers. <sup>(19)</sup> This has been the case following the Bradford riots whereby officers who were injured during the riots are now taking steps to claim compensation for their injuries.<sup>(20)</sup> This has led to the Home Office examining new non-lethal options.

#### 4.2. Deaths caused by police use of live ammunition

Another contributory factor to the increased interest being shown in NLWs has been the publicity given to recent deaths related to the police use of firearms. Two cases in particular have heightened the call for non-lethal options to be made accessible to the police. The first of these was the shooting of Andrew Kernan, a schizophrenic, on July 12th in Liverpool. He was shot twice in the chest whilst wielding a samurai sword, to the anger of his relatives who believed that he could have been disarmed without being killed. The second incident occurred the week

after on July 16th when Derek Bennett was shot five times by an armed response unit in Brixton, London. He was carrying what was thought to be a silver pistol. The man was threatening two other men with the pistol, one of them ran away and Mr. Bennett grabbed hold of the other. The police then shot him. It was after the shooting that police discovered the gun to be in fact a cigarette lighter in the shape of a pistol. This incident led to angry confrontations between local residents and the police.(21)

#### 4.3. Home Office research into NLWs

For some time the Home Office has been listening to demands from Chief Constables around the country that they require access to more powerful non-lethal weapons. As a result several NLWs are being considered and tested:

- The Taser - This weapon 'looks' very similar to a pistol. It simultaneously fires two probes that trail electric cable back to the taser. These can be fired from a distance of 21 ft, and when the probes make contact with the target they transmit 50,000 volt electrical pulses along the wires and into the body of the target. This causes an uncontrollable contraction of the muscle tissue, thereby knocking the target to the floor. When the weapon is fired the time and date is recorded and the information can be downloaded onto a computer. Further, every time it is fired the weapon ejects up to 40 small confetti-like I.D. tags which have the serial number of the cartridge so that it is known which officer fired it. The weapon being tested by the Home Office is the M26 Advanced Air Taser which is manufactured by Taser International, 7339 E.Evans Rd., Scottsdale, AZ 85260, USA (• [www.airtaser.com](http://www.airtaser.com)). Police in Northamptonshire have already begun researching the weapon and are still to make a formal decision on whether to carry out full trials.
- Laser Dazzler - A laser gun that resembles a torch. It fires a random series of green flashes up to 400m that temporarily blinds the target and creates an optical shield for the police to operate behind. It is currently being used by the Los Angeles Police Department.(22, 23)
- Bean-bag munitions - Various munitions exist that are made from material filled with lead shot. These are designed to knock the target down. They are designed so as to not penetrate the body and spread the impact of the blow over a wide surface area. They are fired from conventional shotguns.(24)
- Glue guns - High-powered glue guns fire a pellet of compressed sticky foam which expands to 30 times its original size and covers demonstrators. This impedes their movements and makes it difficult for them to carry on with their protest.(25) This type of glue gun is a move away from the crude spray guns that were seen in the early 1990s and is far more accurate and discriminate than the older variation.



- Water Cannon – A cannon mounted on an armoured vehicle which blasts jet of highly pressurised water at demonstrators. These have been used in Northern Ireland since the 1960s. (26)
- Pepper Spray - Very similar to the CS sprays that are in use with most constabularies across the country. However, pepper spray is derived from the chilli pepper whereas CS is purely a chemical compound. Pepper spray was tested along with CS gas by the Home Office, and was originally deemed too dangerous for use in the UK, however, Sussex police have begun using pepper sprays earlier this year, replacing their CS sprays.(27)
- A weapon that has been rumoured to be looked at is a 'tetanizing beam weapon' which is apparently currently being tested in California. It is a laser that fires an ultra-violet beam that immobilises a person by instantly paralysing their skeletal muscles. Prototypes of the weapon, a version of which will disable the electrical system of a car, tank or aeroplane will be ready for testing within a year.(28)

These weapons could all be used in situations when a police officer or a member of the public is under threat from a criminal. In March it was revealed that the Home Office is examining these new types of weaponry for possible police use.

On the 1st August 2001 it was announced by the Metropolitan police that they intend to deploy the Taser at some point before Christmas after a review of incidents that had put officers in extreme danger. It is a move that is likely to provide a lead that will be followed by other forces around England and Wales. The Metropolitan police decided to press ahead with procurement of the Tasers even though the Association of Chief Police Officers has yet to finish its review of the weapon. The force felt that it could not wait for the findings after it considered an internal report showing that Metropolitan officers were increasingly threatened by attackers carrying knives. Initially the Metropolitan police's 30 armed response units will be armed with the weapon and eventually the weapons will also be given to the Territorial Support Group which deals with riots and other public disorder.(29)

## 5. Commentary

The interest shown in NLWs during 2001 indicates that their use is set to become more widespread. This is related to both technological advances and to demands from police and military forces.

The USA continues to lead the way in the development of NLWs. However, some of these developments have to be treated with caution. Claims that the new VMAD system has no long-term malign effects appear unsubstantiated as research into this area has still not been completed. However, if VMAD was found to cause no serious long-term effects, then such a weapon would be a useful

tool for peacekeepers and police. One has to ask the question: if the intensity/strength of the beam is turned up does it have the capability to cause serious internal injury or indeed death? There are both operational and ethical concerns of dual use weapons which can slide along the spectrum of degrees of non-lethality to lethal effects, a capability which it appears that VMAD has.

The trend in the US indicates increased research into calumative and malodorant agents for use against armed enemies, riots and individuals. This is of great concern to many who believe that the use of either of these agents by the military could promote the use of chemical weapons in conflict, and thus destabilise international controls on both chemical and biological weapons.<sup>(30)</sup> Whilst there are arguments concerning the impact of these weapons on individual human rights, they do offer the user an ability to control a situation without having to resort to the use of lethal force.

It is in following with this line of argument that police in the UK are examining a range of NLWs for possible deployment. The negative media attention that the police received in relation to the shootings of Andrew Kernan and Derek Bennett highlighted the need for some kind of appropriate non-lethal option to be made available to the police for dealing with situations such as these (see Section 4.2 for more details). The firearms teams that are called to dangerous situations have few choices available to them apart from conventional firearms. In the case of Andrew Kernan a weapon such as a Taser could have been used to disable rather than kill. However, in the case of Derek Bennett it was very difficult for the officers involved to know that a very 'life-like' replica gun was being held to the head of a hostage, and in cases such there may be a requirement for a lethal response. With the announcement that the Metropolitan police intend to begin using the Taser operationally also comes concern over its potential misuse. In the hands of a properly trained, conscientious officer the Taser could be a weapon of great benefit to the police and public - stunning someone is certainly preferable to shooting them. But there have been incidences in the US when the Taser has been used against people inappropriately or excessively leading to physical and mental trauma.<sup>(31)</sup> It is certainly advisable that these weapons are restricted to specially trained police units.

The riots that took place in the north of England during 2001 have highlighted the police need for more appropriate non-lethal options. If one takes the example of Bradford when so many police officers were injured in one night of rioting, then there is an evident need for the police to be given appropriate means to protect themselves, and to deter and arrest offenders. This is not to say that the police should be armed to the teeth and take on the role of a para-military force, but they should be equipped adequately to deal with riots such as were seen in Bradford. When one examines what equipment the police had at their disposal during the Bradford riots it becomes clear that there is a lack of a logical 'force continuum' within their structure (See figure i.). By this it is meant that other than being

dressed in body armour and armed with riot shields and batons, the only other non-lethal option that was available was the use of plastic bullets. If this step had been taken it would have marked a serious escalation in the use of force. If we take body armour at one end of the scale (being the most defensive 'weapon' and least likely to cause serious injury or death), and put live ammunition at the other end of that scale (being the most offensive and most likely weapon to cause serious injury or death), we can see how there is a considerable gap in the equipment available to the police:

Figure i. 'Force Continuum'

Alternatives to the use of plastic bullets have been investigated. For example water cannon has been used in Northern Ireland, as has been tear gas. It is perceived that the use of either of these two weapons would lead to 'shorter' and 'sharper' confrontations between rioters and the police rather than the drawn out confrontations seen in the north of England this year.

However, the question of NLW use also needs to be examined from the public's perceptions. An increased use of NLWs for crowd control poses a challenge to our human rights. There is a fine line between the need for law and order on our streets and the infringement of our right to protest peacefully. This was exemplified in the recent riots in Genoa (See section 3.2 for details) when police blatantly abused both their power and equipment to quell trouble caused by a minority of protestors. With new weaponry comes increased responsibility for the police. If new NLWs are introduced a high level of training in their operational use is essential, and police should be given a thorough exposure to human rights awareness. These weapons in themselves do not offer a solution to policing problems in areas such as Bradford. This can only be achieved through close liaison between the local community and the police, and an increased understanding of the communities' problems and tensions.

## 6. Recent publications

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*Medicine, Conflict and Survival*, Vol.17, No.3, 2001. Special edition on Non-Lethal Weapons with contributions from John Alexander, Jurgen Altmann, Colin Burrows, Tobias Feakin, David Fidler, Jorma Jussila, Nick Lewer, Gerrard Quille and Steve Wright. Abstracts and ordering details can be found at <http://www.frankcass.com/jnls/>

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Addley, E. "Less lethal police arms tested". The Guardian Europe, April 17, 2001, p.5.

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