# PATTEN REPORT RECOMMENDATIONS 69 AND 70 RELATING TO PUBLIC ORDER EQUIPMENT

A RESEARCH PROGRAMME
INTO ALTERNATIVE POLICING APPROACHES
TOWARDS THE MANAGEMENT OF CONFLICT

THIS IS THE FOURTH REPORT PREPARED BY THE STEERING GROUP LED BY THE NORTHERN IRELAND OFFICE, IN CONSULTATION WITH THE ASSOCIATION OF CHIEF POLICE OFFICERS

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### FOREWORD BY THE RT HON JANE KENNEDY, MINISTER OF STATE FOR NORTHERN IRELAND

In December 2002, the Steering Group produced a full report on the third phase of the research programme. In line with the Patten report (recommendations 69 & 70) the programme was set up to:

- establish whether an acceptable, effective and less potentially lethal alternative to the baton round is available; and
- review the public order equipment which is presently available or could be developed in order to expand the range of tactical options available to operational commanders.

Subsequently on 9 April 2003 I issued a statement on the use of baton rounds in Northern Ireland which contained the following paragraph:

"On the basis that an acceptable and effective and less lethal alternative is available, the baton round would no longer be used after the end of 2003. In the event that that has not been achieved, the Government would report on the progress of the fourth phase of the research programme and review the options for less lethal alternatives, consulting widely with a range of interested parties including the Chief Constable and the Policing Board".

Since then, the work has continued apace. I know that directly from my own involvement with the work. I am grateful to the Steering Group, and to the many contributors to the programme, including those in government service, the police, academics and other experts, for their sustained commitment. This programme has also been more detailed and wide-ranging than any other. Despite a protracted and international search for a commercially available product, we have been unable to find anything that meets the criteria of an acceptable, potentially less lethal alternative to the baton round currently in service which provides an effective capability that does not expose officers and the public to greater risk in violent public disorder.

Government will continue to monitor all new and emerging commercial products and keep technological research under review. It will ensure that those systems appearing to have real potential are tested and medically evaluated if appropriate. This report thus contains for example a full account of the assessment of the 12 gauge sock round as against the existing L21A1 baton round (chapter 3). The Government has no intrinsic desire to run a programme itself to design and develop alternatives, if products or systems that meet the effectiveness criteria are made available on the market place. I regret that the position in that regard remains broadly as last year i.e. no commercial product in our judgement satisfies the safety, acceptability and effectiveness tests.

This report references the work of the Steering Group in conjunction with academics, medical experts and police services in North America and elsewhere. I am particularly interested in the work of the transatlantic teams looking at the scope for harmonising operational requirements and common approaches to testing and understanding medical outcomes. These contacts are intended in part, from our perspective at least, to lead towards a situation where manufacturers are clearer on the characteristics that will be sought in future systems and products. Members of the Steering Group believe it may represent a significant step forward in creating a broader suite of acceptable, alternative less potentially lethal systems.

It is against this background that Government has concluded that it would be right to continue with the development of the Attenuating Energy and Discriminating Irritant Projectiles (AEP and DIP) mentioned in the last report which it believes represent the best opportunity to get an alternative to the L21A1 round into service as rapidly as possible. The progress made in the development of the AEP and the DIP is set out fully in the report (chapter 2). In addition to the technical programme, presentations to a number of interested bodies have included a description of their potential. It may be beneficial to summarise that here.

Research into an attenuating energy projectile is in part a consequence of the independent medical evaluation of the L21A1 baton round that was published in April 2001. It is, put simply, a programme to develop a successor to the current baton round that would prove significantly safer should it strike the most vulnerable part of the body i.e. the head, while retaining its overall effectiveness. As the report brings out, the AEP would be discharged from the existing launch platform, and would be designed to have the same trajectory and other characteristics as the present round. This has several advantages – in particular it directly addresses safety issues, while keeping the development phase to a minimum. While there remain challenges, the projected timetable would make this projectile available by the end of 2004, ready for full operational use before summer 2005.

However that is *not* the end of the story. In the meantime work is continuing on the second new projectile. This is based not on kinetic energy effects but on an irritant that would be delivered to a violent individual's upper body. There are several commercial products that already operate on this basis and one used by some police services in North America and Western Europe, but we have been unable to identify any that meet our accuracy and safety criteria. The development of the DIP, as a new system, is inevitably a longer term project. It is by no means certain that it can be successfully achieved, although the signs are positive thus far. It will also require substantial continuing financial investment, and I am grateful to the Home Office and the Ministry of Defence for their contributions to the work.

We believe that this combined programme has the potential to provide an acceptable, effective and less lethal alternative to the current, L21A1 baton round, which is in itself a safer and much more consistent round than the L5A7 Plastic Baton Round in use when the Patten Commission reported. As undertaken in the statement of 9 April, we will consult widely with a range of interested parties including the Chief Constable and the Policing Board. A major one day conference will be held in London on 5 February 2004 in support of this consultation process. Attendance at this conference is by prior arrangement only.

I turn now to other elements in this important report. The human rights and acceptability issues set out at length in the phase 2 and 3 reports¹ are still fundamental. The importance of understanding the underlying reasons for public disorder is re-emphasised in this report through the synopsis of the independent research into crowd dynamics in the summer of 2003 in Northern Ireland. The report also updates the public on the related developments over the past year, including water cannon. It brings out that no baton rounds have been fired at all in Northern Ireland since September 2002, although there have been a number of discharges in Great Britain. Resort to the L21A1 in those circumstances obviated the need to use higher levels of force, saved lives and did not result in serious or life threatening injuries being caused to the person struck by the baton round

This phase 4 report, like the previous three, is available on the Northern Ireland Office website **(www.nio.gov.uk).** Government Ministers and the Steering Group are committed to putting a wide range of information into the public domain.

I again welcome the continued work of members of the Steering Group in forging closer ties with counterparts in North America and elsewhere. Managing conflict situations, whether they involve public disorder or violent individuals, is a role for virtually all law enforcement agencies, and there is scope for us all to learn from other approaches.

I hope that this report will also be carefully studied by interested parties both within Northern Ireland and further afield as it is essentially about equipping police with an effective, acceptable and less lethal capability. I know a good deal of it is technical. We make no apology for that. For example the description of the evaluation of water cannon has no precedent in available literature on that subject. The totality of this report is not just about public order equipment and it is rightly titled alternative approaches to managing conflict.

As before we are inviting comments on this report. It poses some important issues for consideration by those who have a contribution to finding the way forward.

In accordance with the original programme, this would be the final report of the work of the Steering Group. I would not wish to pre-empt the outcome of the consultation process following its publication but further reports will be dependent on the decisions reached following that consultation and whatever mechanisms are necessary to take forward any further research. However we do plan to report on progress towards implementation of the programmes to develop further the Attenuating Energy and Discriminating Irritant Projectiles.

I commend this report and will continue to take a close personal interest in developments.



#### INTRODUCTION

## A. The background to the fourth report including the consultation process now envisaged based on the statement of 9 April 2003

- 1. This is the fourth report of the Steering Group set up to take forward recommendations 69 and 70 of the report of the Independent Commission on Policing for Northern Ireland (the Patter report) which was published in September 1999.
- 2. Recommendation 69 stated that "An immediate and substantial investment should be made in a research programme to find an acceptable, effective and less potentially lethal alternative to the Plastic Baton Round (PBR)".
- 3. Recommendation 70 stated that "The police should be equipped with a broader range of public order equipment than the RUC currently possess, so that a commander has a number of options at his/her disposal which might reduce reliance on, or defer resort to, the PBR".
- 4. The phase 1 report was published in April 2001<sup>2</sup> followed by the phase 2 report published in November 2001 and phase 3 in December 2002. All the reports were tabled in Parliament, distributed to a wide range of interested parties and are available on the NIO website or from the secretary to the Steering Group. (Also in November 2001 PSDB published a report entitled "Less Lethal Technologies Initial Prioritisation and Evaluation".)
- 5. On 9th April 2003 the NIO Minister of State Jane Kennedy issued the following statement:

"The Government is very aware of the sensitivities surrounding the use of baton rounds. Our objective is that not a single baton round would need to be fired in public disorder by the police, or the army acting in support. In the great majority of police districts, where there has been no sustained major public disorder, no rounds have been fired for five years or more. Building on that is our objective. With good policing and the support of the community it can be achieved.

With the availability of water cannon this summer, the progressive equipping of police officers with personal incapacitant sprays and the implementation of the community policing programme, the need for baton rounds will be further reduced. The aim would be that the need for baton rounds should be reduced to the point of deployment current in Britain.

The Chief Constable, and the Policing Board have a duty of care for police officers. Moreover, as Patten recognised, they cannot be left in a situation where ultimately they would have no alternative but to fire live rounds.

On the basis that an acceptable and effective and less lethal alternative is available, the baton round would no longer be used after the end of 2003. In the event that that has not been achieved, the Government would report on the progress of the fourth phase of the research programme and review the options for less lethal alternatives, consulting widely with a range of interested parties including the Chief Constable and the Policing Board.

In close consultation with the Board, the Government will progress the urgent developmental work that has been commissioned by the research programme set up to take forward Patten recommendations 69 and 70. That work is intended to find an acceptable and effective less lethal alternative to the current round."

6. The Government has committed to consulting widely on this phase 4 report. As well as being distributed to a wider range of interested parties, a forum will be held in London on 5 February 2004 to enable us to explore the Government's responsibilities arising from Article 2 of the UN Basic Principles on the use of Force and Firearms which states that:

'Governments and law enforcement agencies should develop a range of means as broad as possible and equip law enforcement officials with various types of weapons and ammunition that would allow for a differentiated use of force and firearms.'

It will also provide an opportunity to discuss and debate the ongoing work of the Steering Group.

7. This report will also be published on the Northern Ireland Office website **www.nio.gov.uk** and be tabled in Parliament. Comments on its contents and views on the way forward will be welcomed. Written comments should be sent to:

The Secretary to the Steering Group Room 4.12, Block B Castle Buildings Stormont BELFAST BT4 3SG

or by e-mail to pateam@nics.gov.uk

#### B. Feedback on the Phase 3 Report

- 8. The phase 3 report of the work of the Steering Group was published on 19 December 2002 and, as with previous reports, copies were sent to a wide range of interested bodies both within and outside the UK. The report invited feedback on its contents and views on the way forward. In the event feedback was limited. Written comments were received from the Committee on the Administration of Justice, British Irish Rights Watch and Dr Brian Rappert (of Exeter University).
- 9. It would not be practical to detail all the points made in the comments and discussion on the phase 3 report but the following provides a summary of key points made by respondents:

#### (a) Transparency/Openness

- There was some suggestion that there remained a lack of transparency;
- There was particular comment that even when transparency was provided by presentations at open, commercial conferences, the costs of attendance precluded the attendance of some interested groups;

There was criticism that individuals and their expertise were not identified and it was
therefore harder to assess the credibility of the reviews and research and identify any
conflicts of interests that might exist.

#### (b) Concerns at the safety of the L21A1 round

- Some concerns were expressed over the safety of the L21A1 baton round and the type and range of injuries incurred;
- There was particular reference to the use of baton rounds against children and the injuries that could result.

#### (c) Focus on baton rounds

• Concern was expressed that there was too much emphasis on adding additional weapons rather than finding a less lethal replacement for the baton round.

#### (d) Taser

- There was opposition to the introduction of the taser;
- There was comment at the lack of long term data on the effects of the use of the taser;
- There was criticism that the guidelines on the use of taser have not been published;
- There was comment that tasers should not be used in public order situations.

#### (e) Water Cannon

- Concern was expressed that a decision had been taken to purchase water cannons before the final medical evaluation was known;
- Comment was made on the need for reassurance that the water cannon would not be deployed before appropriate training, medical evaluation and guidance were in place.

#### (f) CS Spray

- There were concerns at the possible introduction of CS in Northern Ireland, albeit in hand held incapacitant sprays for use at short range in dealing with violent individuals;
- Comment was made about the combined effects of the use of CS with the MIBK solvent.

#### (g) Lack of any advancement in respect to the research into Distraction Devices

• There were concerns expressed that little progress had been made in progressing research into distraction and other devices in categories B and C.

#### (h) Management of conflict

- There was recognition that the management of conflict must range beyond police weapons;
- It was commented that aggressive posturing suggesting a state of readiness could fuel tensions rather than reduce them.

#### (i) Monitoring of use of less lethal weapons

- Comment was made about the need to monitor the use of less lethal weapons and that arrangements were needed to track usage patterns.
- 10. Written responses covering the points raised as appropriate were sent on behalf of the Steering Group to each of the bodies which had given written comments. Clarification on the points are also covered in the substance of this report; particularly items (a) to (f) above. For example this report includes the guidelines on the trial of the Taser even though it is not a technology designed or suitable for use in crowd control. The revised ACPO guidelines on the use of the L21A1 baton round (reproduced in this report), published on 8 December, included reference to the risks to children.
- 11. Opportunities for meetings and discussions were explored. Members of the Steering Group subsequently met with the Human Rights Commission and the Committee on the Administration of Justice. At neither meeting were any practicable alternatives to the way forward set out in the phase 3 report suggested. Representatives of the Steering Group have also made a presentation to the Policing Board. PSNI and representatives of the Steering Group attended an Amnesty International Conference in Belfast.
- 12. The Northern Ireland Human Rights Commission separately published on 8 April 2003 a report by the Omega Foundation entitled "A review of the human rights implications of the introduction and use of the L21A1 baton round in Northern Ireland and proposed alternatives to the baton round". Jane Kennedy sent the Government's reply to the Commission on 13 June, which included a response on each of the report's recommendations falling to Government. The reply made clear that the Government does not accept the report as fair or accurate. Some of the points contained in the report's recommendations are dealt with in this document; a copy of the Government's full response is separately available from the address in the introductory section of chapter 1.

#### C. An Overview of this Report and Critical Issues for Consideration

- 13. Since the publication of the phase 3 report much work has been done by the Steering Group and others on its behalf as detailed below. This includes work to advance the development of the Attenuated Energy Projectile (AEP) and the Discriminating Irritant Projectile (DIP) first outlined in the phase 3 report. This is detailed in chapter 2 of this report.
- 14. The report also updates the search for a commercial off the shelf product in line with the Minister's commitment in the April 2003 statement. It includes extracts from an independent report on the police management of conflict in Northern Ireland in the summer of 2003, illustrating the approach adopted by PSNI.
- 15. The international context has also been important with work ongoing on the information sharing and the potential for developing common standards. Chapter 5 details developments in this area.
- 16. The PSNI experience in the procurement of water cannon is detailed in chapter 6.
- 17. With the wider use of the L21A1 baton round across the England and Wales (and introduction in Scotland) and no firings of baton rounds in Northern Ireland since September 2002, chapter 7 details some case studies on the use of the round in potentially life-threatening scenarios. The subsequent sections deal with the trial of the taser in England and Wales and the introduction of personal CS incapacitant sprays to the PSNI.

18. Finally the report looks in more detail at developments in accountability and independent scrutiny of less lethal technologies in the UK during the year.

#### D. The Work of the Steering Group

19. In summer 2000, the Secretary of State for Northern Ireland set up a UK-wide Steering Group to lead the research programme. The Group is comprised of representatives from Her Majesty's Inspectorate of Constabulary, the Home Office, the Association of Chief Police Officers, the Ministry of Defence, the Northern Ireland Policing Board, the Police Scientific Development Branch (PSDB) of the Home Office, the Defence Science and Technology Laboratory (Dstl), the Police Service of Northern Ireland, and was chaired by the Northern Ireland Office. Since the summer of 2002 the Association of Chief Police Officers (Scotland) has also been represented. The Steering Group was given the following terms of reference:

#### "Objective

To establish whether a less potentially lethal alternative to baton rounds is available; and to review the public order equipment which is presently available or could be developed in order to expand the range of tactical options available to operational commanders.

#### Task

In the light of the recommendations in the Patten report for a research programme to find an acceptable, effective and less potentially lethal alternative to the Plastic Baton Round, and for the [RUC] to be equipped with a broader range of public order equipment, to provide advice to the Secretary of State for Northern Ireland in a report as follows:

Phase 1 (defining operational objectives and literature review)

Define the operational objective against which less potentially lethal weapons must be tested.

- Prepare a literature review of less potentially lethal weapons available or under research;
- Examine the literature review against the operational objective.

Phase 2 (evaluating the literature review, preparing business case and directing further research as necessary)

- Formulate proposals for further research on less potentially lethal weapons which would benefit from further research and which have the potential for successful transfer to the operational field, setting out the timings and the costs of that research;
- Prepare business case.

#### Phase 3 (research)

- As directed under phase 2, conduct further research, evaluate performance and safety, and establish deployment costs.

Phase 4 (operational objectives and public order equipment)

- Define operational objectives for public order equipment;
- Prepare a report on the tactical deployment of a range of public order equipment in Northern Ireland, covering as wide a range of equipment as possible."
- 20. In addition to the main steering group, two sub-groups have been set up in 2003 to refine the requirement and operational issues and to consider the technical/procurement issues relating to the AEP/DIP. These two groups are referred to as the Operational and Technical Sub-Committees. The terms of reference for these Committees are as follows:-

#### **Operational Sub-Committee**

Attenuated Energy Projectile (AEP) and Discriminating Irritant Projectile (DIP) Operational Sub-Committee – Terms of Reference:

#### Role of the Operational Sub-Committee (OSC)

The OSC is a sub-committee of the joint Steering Group into the Alternative Approaches to the Management of Conflict. The OSC will consider the operational issues and implications of the AEP and DIP development programmes.

#### **Sub-Committee Structure**

The representative from the Alternative Approaches to the Management of Conflict project will chair the OSC on ACPO's behalf. Attendance will be drawn from representatives of the Police and Military groupings responsible for advising on the introduction and operational use of such equipment.

Initial Representation:

#### **Home Office**

**PSDB** 

**HMIC** 

#### ACPO

Police Use of Firearms Secretariat
Public Order Sub Committee
Metropolitan Police Service
Police Service of Northern Ireland

#### Ministry of Defence

Dstl

HQNI

#### Responsibilities

To draft the operational requirement for the AEP and DIP, and have it agreed with the respective ACPO and Military policy units.

To ensure that all operational issues relevant to the development and potential introduction into service of the AEP and DIP projectiles, are reviewed and where necessary reported on. This will include issues associated with compatibility of existing equipment.

To review operational issues associated with the launcher system(s), including sighting and zeroing.

To act as a ready point of contact with the technical sub committee on issues concerning operational, issue, carriage, use and training issues relating to the less lethal weapon systems referred to it by the steering committee.

To convene a users' group to review and if necessary assist in the setting up of user trials and development of draft operational guidance.

#### Frequency of Meetings

The OSC will meet as required, but expected to be at least every two months, throughout the development phase of the programme. The Chairperson will ensure that issues relevant to emerging policy issues are reported to in the first instance to the ACPO Steering Group Programme Co-ordinator and will also ensure that an update is provided for each meeting of the steering group.

#### **Technical Sub-Committee**

Attenuated Energy Projectile (AEP) and Discriminating Irritant Projectile (DIP) Technical Sub-Committee – Terms of Reference:

#### Role of the Technical Sub-Committee (TSC)

The TSC is a Sub-Committee of the joint Steering Group into the Alternative Approaches to the Management of Conflict. The TSC will consider the operational issues and implications of the AEP and DIP development programmes. This will include (but not be limited to) advice and guidance on development, platform integration, issues pertaining to issue, carriage and use, including storage, transport, and deployment.

#### **Sub-Committee Structure**

A member of the Defence Logistics Organisation (DLO) will chair the TSC. The MOD will also supply the secretary. Attendance will be drawn from the research and development branches, procurement areas and user communities.

Initial Representation:

#### Home Office

PSDB HMIC

#### **ACPO**

Police Use of Firearms Secretariat Public Order Sub Committee Metropolitan Police Service Police Service of Northern Ireland

#### **Northern Ireland Office**

Patten Action Team

#### Ministry of Defence

DEC DGM IPM Dstl

#### Responsibilities

To formulate and agree and implement a programme to ensure the successful introduction into service of the AEP and DIP, and review the compatibility issues with existing equipment where appropriate.

To review the issues associated with the launcher system, including sighting and proofing. If necessary the TSC will implement a programme to rectify problems.

To act as a forum for the exchange of information between government departments concerning operational, training, procurement and quality issues relating to all joint less lethal weapons and ammunition.

To convene a users' group to review and if necessary trial equipment to assist in the development and acceptance of the AEP and DIP.

#### Frequency of Meetings

The TSC will meet as required, but expected to be at least every two months, throughout the development phase of the programme. The chairperson will issue an update report for each Steering Group meeting.

- 21. The work of the sub-committees has been important in ensuring the ongoing development of the AEP and DIP. By refining the operational requirement and with a focus of turning the concept into a realisable product it is now possible to set a realistic programme for the delivery of potential alternatives to the L21A1. Further detail is set out in the following chapter.
- 22. Other work undertaken by the Steering Group includes the continued evaluation of commercial off the shelf products and co-ordination of efforts to agree international standards for less lethal technologies. The Steering Group has continued to encourage development of databases of medical effects of the use of less lethal weapons and of the less lethal equipment available to the police, as well as promoting research into the management of conflict and monitoring the development of less lethal technologies to identify where improvement might be achieved.
- 23. In addition members of the Steering Group attended various international events in 2003 related to less lethal technologies. These have included:

The Defence IQ Less Lethal Weapons Conference, Defence Academy of the United Kingdom at Shrivenham 15-16 April;

The European Working Group 2nd European Symposium on non lethal Weapons – 12-14 May;

Janes 6th Annual Less Lethal Conference in East Kilbride – Critical Intervention – 2-3 October;

Police Ombudsman's conference (in Belfast) – Policing the Police 5-7 November;

ACPO Police Use of Firearms Conference – 11-13 November.

## PROGRAMME TO FIND A REPLACEMENT FOR THE CURRENT BATON ROUND

#### **Dstl Programme on the Development of Less Lethal Technologies**

#### A. Introduction

- 1. In the phase 3 report the Steering Group advised that the NIO had commissioned a Dstl programme of research supported by parties in academia and industry into the two technologies that were assessed to hold the most promise:
  - (a) an Attenuating Energy Projectile (AEP) that would have a reduced injury potential compared to the L21A1, specifically to the head;
  - (b) a Discriminating Irritant Projectile (DIP) that would deliver a cloud of sensory irritant in a discriminatory manner to an individual.
- 2. The research requirements for the two rounds were set out in the phase 3 report.

## B. Attenuating Energy Projectile and Discriminating Irritant Projectile operational requirements

3. Crucial to the work of the Dstl and the Technical Sub-Committee has been the refinement of the operational requirements for these rounds. This further work undertaken by the Operational Sub-Committee has re-examined the requirements for this technology and has produced a detailed operational requirement for each of the proposed technologies. This will assist in guiding the development programme and will be kept under constant review. The two operational requirements are as follows:

#### Attenuating Energy Projectile (AEP) Operational Requirement

#### A.1 Introduction

This document is the operational requirement for the development of an Attenuating Energy Projectile (AEP) for use in the United Kingdom by the Police and UK Military Forces at home and abroad. The AEP is being developed in furtherance of the Defence Advisory Council (DSAC) statement in relation to the comparative injury potential of the L21A1 in which DSAC requested that research should be undertaken on energy attenuating features for future Kinetic Energy projectiles in order to reduce the severity of head injuries. The AEP, if demonstrated to be at least as operationally effective as the L21A1, may be a potential successor to the current L21A1 baton round and is to be used with the Heckler and Koch L104

baton gun system. The system is designed for use as a less lethal option in situations where officers and/or military personnel are faced with individual aggressors either on their own or as part of a group.

This equipment should be developed taking into account the 'ACPO Less Lethal Options – An Operational Requirement' (detailed in the Second Report of the Research Programme Into Alternative Policing Approaches Towards The Management Of Conflict prepared by the joint services Steering Group led by the Northern Ireland Office, in consultation with the Association of Chief Police Officers). However if there is any conflict between the main text of this document and that of the generic ACPO less lethal operational requirement, then this text takes precedence.

#### A.2 Application

**Operational Role:** The objective is for the AEP to deliver an impact which is not intended to cause serious or life threatening injury, but is of sufficient force to dissuade or prevent a potentially violent person from their intended course of action and thereby neutralise the threat. The AEP may be deployed in a variety of operational situations, however the objective will remain the same.

The AEP should be accurate and discriminating, designed to be fired at individual aggressors. The equipment should be capable of carriage and deployment by an individual police officer or soldier.

#### A.3 Technical Specification

**Accuracy:** When fired from a fixed mount at a range of 40m [essential] (65m [desirable]) the system should achieve a 95% probability of impact on a target 400mm wide by 600mm high. When fired by trained personnel, from the standing and kneeling positions whilst wearing patrol/specialist protective clothing at a range of 40m [essential] (65m [desirable]) the system should achieve a 85% probability of impact on a target 400mm wide by 600mm high. It would be advantageous if it could also be fired from the prone position.

It is desirable that this accuracy could be achieved on a target 200mm wide by 400mm high. It is also desirable that the features of the weapon system assist in achieving this degree of accuracy in operational circumstances. Recognising that it is not always possible in operational circumstances to fully achieve the degree of accuracy obtained in testing or training, the system as a whole should avoid features that would tend to impair operational accuracy.

**Kinetic Energy/Momentum:** To allow the design to optimise safety as a whole, instead of concentrating on arbitrary parameters, pre-defined maximum kinetic energy or momentum constraints have not been set. The design must however demonstrate further improvements in safety when compared to the L21A1.

**Injury causing potential:** The equipment developers will be required to produce a concept that meets the requirements of this document and whilst maintaining operational effectiveness causes reduced injury potential when compared to the L21A1, specifically, it should reduce the clinical consequences of an impact to the head.

Specifically, the AEP shall be designed not to introduce any new injury mechanisms compared to that of the L21A1. The AEP must not produce fragments that may in themselves cause an increased risk of injury.

The AEP must not introduce or increase the risk to the occupational health of the users, in comparison to the L21A1, e.g. through noise exposure, inhalation of harmful combustion products, inhalation or repeated exposure of harmful chemicals, repetitive impact or jolt injuries.

**Operational Range:** The operational range of the projectile is 1-40m [essential], 1-65m [desirable]. It is desirable that the potential for injury to persons other than the intended target is minimised and it is highly desirable that the potential for injury behind a target at maximum range is minimised.

**Dress:** All requirements should be met when the system is fired by:

- A police officer wearing specialist firearms overalls, ballistic helmet with the visor in the up and down position and protective equipment;
- A police officer wearing full public-order dress, including a public order protective helmet fitted with a visor in the up and down position;
- A soldier wearing Combat Body Armour (Internal Security), S10 respirator, gloves and an Mk 6 helmet with a visor in the up and down position.

**Weapon System:** The AEP should be capable of being fired, with accuracy, from the L104 gun with L18 sight. Nothing in the design of the round should preclude the ability to fire a second round against the same target without delay, if considered necessary and subject to continuous assessment.

**Use in a confined space:** The system must be safe to fire from within a confined space, such as a tactical patrol vehicle or within a building. It is essential that smoke and contamination should be within occupational exposure limits when fired, within a stationary tactical patrol vehicle without, ventilation or during training on a range. The firing of the AEP within buildings or confined spaces should not present any person with increased risk compared with a firing in the open.

**Flash, Smoke, and Noise:** It is essential that any smoke and or flash signature that occurs on firing does not affect visual performance of the users (either through obscuration or loss of night vision), and that the risk of injury is not increased by the flash and smoke. Any noise, smoke or flash produced by the system (either during initiation or during flight) must be considered not to increase overall risk of injury to any person and be within occupational health parameters.

**AEP Material and Colour:** All suitable materials may be considered. The AEP should be incapable of being marked or tampered with by the user prior to firing. The AEP colour must not conflict with standard ammunition markings. The marking of the cartridge case should enable the AEP to be easily distinguishable from other projectiles capable of being fired from the weapon system.

**End Closure Cap:** It is essential that nothing leaves the system with the projectile that may affect the trajectory of the AEP or introduces its own injury risk.

#### Storage Life:

**Central Depot Conditions:** When fully developed and in service the AEP must have a storage life of at least 3 years (desirably 10 years) when stored in its original transport containers in a purpose built, controlled explosive storage facility and whose temperature range is monitored daily.

**Operational Storage:** In a store which is protected from significant solar heating, rain and other external effects the AEP, when stored in its original transport containers, must have a life of at least:

A3 and C0\* – 2 years (desirably 5 years) A1, B3 and C2\* – 1 year (desirably 2 years)

**Operational Usage:** Stored or carried ready for use in boxes, pouches or a weapon, in patrol vehicles or on the person and returned to a ready use place of storage between patrols (and subject to periodic checks by a competent person) the operational life should be:

A3 and C0 – an absolute minimum of 6 months and it is highly desirable that this period be 1 year. A1, B3 and C2 – 3 months (desirably 6 months)

**Environmental Conditions:** The AEP should be suitable for use in temperatures of -21°C to +58°C and highly desirable that it may be used in temperatures between -46°C and +71°C. It is desirable that the AEP will operate successfully after five minutes immersion in one metre of water.

**Packaging:** The system and its packaging must be certified for transportation by road, rail, air and sea and must be certified for storage in approved premises. The system must also be suitable for transport by road and on the body in a ready to deploy condition.

**Manufacture and Quality Control:** It should be possible to manufacture and integrate the AEP system by a number of manufacturers in a cost-effective manner. It should also be possible during manufacture to ensure that adequate quality control be applied to ensure that consistent performance is achieved.

**Drill and Training Ammunition:** It is essential that drill ammunition is available, to enable users to practice safe and efficient handling of the weapon system. It is desirable that a low cost training round and/or the ability to safely re-load rounds can be developed for use in familiarisation practice, albeit that zeroing and qualification training would be conducted with the operational round.

#### Discriminating Irritant Projectile (DIP) Operational Requirement

#### **B.1 Introduction**

This document is the operational requirement for the development of a sensory irritant release projectile, referred to as the Discriminating Irritant Projectile (DIP), for use, within the United Kingdom by Police and UK Military Forces. The system is designed for use as a less lethal option in situations where officers and/or military personnel are faced by individual aggressors acting either on their own or as a part of a group.

This equipment should be developed taking into account the 'ACPO Less Lethal Options – An Operational Requirement' (detailed in the Second Report of the Research Programme Into Alternative Policing Approaches Towards The Management Of Conflict prepared by the joint services Steering Group led by the Northern Ireland Office, in consultation with the Association of Chief Police Officers). However if there is any conflict between the main text of this document and that of the generic ACPO less lethal operational requirement, then this text takes precedence.

Whilst it is not believed that they are a constraint to the envisaged development of this equipment, the development and deployment is to be considered in accordance with the Chemical Weapons Convention and Chemical Weapons Act.

<sup>\*</sup> These climatic classes are MOD standard conditions. A3 and CO together represent the UK; the remainder represent the area of likely military operations.

#### **B.2 Application**

**Operational Role:** The objective is for the DIP to deliver a localised cloud or burst of sensory irritant which is not intended to cause serious or life threatening injury, but has sufficient effect to dissuade or prevent a potentially violent person from their intended course of action and thereby neutralise the threat. The DIP may be deployed in a variety of operational situations, however the objective will remain the same.

The DIP should be accurate and discriminating, designed to be fired at selected targets. The discriminating nature of the DIP should restrict the primary exposure of the irritant to a single person, however it is acknowledged that persons within up to 1 metre of the target may also be affected. The equipment should be capable of carriage and deployment by an individual police officer or soldier.

Furthermore in situations of serious public disorder, there may be a requirement to maintain a sterile zone between the security forces and rioters for the safety of personnel. A DIP may, in appropriate situations, provide a system to enforce the sterile zone or disperse rioters. The action of the DIP in this situation may become less discriminate with increasing range.

#### **B.3 Technical Specification**

**Accuracy:** When fired from a fixed mount at a range of 25m [essential] (65m [desirable]) the system should achieve a 95% probability of impact on a target 400mm wide by 600mm high. When fired by trained personnel, from the standing and kneeling positions whilst wearing specialist protective clothing used for public order and firearms duties, at a range of 25m [essential], 40m [highly desirable], 65m [desirable] that the system achieves a 85% probability of impact on a target 400mm wide by 600mm high. It would be advantageous if this could also be achieved when fired from the prone position.

It is desirable that this accuracy be achieved on a target 200mm wide by 400mm high. It is desirable that the features of the weapon system assist in achieving this degree of accuracy in operational circumstances. Recognising that it is not always possible in operational circumstances to fully achieve the degree of accuracy obtained in testing or training, the system as a whole should avoid features that would tend to impair operational accuracy.

**Kinetic Energy/Momentum:** To allow the design to optimise safety as a whole, instead of concentrating on arbitrary parameters, pre-defined maximum kinetic energy or momentum constraints have not been set. Effectiveness will however be related to the release of irritant as opposed to the kinetic energy or momentum delivered on impact.

**Injury causing potential:** The equipment developers will be required to produce a concept that meets the requirements of this document and causes a probability of unacceptable injury not higher than the L21A1. Specifically, the DIP shall be designed not to introduce any new injury mechanisms to those of the L21A1. The DIP system must not produce fragments that may in themselves cause an increased risk of injury.

The toxicology of the sensory irritant (or carrier) must not introduce any serious risks to health for a representative target population (including fire risk).

The DIP system must not introduce or increase the risk to the occupational health of the users, in comparison to the L21A1, e.g. through noise exposure, inhalation of harmful combustion products, inhalation or repeated exposure of harmful chemicals, repetitive impact or jolt injuries.

**Operational Range:** The operational range of the projectile is 1-25 m [essential],1-40 m [highly desirable] and 1-65 m [desirable]. It is desirable that the potential for injury other than to the targeted individual is minimised and it is highly desirable that the potential for injury behind a target at maximum range is minimised. Recognising that it is not always possible, in operational circumstances, to fully achieve the degree of accuracy obtained in testing or training, the system as a whole should avoid features that would tend to impair operational accuracy.

It is essential that irritant is not discharged during the flight of the projectile and that on striking an individual or object that all of the irritant is dispersed. It is desirable that should the DIP strike an object or reach the end of its flight that all irritant is discharged from the projectile thus reducing the potential for contamination or further use of any residual irritant.

**Dress:** All requirements should be met when the system is fired by:

- A police officer wearing specialist firearms overalls, ballistic helmet with the visor in the up and down position and protective equipment including respirator if required;
- A police officer wearing full public-order dress, including a public order protective helmet fitted
  with a visor in the up and down position. If it is shown to be necessary for officers firing the DIP to
  be protected from irritant effects then the requirement would include compatibility when wearing
  a respirator;
- A soldier wearing Combat Body Armour (Internal Security), S10 respirator, gloves and an Mk 6 helmet with a visor in the up and down position.

**Weapon System:** Nothing in the design of the round should preclude the ability to fire a second round against the same target without delay, if considered necessary and subject to continuous assessment.

Consideration must be given to the type of weapon system used and the benefits and or disadvantages of introducing a new system to the user's inventory.

It would be operationally desirable to utilise the same weapon delivery system as used for the L21A1, however, this should not preclude an alternative delivery system and or calibre being considered following discussion with the end users should 37 mm prove to be an inappropriate delivery platform.

**Sighting System:** The sighting system must be simple to use and enable the sights to be easily aligned on the correct location on the targeted individual. If the DIP is to be used with the Heckler and Koch L104 baton gun it would be highly desirable that the same sight unit, used for the L21A1 and/or AEP is employed.

The objective is, for operational reasons, to have a single sight setting. If it becomes necessary, due to the trajectory of the projectile, to have several sight (range) settings, the maximum which could be considered is three. It is essential that this sighting system is consistent and works in low light conditions (such as those provided by urban street lighting at night). It should be simple to use and require the minimum of additional training. The sighting system must have a clear aiming mark that the firer may place on the correct location on the target.

**Use in a confined space:** The system must be safe to fire from within a confined space, such as a tactical patrol vehicle or within a building. It is essential that smoke and contamination should be within occupational exposure limits when fired, within a tactical patrol vehicle, without ventilation or during training on a range. The firing of the DIP within buildings or confined spaces should not present any person with increased risk compared with a firing in the open.

**Flash, Smoke, and Noise:** It is essential that any smoke and or flash signature that occurs on firing does not affect visual performance of the users (either through obscuration or loss of night vision), and that the risk of injury is not increased by the flash and smoke. Any noise, smoke or flash produced by the system (either during initiation or during flight) must be considered not to increase overall risk of injury to any person and be within occupational health parameters.

**DIP Material and Colour:** All suitable materials may be considered. The DIP should be incapable of being marked or tampered with by the user prior to firing. The DIP colour must not conflict with standard ammunition markings. The cartridge case should enable the DIP to be easily distinguishable from other projectiles capable of being fired from the weapon system.

**End Closure Cap:** It is essential that nothing leaves the system with the projectile that may affect the trajectory of the AEP or introduces its own injury risk.

#### Storage Life:

**Central Depot Conditions:** When fully developed and in service the DIP must have a storage life of at least 3 years (desirably 10 years) when stored in its original transport containers in a purpose built, controlled explosive storage facility and whose temperature range is monitored daily.

**Operational Storage:** In a store which is protected from significant solar heating, rain and other external effects the DIP, when stored in its original transport containers, must have a life of at least:

A3 and C0 – 2 years (desirably 5 years)

**Operational Usage:** Stored or carried ready for use in boxes, pouches or a weapon, in patrol vehicles or on the person and returned to a ready use place of storage between patrols (and subject to periodic checks by a competent person) the operational life should be:

A3 and C0 – An absolute minimum of 6 months and it is highly desirable that this period be 1 year. Following transport of the DIP, there should not be any special requirements to activate or redistribute the sensory irritant in the round (e.g. shaking after setting).

**Environmental Conditions:** It is highly desirable that the DIP should be suitable for use in temperatures of -21° C to +58° C. It is desirable that the DIP will operate successfully after five minutes immersion in one metre of water.

**Packaging:** The system and its packaging must be certified for transportation by road, rail, air and sea and must be certified for storage in approved premises. The system must also be suitable for transport by road and on the body in a ready-to-deploy condition, and should be able to be repackaged in a suitable facility in to ready-to-use packages if necessary.

**Manufacture and Quality Control:** It should be possible to manufacture and integrate the DIP system by a number of manufacturers in a cost-effective manner. It should also be possible during manufacture to ensure that adequate guality control be applied to ensure that consistent performance is achieved.

The DIP must not leak sensory irritant whilst in storage and must not subject the firer/loader to the effects of the sensory irritant during loading, firing, cartridge removal or weapon maintenance

**Drill, Practice and Inert Training Ammunition:** It is essential that drill ammunition is available, to enable users to practice safe and efficient handling of the weapon system. It is also essential that practice rounds which emulate the trajectory of the operational DIP rounds are made available to enable users to undertake practice and qualification shoots. Training units will also require inert training rounds containing a simulant to represent the sensory irritant, in order that the localised irritant cloud distribution effect can be demonstrated during training programmes.

#### C. Effectiveness Criteria

- 4. The Patten Commission recommended that an immediate and substantial investment should be made in a research programme to find an acceptable, effective and less potentially lethal alternative to the Plastic Baton Round (PBR) in service in Northern Ireland.
- 5. In its approach to the work, the Steering Group has sought to develop approaches that can be used objectively to inform issues related to "acceptability", "effectiveness" and the "less lethal potential" of candidate technologies.
- 6. The approach to date has included the development of:
  - an operational needs analysis in relation to policing violent encounters, as set out in the Phase 2 report;
  - an acceptability audit framework, also set out in the Phase 2 report, which included strategic, ethical, operational and societal factors;
  - an operational requirement for less lethal weapons determined by the Association of Chief Police
    Officers in conjunction where appropriate with MOD;
  - prioritised technical and medical testing and assessment of less lethal technologies.
- 7. Technologies introduced or recommended during the lifetime of this programme have been subject to testing, medical assessment, human rights audit and operational use control mechanisms (ACPO Guidance on use).
- 8. It has become evident from all the work undertaken by the Steering Group, nationally and internationally, that operational effectiveness is closely allied to a complex matrix of issues. Identified effectiveness criteria include issues associated with reliability and consistency of the technologies as well as predicted physiological and/or psychological responses, both at the individual and at the group level.
- 9. The operational needs analysis and the ACPO operational requirement together with knowledge emanating from the technical and medical testing of less lethal systems have provided a background against which an informed approach can be taken to the development of operational effectiveness criteria.

- 10. The Operational Sub-Committee of the Steering Committee has therefore been tasked with considering operational issues associated with the current development of the AEP/DIP rounds. It was in this context that consideration began to be given to determining criteria against which operational effectiveness could be measured.
- 11. It is the emerging view of the Operational Sub-Committee that operational effectiveness criteria have potential utility across the whole range of less lethal weapons candidate technologies.
- 12. This work is still at an early stage and will require refinement before it can be applied with confidence to candidate systems. It is however anticipated that the criteria may enable an appropriate marking system to be independently developed.
- 13. If the operational effectiveness criteria are shown to have utility, they will potentially sit alongside the measures of predicted pathophysiological response/effect derived from modelling and testing undertaken independently by Dstl and PSDB, and the acceptability matrix.
- 14. The determination of effectiveness criteria has the potential to inform development of less lethal weapons and technologies and to assist the selection of potential less lethal systems. The criteria will also provide one of the measures against which post utilisation review can take place.
- 15. The following issues have at this early stage been identified as being potentially relevant to operational effectiveness:
  - Operational Availability / Deployment Issues;
  - Technical reliability and ergonomics;
  - Operational Accuracy;
  - Subject Response Factors;
  - Operational Use- Effectiveness Factors;
  - Operational Use of Force Follow up Considerations;
  - Consequence of Use Factors;
  - Tactical constraints.
- 16. The work will be further developed in consultation with practitioners.

## D. Attenuating Energy Projectile and Discriminating Irritant Projectile Programme

#### Introduction

- 17. This programme examines the development of two concepts:
  - (i) a kinetic energy projectile that will reduce the clinical severity of an impact to the head, compared to that predicted to occur with the L21A1 baton round;
  - (i) a projectile that delivers a sensory irritant to an individual and retains reasonable discrimination in its effects

18. These devices are named the Attenuating Energy Projectile (AEP) and Discriminating Irritant Projectile (DIP) respectively. These were initially described in the third report prepared by the Steering Group,<sup>3</sup> with the full publication of the research requirements for these projectiles. This section of the report describes the changes in emphasis that have been made in the project and the progress since the publication of the third report.

#### **Project drivers**

19. The original remit of the work was to undertake research on concepts that would be suitable to take forward for refinement into prototypes and then onto design/development. The programme timescales were always urgent given the emphasis in the Patten report and were also driven by the announcement by the Minister of State for the Northern Ireland Office on 9 April 2003. The plan is for a rolling programme of work, so that early project successes can be built upon, to attempt to shorten the timescale of the development cycle.

#### **Programme Management**

- 20. The programme has been guided by the Steering Group and the Technical Sub-Committee.
- 21. Several iterations of the research requirements for both devices were produced to specify exacting requirements for both the AEP and DIP. This resulted in the production of the respective operational requirements of both weapon systems. These requirements were deliberately challenging in their construction to attempt to advance the state-of-the-art. The latest requirements have been set out in Section B of this chapter.
- 22. As a result of the research and concept phases of the programme, these requirements will be developed further to reflect developments and issues that emerge as a result of the progress by the Operational Sub-Committee of the Steering Group.
- 23. The original research requirements for the devices stated that the AEP should be a 37mm or possibly 40mm diameter device. These two calibres were chosen because of the ease by which concepts could be integrated into the current, or modified launch platforms. Modification and rebarreling would be necessary if 40mm was used.
- 24. No decision has yet been made on the calibre of the DIP. The option exists for
  - (i) to be consistent with existing equipment (the 37mm baton gun); or
  - (ii) to move to a different platform as required.
- 25. This decision has been left open throughout the project and still remains as a point for discussion. As a result, one of the options is based around 37/40mm calibre technologies, but further consideration is being given to platform, aiming, human factors and logistics issues, to minimise the risks from aiming errors as well as broadening the options for the police.

#### **AEP Programme**

- 26. The research programme built upon significant experience from earlier development projects that resulted in the design of the L21A1. It also employed techniques such as modern finite element models, enhanced instrumentation and an improved understanding of high-strain rate impact dynamics, in order to consider the problem of impact to the human body.
- Patten Report Recommendations 69 and 70 Relating to Public Order Equipment: A Research Programme into Alternative Policing Approaches Towards the Management of Conflict, The Third Report Prepared by the Steering Group led by the Northern Ireland Office, in consultation with the Association of Chief Police Officers.

- 27. Information obtained from open literature reviews on the use of the baton round and experience gained in the operation of the system was also introduced into the development programme. Thus the driving concern for system performance, included the balance of:
  - effectiveness:
  - injury-potential;
  - consideration of accuracy with range.
- 28. These three issues create a difficult compromise. It is a relatively simple matter to provide acceptable solutions to any two of these, but the remaining aspect would always be difficult to achieve. This is a particularly challenging aspect of this programme, compounded by the need to consider, for example, consistency characteristics.
- 29. One of the significant issues that has come out of independent medical evaluations of previous systems is that the accuracy and consistency of the system (firer, weapon, sight and ammunition) are very important factors to minimise the risk of injury. These accuracy/consistency requirements are key performance parameters of the AEP programme. Significant effort has therefore gone into all of the candidate designs to attempt to ensure that the necessary production tolerances could be met. Additionally, potential manufacturers have been engaged in the project from an early stage.
- 30. An assessment of impact round concepts has been undertaken from first principles to examine whether the most suitable materials, geometry and masses have been used in order to meet the operational requirements of the AEP. Several candidate materials have been examined to consider their static and dynamic mechanical properties (static properties for storage, and dynamic for ballistic and impact considerations). The material properties have been tested under a variety of impact scenarios from 'rigid' targets (to determine the initial impact behaviour of the material without target influence), 'compliant' targets (to represent realistic conditions) and 'representative' targets (to obtain an indication of injury causing potential).
- 31. Similarly, consideration has also been given to geometric features that may be included in the design to provide additional energy attenuation from the initial material properties (for example, crush zones and energy absorbing layers). These geometric factors have been tested experimentally under laboratory and proof conditions and have been examined mathematically using finite element models to iterate the design and understand the impact dynamics.
- 32. All of these have been based around the use of the L104 baton gun, so the internal barrel ballistics have therefore been known. This, in turn, drives a minimum physical hardness for each material type to ensure that the projectile is engraved, so that it is spinstabilised on exit from the muzzle. The integration into the cartridge case also demands certain mechanical properties to



Development prototypes of the AEP, showing the incorporation of novel materials into the impact face of the projectile to provide frontal energy absorption. The projectile on the left incorporates voids in the nose; the projectile on the right employs energy attenuating materials alone.

ensure that the projectile launch characteristics are consistent.

33. The third report of the Steering Group stated that in the design of the AEP concepts consideration would be given to techniques that involved crushable/frangible sections to absorb the energy. These have been considered further and the frangible option has currently been discounted because it was not possible to produce a safe projectile that could be fired reliably using brittle elements. It was deemed that the fragments themselves might introduce a new injury mechanism and could not be fired with the desired reliability. Thus, current efforts have concentrated on techniques that would provide energy absorption by deforming the body of the AEP. This has the effect of transmitting less energy to the target compared with a rigid projectile (because some of the kinetic energy would be used in AEP deformation). This crushing of the AEP body would also reduce the rate of onset of the impact force and reduce the magnitude of the peak force, both of which have been shown in human impact to reduce the severity of injuries. The outcome of attenuating the energy is a reduction in the peak force.

#### **DIP Programme**

- 34. The requirements for the DIP arose initially from Patten recommendations 69 and 70 relating to public order equipment, but the DIP may also have a role as an option at comparatively shorter range to facilitate the arrest of an individual armed, say, with a bladed weapon or in other threats to the police and members of the public. The DIP needs to be discriminating in its nature, such that only those targeted are principally affected by the irritant. It was appreciated at an early stage in the programme that the cost, engineering, effectiveness and medical issues would all drive the irritant source to a micronised material and this would almost certainly be CS (orthochlorobenzylidene-malononitrile) because of its well characterised toxicological profile and appropriate effects.
- 35. The Steering Group appreciated that the projectile would not be sufficiently discriminating to affect only the person hit with such a projectile, but understood that a 'discrete cloud' of irritant would be produced. The Steering Group also desired the DIP to be effective out to a significant range (65m desirably), but understood that at these longer ranges striking the intended target may become more problematic with the result that persons other than the intended target were affected.
- 36. It was not a requirement that the projectile would have the dual purpose of releasing an irritant and delivering a kinetic energy effect, so the mass of the projectile would undoubtedly be less than the current baton round. In practical terms, this meant that it could be fired at a higher velocity and have a lower and flatter trajectory. Reduced mass could also allow a point of impact on the thorax, if necessary, so that the release of the irritant would be closer to the oro-nasal region. However, injury issues have still been considered from an early stage, and still need to be developed further.
- 37. The development of DIP was not to be constrained to the L104 baton gun, or even 37/40mm calibre, and there may be some merits in changing to a different calibre; thus:
  - An obvious indication to the intended target that the device is not a 37mm AEP or L21A1 baton round:
  - Different sighting systems and the reinforcement to the user that the projectile in use was not a kinetic energy device, with the corresponding implications for the aim point.
- 38. This, however, would bring some drawbacks to the use of the system, for example:
  - The logistical and cost issues associated with multiple guns;
  - The decision-making issues with deploying two (or more) systems;
  - The differences, and similarity, in systems having implications on the chance for operator error.

- 39. The research programme needed to follow a twin-track approach for the platforms to address the issues highlighted above. The first element of the work has incorporated assessment of historical equipment developed by MOD and currently available systems. The development of test samples has utilised as much information as possible from these previous programmes to avoid the duplication of effort and gain as much experience as possible.
- 40. One of the aspects crucial to the success of the project has been the delivery of a suitable quantity of irritant, in an appropriate form, with well characterised toxicology. Further investigation showed that a frangible nose was the most promising way forward because it provided a compact, rapidly acting delivery mechanism that would discharge its irritant on impact.
- 41. It was appreciated that one of the most challenging elements of this part of the project would be to ensure that a high degree of accuracy and consistency of the DIP could be achieved. This is necessary to satisfy the requirement that the device is effective and ensure that the risks of missing the intended target, or hitting a vulnerable part of the body, are small. This is not a simple matter, because the use of a micronised powder in the nose and a multi-component design introduced the possibility of shifting the centre-of-gravity of the projectile due to manufacturing variations. This would affect the consistency of the projectile. All attempts have therefore been made to contain the micronised powder in a capsule so that these effects are minimised.
- 42. Another challenging element of the programme is to prevent the introduction of any new injury mechanisms from the fragmentation of the CS-containing capsule. If this capsule produced sharp fragments, then these may create an injury risk from laceration.
- 43. The concept analysis stage of the programme included consideration of any existing equipment that could be utilised and/or improved to meet the research requirement. Work is being undertaken to look at new concepts, based upon experience from other development programmes. Limited tests have been carried out to determine whether the concepts could be produced which have sufficient consistency when fired, and whether sufficient irritant is released on impact. Significant risk to the success of the programme still remains in the transition from concept to development of the device.
- 44. The search for concepts examined existing projectile and launcher designs, but did not consider designs that had been discounted by PSDB<sup>4</sup>.



Medium calibre variants (of different mass and aerodynamic properties) of 37 mm DIP concepts, showing the carrier body and irritant payload in the nose, within a frangible cap. There has been no decision yet on the preferred calibre of the projective, but a smaller calibre option would be entirely frangible with no carrier body.

45. In order to assess the ability of the DIP concepts to produce sufficient concentration of CS at the facial area, prototype DIPs were fired at a human-shaped target with a simulated oral cavity. This oral cavity was connected to an Electrical Low Pressure Impactor (ELPI) device that samples air at a flow rate of 10 litres per minute. ELPI is a real-time particle size spectrometer and measures the airborne particle size and concentration, thus enabling the early assessment of the system hazards.

- 46. The DIPs used in these trials were filled with CDC4 (a micronised CS simulant) and fired from a compressed air gun to hit the dummy chest. The peak concentrations were assessed by an inhalation toxicologist to determine whether there would be any significant concerns on the amount of CS delivered to a subject. These initial tests showed that the irritant dose would be safe and effective, delivering a similar amount of CS to a personal incapacitant spray.
- 47. These tests have also been expanded to examine the consistency of the projectile designs, again, engaging manufacturers at an early stage, to ensure that risks to the programme are minimised.

#### Technical summary

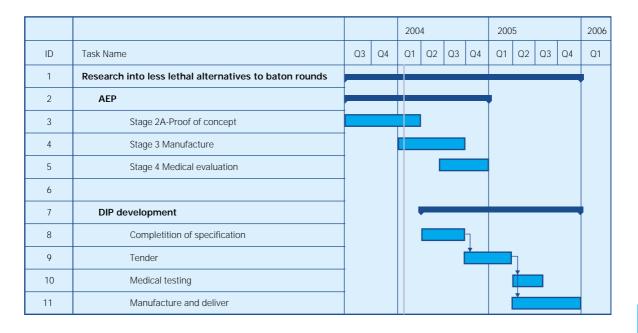
- 48. Concept AEP projectiles have been subjected to a variety of tests addressing consistency, effectiveness and injury potential. The results of these tests are promising and have demonstrated that potential improvements can be made in reducing the clinical severity of an impact to the head.
- 49. Early DIP concepts have also been produced in small numbers and an initial assessment of their ability to disseminate an effective and safe concentration of micronised irritant is very encouraging.

#### Remaining work

50. The AEP and DIP programmes both still have a significant number of issues to resolve, which are not without technical risk. The coming months will involve a large amount of detailed work to examine cartridge and weapon integration issues to ensure that accurate, consistent, effective and safe devices are produced. The development work will culminate in the production of technical drawing/data packs for a finalised design. This design will be medically assessed and the technical drawing/data packs will be used for a tender process to ensure that a cost-effective product is manufactured. The consistency of this final product with the design specifications will also be assessed (proof testing).

#### E. Programme Timescales

51. The programme for the development of the AEP and DIP is still somewhat fluid as there remains some research to be carried out on the concepts but the table presented below is the current best estimate of the timetable to complete the development to a point where these new technologies would be operationally available to police across the UK.



## COMMERCIAL OFF THE SHELF PRODUCT EVALUATIONS AND UPDATE

#### 12-Gauge Sock Round

#### **Assessment**

#### **Summary of Outcome**

On the basis of tests, the PSDB comparison of the attributes of the two systems, and a recognition borne of operational experience in the US that the bean bag class of projectiles frequently require multiple impacts to effect compliance, ACPO concluded that the 12-gauge sock round system did not meet their operational requirement as an alternative to conventional firearms. It had few benefits and many disadvantages over the currently deployed alternative, the L21A1 baton round.

#### Detail

- 2. The Steering Group identified a 12-gauge sock round as a weapon system that might meet ACPO's operational requirement as a less-lethal option in incidents where the threat of violence to the public and police officers could currently justify the use of conventional firearms.
- 3. The DSAC Sub-committee on the Medical Implications of Less-lethal Weapons (DOMILL) was requested to provide a statement on the medical implications of use of the 12-gauge sock round weapon system. Dstl Biomedical Sciences provided an outline technical plan to provide DOMILL with the technical information to underpin the proposed statement, and after endorsement, undertook a considerable body of work to fulfil this request. While tests were carried out on a specific version of the 12 gauge sock round this is not identified for commercial confidentiality reasons.
- 4. The work focussed on critical issues related to potentially life-threatening trauma:
  - a. Accuracy and consistency;
  - b. Skull fracture risk;
  - c. Non-penetrating (blunt) thoracic injury;
  - d. Perforation of the body wall of the torso.
- 5. The technical strategy was to compare the 12-gauge sock round in these respects to the currently available weapon system for public order use and as a less lethal alternative the L21A1 baton round. In the accuracy and consistency tests, the baton round was fired from the L104A1 gun, employing the L18A1 optical sight. The 12-gauge sock round was fired from a shotgun (18" barrel). For the remaining studies (b-d), the L21A1 was fired from a smooth-bored compressed air-gun.

#### Accuracy & consistency

- 6. This trial consisted of two phases:
  - (i) firings from a clamped weapon to assess velocity and ammunition consistency;
  - (ii) manned firings to determine the dispersion of the projectiles from the weapon systems in the hands of trained users. Accuracy of the 12-gauge sock round could not be precisely assessed because there was no formal zeroing procedure available for the 12-gauge system; an improvised zeroing procedure was used.

#### Clamped weapons

- 7. The pertinent features were:
  - Three examples of each weapon system; each type of ammunition from three manufacturing batches; temperature conditioned ammunition (21° C);
  - Velocity at muzzle and range; co-ordinates of impact recorded with respect to bore-sight;
  - Firings at 2 m, 5 m, 10 m, 25 m;
  - Ten rounds at each combination of weapon type, example, batch number and range.

#### Firings by trained personnel

- 8. A similar plan was employed, using three trained police firers. The impact co-ordinates were noted with regard to the aim point, and velocity was measured only at muzzle (although some limited data was acquired at other ranges). Firers were not permitted to alter their point of aim away from the designated point. The shotguns' sights were adjusted and classed as nominally zeroed. The L18A1 sights on the L104 gun were zeroed using a collimator.
- 9. The probabilities of impact to the head and chest from the L21A1 and 12-gauge sock round projectiles were calculated, employing data gathered from the manned firings. Estimates for two adult male statures were calculated average and small adult.
- 10. It was concluded from the tests that the 12-gauge sock round had a greater variability in velocity and fall of shot than the L21A1. Under the conditions employed in the tests, both projectiles had an extremely low probability of striking the head. The risk of impact to the chest was low for both projectiles. No further assessment of the risk of impact to vulnerable areas could be undertaken until a formal zeroing procedure had been devised for the 12-gauge sock round, weapon and sight. In simpler terms the 12 gauge sock round is inconsistent and inaccurate when compared to the L21A1.

#### Skull fracture risk

- 11. A particular area of the bovine (cow) scapula has similar thickness and break stress to the human skull (with the exception of the squamous temporal area), and can be used to model the fracture of the human skull to localised impacts. The model was used in the assessment of the L21A1 Baton Round. The scapulae (acquired from the meat trade) were supported in gelatin, with their upper layer covered with a 10 mm layer of gelatin and chamois leather.
- 12. The output of the model was Skull Fracture Index and Penetration Index. Fracture severity was assigned a number from a five point scale, and Penetration Index was assigned a description from a choice of four different conditions.

- 13. The principal variables in the experiments were projectile type and angle of incidence. The angles of incidence used were perpendicular (90 deg. to the model surface) and oblique (45 deg.). All firings were carried out at a range of 2 metres.
- 14. It was concluded from the trial data that with both perpendicular and oblique impact to the bovine scapula, both rounds would produce serious fractures to the skull at a range of 2 m. Extended ranges were not assessed. At 2 m, the L21A1 produced more serious fractures of the model than did the 12-gauge sock round, at both angles of incidence. However, the 12-gauge sock round resulted in a significantly greater incidence in the various degrees of penetration of the model compared to the L21A1, at oblique incidence.

#### Non-penetrating (blunt) thoracic injury

- 15. The Dstl Behind Armour Blunt Trauma (BABT) rig predicts the value of specific indices of motion of the lateral chest wall, following impact by short duration, high energy projectiles. The displacement/time profile of the simulated body wall was determined. The body wall velocity was calculated by differentiation of the displacement with respect to time. The rig is validated in terms of the peak body wall velocity; biological effects can be predicted from this index.
- 16. The response of the rig to the L21A1 and 12-gauge sock round projectiles was determined and compared. For the 12-gauge sock round firings, the BABT rig was located 2 m and 5 m from the end of the gun barrel. Due to the inconsistency of the 12-gauge sock round and the requirement to strike a small area on the model, the response to the range of velocities likely at 10 m and 25 m was determined by firing the rounds through polythene to reduce the velocity. The L21A1 velocity was varied by firing it from a smooth-bored air-gun, with adjustable driving pressure.
- 17. Rig wall displacement: The peak displacement of the rig wall with the L21A1 (32.3±1.8 mm) was statistically significantly greater than that with the 12-gauge sock round (16.1±2.3 mm). Thus, it was predicted that the peak localised displacement of the lateral chest wall would be twice as great with the L21A1. This has two implications:
  - The L21A1 is likely to inflict more notable visceral pain;
  - The incidence of injuries that result from body wall deflection, such as rib fracture, are likely to be more serious with the L21A1.
- 18. Rig wall velocity: The peak velocity of the rig wall arising from impact of the L21A1 was significantly greater than that of the 12-gauge sock round projectile. Overall, both peak wall velocities were relatively low (the impact velocities were 70-80 m/s, but the resulting body wall velocities were about 1/6th these speeds). The predicted lethalities of blunt chest trauma for both projectiles at 2 metres were less than 5% (the curve used to calculate lethality a "probit" curve relating peak wall velocity and probability of death has large errors at this low velocity extreme and cannot be used for more precise estimates).
- 19. It was concluded from these data that the L21A1 may result in more serious non-penetrating chest trauma than the 12-gauge sock round. The 12-gauge sock round will cause less abdominal wall deflection than the L21A1 and will therefore inflict less severe visceral pain. On the basis of this index, the 12-gauge sock round is less likely to be effective than the L21A1 following a single impact. This is reflected in operational use, where multiple impacts of the bean bag class of projectiles are normally required to induce compliance.

### Perforation of the body wall of the torso

20. Trials to assess the risk of perforation of the body wall comprised a comparison of 12-gauge sock round and L21A1 at a range of 2 m against the thoracic and abdominal wall of dead pigs (used for other experiments in Dstl). The L21A1 projectiles were fired from an air-gun, and were therefore unspun. A penetration is a defect in the skin, but no defect on the inner surface of the body wall; a perforation has a defect on the outer and inner surfaces of the body wall.

#### Model limitations

21. There is no validated model for the prediction of human torso body wall perforation by less-lethal projectiles. Limited models are available to predict the penetration of skin and subcutaneous tissues by metallic projectiles simulating anti-personnel projectiles, such as fragments and spheres<sup>5,6</sup>. These models also give some indication of the (significant) effects of clothing on the vulnerability of the skin to penetration. Although the pig may seem intuitively to represent humans of the same body weight, this assumption is not warranted. The pigs used in these experiments were employed to compare the penetration potential of the two projectiles and in that respect provide valid information. A 70 kg pig is not a mimic of a human of the same weight and therefore the absolute risk of penetration in a human cannot be determined from the pig cadaver data. It is indicative only; the limitation of models reinforces the requirements to collect and review operational data.

### Method

22. Six dead pigs ranging in weight from 67-94 kg were used - three males and three females. They were not clothed in any covering. 12-gauge sock round projectiles were propelled to the left side of each carcass; the L21A1 batons struck the right side. Impacts were on the thorax and abdomen. The total number of 12-gauge sock round rounds fired at the six pigs was 102 (70 to chest and 32 to abdomen); 101 L21A1 projectiles were fired (71 to chest; 30 to abdomen). An indicative index of perforation for a projectile is the impact energy divided by the contact area (Joules/mm²). For the L21A1, and assuming the contact diameter is 37 mm (but note that it is not a right cylinder), this index is 0.23 J/mm². The effective contact diameter for the deformable 12-gauge sock round was determined from the marks on the pig skin. The contact diameter was about 20 mm, resulting in an index of about 0.44 J/mm², indicating a greater potential for perforation at 2 m by the 12 gauge sock round.

### Results

- 23. Of the 102 12-gauge sock round rounds fired, 20 (19.6%) lacerated the skin, of which 12 (11.8% of the total rounds fired) were found embedded in the body wall. Of the twenty 12-gauge sock round rounds that penetrated the skin, eight projectiles (7.8%) perforated the body wall and entered the body cavity. These data may be split into chest and abdominal impacts: there were two chest and eight abdominal body wall perforations. The majority of the perforations were in a 70 kg female (two chest, four abdomen out of a total of 24 impacts to this carcass). The two remaining abdominal perforations were in a 67 kg female and 81 kg female. The internal injuries associated with the perforations were perforation of colonic wall with faecal spillage, a defect in the interventricular septum in the heart, splenic and liver laceration. By comparison, of 101 L21A1 projectiles, three lacerated the skin and embedded in the body wall. There were no body wall perforations with the L21A1.
- 24. It was concluded that at 2 m, the 12-gauge sock round had a greater risk of perforation of the body wall than the L21A1. When the 12-gauge sock round did not perforate, the non-penetrating trauma was generally similar in terms of the nature of the pathology to that from the L21A1, but the injuries from the 12-gauge sock round had a lower incidence.

<sup>5</sup> DiMaio VJ (1981). Penetration and perforation of skin by bullets and missiles. Am J Forensic Medicine and Pathology. Vol 2: No 2: 107-110.

<sup>6</sup> Sperrazza J, Kokinakis W (1968). Ballistic limits of tissue and clothing. Annals New York Academy of Sciences. Vol 152; 164-167.

- 25. Body wall perforation studies were only undertaken at 2 m range. The rationale for firing at this range only was that the variability of the 12-gauge sock round at 2 m velocity was so great and the reduction in mean velocity with range relatively small (data from the accuracy and consistency trials), that in a population of velocities at specific ranges up to 25 m, the 2 m data could encompass a significant proportion of individual shot velocities at extended range. Put simply, the 12-gauge sock round was so variable that it had a broad and overlapping spread of velocity at all operational ranges.
- 26. The 12-gauge sock round velocity from 1440 shots at ranges of 2 m, 5 m, 10 m and 25 m were available from the accuracy and consistency tests. There was considerable overlap in velocity, even between 2 m and 25 m data. Ninety seven percent of the 12-gauge sock round projectiles at 25 m, had velocities greater than the minimum velocity measured at 2 m. Thus, informed judgements can be made from data obtained at 2 m on the probability of particular events at greater ranges.
- 27. Fifty five percent of the velocities at 10 m were faster than the minimum perforation velocity observed. This value for 25 m was about 12%. At 5 m there was very little change from the distribution at 2 m.

The manufacturer of the 12 gauge sock round recommends the following deployment ranges:

- 0-10 feet (3.1 m): Do not deploy unless deadly force is warranted or officer or public safety is at immediate risk:
- 10-20 feet (3.1-6.1 m): Exercise caution and target only the lower extremities unless deadly force is warranted, or officer or public safety is at immediate risk;
- 20-30 feet (6.1-9.2 m): Deploy at lower extremities unless deadly force is warranted, or officer or public safety is at immediate risk;
- 30-60 feet (9.2-18.3 m): Deploy at upper abdomen or lower unless deadly force is warranted, or officer or public safety is at immediate risk;
- Beyond 60 feet (18.3 m): energy and accuracy may not be sufficient for deployment consideration.
- 28. The manufacturer's declared Optimum Deployment Range is c. 6-18 m. They recognise the injury potential to the torso at short range and state that at 6-9 m the projectile should strike the limbs, but from 9 m and beyond the lower abdomen may be targeted. On the basis of the Dstl pig data, there would still be a low risk of abdominal wall perforation in an unclothed subject at >9 m.
- 29. Dahlstrom *et al* used two pigs to define the penetration characteristics of the 12-gauge sock round projectile (operational velocity and higher velocities). The pigs weighed "about" 200 pounds (91 kg) and were at a range of 10 feet (3.1 m); sixteen shots were fired on each (eight chest, eight abdominal). The velocity of the 12-gauge sock round projectile was not measured in the experiments; it was predicted from separate shots using the various batches of ammunition.
- 30. None of the shots assumed to have velocities of 250 f.p.s. (76 m/s) or 300 f.p.s. (92 m/s) perforated the body wall and entered a body cavity (eight at each velocity). A high incidence of perforation was observed at 350 f.p.s. (107 m/s). The estimated  $V_{50}^8$  was 335 f.p.s. (102 m/s).
- 31. The velocity of the 12-gauge sock round at 5 m in the Dstl trials was 80.0±4.8 m/s (n=269; manned firings), with maximum velocity of 94.5 m/s. The largest animal used by Dstl was 94 kg, similar in weight to that used by Dahlstrom. For this animal, the impact velocities ranged from 76-91 m/s (mean 82 m/s); there were no perforations of the body wall from 18 shots. This is consistent with Dahlstrom's data.

<sup>7</sup> Dahlstrom DB, Powley KP, Fackler ML (2001). Drag-stabilized (bulb with tail) 12 gauge shotgun bean bag projectile. Wound Ballistic Review Vol 5, Issue 1, 8-12.

<sup>8</sup> The velocity resulting in a 50% probability of perforation.

32. A body mass of 91 kg used by Dahlstrom is not representative of the average body mass of UK adults. The pigs used in the Dstl studies were more representatives of male adult body weight, but nevertheless cannot be assumed to represent the properties of the human body wall.

### Conclusions:

33. There will be a risk (about 1 in 20 from the pig data) of abdominal perforation upon impact to the abdomen in unclothed targets by the 12-gauge sock round projectile at ranges considered to be within its normal operating range - beyond 6 m. The risk in humans cannot be determined quantitatively due to the lack of validated models.

### **Overall Conclusions:**

- 34. With respect to velocity and dispersion on a target (i.e. accuracy), the 12-gauge sock round was a significantly more variable weapon system than the L21A1.
- 35. Both projectiles will produce serious and life-threatening injury if they strike the head. The probability of striking the head was estimated to be extremely low for both projectiles which was in accordance with previous conclusions in 2001.
- 36. The probability of striking the upper torso (chest) was very low for both projectiles at ranges of 2 m, 5 m and 10 m. There were differences between the risk of chest impact by the two projectiles at 25 m, but these differences could not be clarified until a formal zeroing procedure for the 12-gauge sock round weapon system was devised. On the available data and trial design, the highest risk for the 12-gauge sock round was about 1 in 235.
- 37. The 12-gauge sock round projectile was predicted to result in less serious thoracic and abdominal non-penetrating trauma than the L21A1 the peak body wall displacement and peak velocity were lower. This prediction was supported by the nature and severity of the gross pathology observed in the trials to assess perforation frequency.
- 38. The reduced displacement of the body wall by the 12-gauge sock round implied that this projectile would be less capable of inflicting visceral (deep) pain than the L21A1, and would therefore be less effective for a single impact on the abdomen.
- 39. The incidence of perforation of the body wall by the 12-gauge sock round was greater than that of the L21A1 at 2 m. The incidence was not likely to change significantly at 5 m range. The incidence appeared to be dependent upon body mass as well as velocity most of the perforations were in a 70 kg unclothed female target. Should the 12-gauge sock round strike the abdomen, there was predicted to be a risk of about 1 in 20 of abdominal perforation in unclothed pigs by the 12-gauge sock round projectile at ranges considered to be within its normal operating range beyond 6 m.
- 40. Although the pig is not a validated model of the human with regard to body wall perforation or skin penetration by less-lethal projectiles, the frequency of perforation in animals of similar weight to humans should be regarded as indicating that there is a true risk.

### Review by PSDB

- 41. Subsequently, and on behalf of ACPO, PSDB compared the performance of the L21A1 and the 12-gauge sock round against the ACPO operational requirements. The review concluded that:
  - Both rounds had acceptable accuracy out to 20 m;
  - The L21A1 and 12-gauge sock round both used pain compliance to achieve the intended outcome;
  - The L21A1 was more likely to be effective after one impact;
  - The 12-gauge sock round had a multi-shot capability and was more likely to require more than one impact to achieve compliance;
  - The 12-gauge sock round was more likely to cause a penetrating/perforating injury than the L21A1 under the current guidelines for use;
  - Both rounds would cause a serious injury if they struck the head;
  - The 12-gauge sock round was unlikely to ricochet; the L21A1 could in certain circumstances ricochet once with great energy, but would lose most of that energy on the second ricochet.

### **Outcome**

42. As a result of the decision by ACPO not to take forward the 12-gauge sock round, DOMILL did not produce an independent statement on the medical implications of its potential use.

### THE MANAGEMENT OF CONFLICT

### **Nothing Happened?**

## Extracts from an Independent report on public order in Northern Ireland in summer 2003

- 1. In the spring of 2003 in support of the work of the research programme into alternative policing approaches towards the management of conflict the Policing Board asked for research to be undertaken in regard to the dynamics of crowds. This work built on the phase 3 report into alternative policing approaches towards the management of conflict. It followed the specific suggestion for further scrutiny set out on page 34 of that report which referred also to published research in America in 2001 on the same subject. The report was commissioned from Dr Neil Jarman in Belfast. The full report runs to some sixty pages and it is not practical to reproduce it in full here. However, with the author's permission, the following sections have been included, without any editing. (The sections omitted are largely the chapters describing events from which the author derives his conclusions.)
- 2. The author entitled the report "Nothing Happened? A Review of Public Order during the Summer of 2003". The author noted in Chapter One, Introduction, the wording of Recommendation 70 of the Patten Report. The chapter continued:

### "This stated that:

"The police should be equipped with a broader range of public order equipment than the RUC currently possess, so that a commander has a number of options at his/her disposal which might reduce reliance on, or defer resort to, the PBR."

Although a strict adherence to the wording of this recommendation would focus on the literal meaning of 'public order equipment', and would thus emphasise the need for alternative technologies of less lethal force, the second part of the recommendation emphasises the need for a variety of options which might reduce or defer the use of PBRs. From this we might infer that Patten was urging consideration of a different approach to public order policing, so that the use of force, in any form, was less likely. This is indeed evident from the section of chapter 9, entitled 'Public order partnerships', a title which also implies a non-traditional approach to the policing of crowd events...

...This type of approach demands a much broader interpretation of the meaning of 'public order equipment' than is currently accepted, and requires that this be extended beyond the 'hard' technologies of weaponry systems and projectiles to include a variety of softer technologies (which might only be considered 'technologies' in a very broad sense) such as planning, strategy and training and which help avoid the use of 'hard' technologies.

This broad view would in fact sit comfortably within the overall philosophy of the Patten Report with its emphasis of policing with the community in which the police are but one actor among many working together to maintain the peace.

This view has been acknowledged in the Third Report of the Working Group, which states that seeking alternative approaches to managing conflict 'encompasses other less tangible areas such as Policing with the Community, Conflict Resolution and Community Safety' (p11) and later continues:

Conflict management is the avoidance of violence and unnecessary use of force through the efficient guidance of conflicts on one hand and effective handling of public gatherings ... on the other. Prevention is a part of Conflict Management. (p12).

Between 1998 and 2000 police officers from the RUC were part of a research and development project involving members of the Belgian Gendarmerie and the South African Police Service. This project explored how the principles and approaches of community policing might be used as the basis for a new approach to public order policing and one that would reduce the need for the use of force by managing public events by working with a wide range of partners and over a longer period of time.

In many ways the theoretical approach developed by the Belgian Gendarmerie which is based on a four-point model of Provention, Prevention, De-escalation and The Police as a Learning Organisation (and described in some detail in the Third Report) is far more suitable to the situation faced by the police in Northern Ireland, than it is to situation faced by other police organisations. This is because the cyclical nature of the marching season and its attendant need for public order policing should be suited to the developmental, incremental and culminative approach advocated by the model.

However the situation in Northern Ireland is also complicated by at times the slow moving dynamics of the political situation and by the continued status of policing as a significant factor in the political process. Policing practice is thus forced to continue to develop in situations where full and open engagement with all sections of the community is not yet possible. This has not prevented the PSNI from developing new approaches to policing, but it does mean that on one hand the potential for exploring how effective and wide ranging partnerships might work have been constrained and on the other hand it has perhaps muted constructive criticism of the way policing by the PSNI has been developed and restricted the emergence of more radical approaches to policing with the community.

Despite the reforms to policing and changes in approach to the management of public events the increase in tension during the marching season has been a persistent and challenging problem. However, the scale of disorder has varied considerably in different years. In part this is due to the close relationship between political developments and street politics, but in part this has been linked to changes and developments in the management of public order and the policing of public events over recent years. The summer of 2003 was by common consent the quietest marching season since the current cycle of disorder erupted in 1996.

This report was commissioned to examine some of the reasons for the variables in the scale of violence and public disorder associated with the marching season. It is important to note the association with the marching season as public order has become virtually synonymous with the policing of parades over recent years. However, public order policing incorporates a much wider sphere of activity in Northern Ireland, as in any other jurisdiction, than managing parades. The PSNI are regularly responsible for the management of public order in a number of other contexts, in particular the policing of the night-time economy of many towns and cities, protest demonstrations, football matches and other sporting events. While the policing of such situations has not created any great controversy, they have provided the police with an opportunity to refine and expand their range of approaches to crowd management.

The aim of this research was to focus on two specific aspects of the management of historically contentious public events: the role of the crowd, and the benefits of more inclusive approaches to policing public events. As such it aims to build upon a report by the Human Effects Advisory Panel into crowd behaviour and crowd control (HEAP 2001). This work, summarised in chapter 3 of the Third Phase Report also recommended that crowd behaviour was an area worthy of further scrutiny within the Northern Ireland context.

Perhaps surprisingly, in spite of the amount of attention that has been paid to the recent public disorder across Northern Ireland, there has been little attention paid to the micro-dynamics of the crowds that come onto the streets to support or protest at contentious events or who cause disorder at interfaces. The research was intended to address a number of questions about riots and disorderly crowds. These included:

- (1) What is the make up of the crowd, what is their age and gender breakdown?
- (2) Are the crowds organised in any way either to impose constraints on violence or to facilitate disorder?
- (3) What causes a peaceful crowd to turn into a disorderly crowd? What role do police actions play in precipitating disorder, what roles do community leaders play in precipitating disorder?
- (4) When and where do riots occur? Are there differences between disorderly crowds and crowd events in Belfast and elsewhere?
- (5) What is the context of disorderly crowds: are they inter-communal, anti-police or are other factors more significant?
- (6) Do alcohol and/or drugs play a role in crowd disorder?
- (7) What makes the disorder stop?

The ability to answer such questions is however, always contingent upon the nature of the events that unfold. If disorder does break out then the research can indeed focus on exploring the questions identified above. But if events remain peaceful, very different questions become pertinent. The experience of recent years suggests that a peaceful marching season requires considerable work and this involves a wide range of groups and organisations. The question of 'why did violence not break out?' is therefore equally significant for those involved in the preparation and planning of event management.

The research was thus also interested in number of broader questions about the potential for the control of crowds and reduction of crowd violence. These included:

- (1) What can the police do to reduce the potential for violence and disorder?
- (2) What improvements could be made in the policing of potential disorderly situations?
- (3) What is the scope and potential for community based organisations to reduce the potential for disorder?

The next section of the report is based on observation at a number of key events over the summer of 2003. The events that were attended were chosen either because they had had a recent history of disorder or because they had the potential for disorder. The focus in this section is on what happened, who was involved and what can be learned. This is not to deny the importance of, or potential for, other types of public disorder in Northern Ireland, but rather that over the past decade disorder has been most frequently associated with set piece events such as parades, or in fixed locations such as interfaces. Such potential flashpoints are easier to study as they are either annual events or disorder occurs with some repetition. Disorder at one-off events is by its very nature more difficult to predict and thus study.

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### Chapter Three

### The Dynamics of Crowds

The introduction set down a number of questions about the crowd make up and dynamics that the research would aim to address. Many of the questions have been touched on in the previous review of the main events, while this section provides a brief summary reflection on each of the specific questions.

The disputes over parades are related to the segregated nature of Northern Irish society and much of the disorder, or potential for disorder, has occurred in the interface areas where Protestant / unionist residential areas meet Catholic / nationalist residential areas. But parade-related disorder is not the only form of public disorder in such areas as over recent years interface violence has become a significant problem in its own right (Jarman 2002a).

Parts of North and East Belfast have experienced numerous outbursts of rioting and disorder, which is partially a result of the tensions raised by the parades but which is in part sustained by local dynamics. This recurrent and persistent disorder is often locally referred to as 'recreational rioting' (Jarman and O'Halloran 1999) and while the flippancy of the term disguises the seriousness of the activity, it does nevertheless offer an indication of the way that collective street violence is viewed by some people.

These reflections are largely drawn from the observations at parade related crowd events over the summer of 2003, however the author has been observing at a wide variety of public events across Northern Ireland for a number of years and this experience will also be used to provide some further context.

### What is the make up of the crowd, their age and gender breakdown?

In all of the larger events attended during the summer the crowds were predominately made up of adults males, they were largely aged between the early twenties and late forties. However, there were a small percentage of adult females in the same age range at all of the events and smaller number of younger males. In most cases the majority of the crowd comes from neighbouring areas, rather than travelling any great distance, although some people would be mobilised from further afield. This local base means that the size and scale of a crowd can ebb and flow over the duration of an event and that people may also come out onto the street at short notice without necessarily being formally organised or mobilised.

While adult males are the most prominent grouping, young male children and youths are also frequently prominent at such events. In the case of one event in East Belfast young male children were the only presence from the Short Strand as a loyal order parade passed, while at the Whiterock parade it was young boys who were responsible for throwing missiles at the police. Anecdotal evidence from numerous interface areas over recent years indicates that young children can play a prominent role in both recreational rioting and in sustaining hostilities between neighbouring communities. In some areas children of primary school age have been involved in initiating disorder in exchanges with children of a similar age from a neighbouring community. During one period of recurrent disorder on the Limestone Road area of North Belfast the police felt a need to be present at the interface as children left the local primary school each afternoon. In many interface areas considerable effort goes into keeping children away from interfaces over the summer months and in creating diversionary activities to reduce outbreaks of disorder.

## Are the crowds organised in any way – either to impose constraints on violence or to facilitate disorder?

There was clear evidence at all of the observed events of active organisation from within the people on the ground or from within the local communities to try to prevent any disorder from occurring. The form of the organisation ranged from seemingly informal structures whereby individuals were not physically identified, as stewards or similar, but were clearly known by local people (Tour of the North), to more formal processes of identifying those responsible for stewarding a crowd (Whiterock) or marshalling a parade (Derry/Londonderry).

The attempts to organise and manage behaviour include the work of a diverse range of organisations. These include:

- Political Parties and Movements: Sinn Fein and the members of the wider republican movement have often played a prominent role in ensuring crowds were appropriately stewarded. In unionist areas Progressive Unionist Party politicians and activists have similarly frequently been involved in trying to constrain behaviour. The Ulster Political Research Group were also involved in crowd management and intervention work over the summer of 2003 through the mobilisation of activists within the Protestant Interface Network.
- Event Organisers: the marshalling of parades has developed into a more effective contribution in recent years in large part due to a training programme established in 2000. The Apprentice Boys of Derry currently have the most effective network of trained marshals (Bryan and Jarman 1999). The Patten Report recognised the value of such work and recommended that marshal training be further developed and that the provision of trained marshals become a condition of all cases where the Parades Commission issues a determination (Recommendation 68). A review of the current training provision will be carried out early in 2004.
- Community Networks: informal community networks have played a prominent role in attempts to reduce or constrain disorder at interface areas over recent years (Jarman 1999, 2002b). Many such groups have utilised mobile phones to link activists into networks that connect both members of the same community and provide communication with actors from the other side. The PSNI also frequently link into such networks at some level (Hamilton 2002).
- Third Party Monitoring: Since July 2002 Mediation Northern Ireland have co-ordinated a network
  of non-aligned monitors to provide support to peace building and conflict intervention work. The
  monitors have been most extensively utilised in support work in the East Belfast interface areas,
  but they have also more recently been involved in monitoring in Antrim. In Lurgan a Community
  Safety Group was established in 2003 to monitor the patterns of behaviour at contested parades in
  the town.
- Human Rights Monitors: The Committee on the Administration of Justice was the first group to be involved in monitoring at the recent parade disputes. Between 1996 and 1999 they monitored police activity at numerous contentious parades (CAJ 1996, 1997). Other human rights groups, including Amnesty International, Human Rights Watch the Pat Finucane Centre and a number of international monitoring groups, also focused on the policing of such events (Human Rights Watch 1997; Pat Finucane Centre 1996; Peace Watch Ireland 1997; Irish Parades Emergency Committee 2002). This activity has declined in recent years but some international monitors were present at parades in Belfast over the summer.

## What causes a peaceful crowd to turn into a disorderly crowd? What role do police actions play in precipitating disorder, what roles do community leaders play in precipitating disorder?

This question cannot be answered from the observations of last summer. Previous experience from observation at a range of events over the past several years would suggest that there are a large number of factors that can provoke a crowd to disorder. These would include:

- the close proximity of members of opposing communities or organisations in which exchanges of abuse can lead to exchanges of missiles and more serious violence;
- the actions of the police in imposing a constraint on one group or in attempting to move people against their will;
- the presence of the police at a contentious location over a sustained period of time;
- the delayed or slow departure of the security forces following a protest;
- the arrival of new actors on the scene of a protest or stand-off.

In previous years a police presence or activity has readily provoked a hostile response from members of a crowd, but through the summer of 2003 the police presence at potentially contentious events was deliberately low key. Police officers and vehicles generally moved into place at the last minute and departed as soon as possible and the use of full riot gear was kept to a minimum. There were a number of potential flashpoints at the different events when missiles were thrown at rival crowds or at the police, which could have erupted into disorder if the other side had responded aggressively or if the police had intervened. But this did not happen and the flashpoint passed without developing. Police intelligence and dialogue (either direct or indirect) with key parties were undoubtedly key factors in encouraging the police to take a more discrete approach.

For the parades in Portadown and Derry/Londonderry the police had good indications of the attitudes of the two main parties and were satisfied that they could reduce the security presence without threatening their ability to maintain public order. Similarly in regard to the Whiterock parade the police were able to maintain a lower key presence than in previous years because discussion with key parties had indicated that the agreement was reached in good faith and would be adhered to. In North and East Belfast the police maintained a significant presence for the first contentious parades, the Tour of the North and the Somme parade respectively, but thereafter steadily reduced the number of officers and vehicles they deployed for the later events.

Community leaders and community activists have demonstrated that they can similarly play a variety of roles. They can actively work to prevent disorder, they can be actively involved in provoking disorder or they can stand to one side and take no action. It is difficult to determine if and how community leaders are actively involved in encouraging disorder as this rarely takes place in public. More frequently they have publicly stated that they were unable to intervene to any effect because of 'public anger'. It is also important to note that there are different levels of leadership on the streets and it is important to have the appropriate people working to maintain order. It is also clear that effective leadership in restraining crowds is often visible leadership; the lack of a visible presence can therefore be as significant as an actual visible presence. During the summer of 2003 community leaders from all sections of both main communities appeared to work visibly and positively to ensure the minimal opportunity for disorder. This approach also appeared to be an effective contribution to the quiet summer.

## When and where do riots occur? Are there differences between disorderly crowds and crowd events in Belfast and elsewhere?

As has been noted, no serious trouble occurred during the period of this research. In previous years the two most problematic areas have been the numerous interface areas of North and East Belfast and contentious parades in Portadown, Belfast and Derry/Londonderry. Popular wisdom would suggest that most riots and cases of crowd disorder occur during the summer marching season but previously published research (Jarman 2002a) would suggest that public disorder occurs throughout the year in some flashpoint areas. The dispute over Holy Cross for example ran through the Autumn of 2001.

Unfortunately the PSNI do not collect or hold statistics on the number, location or date of riots or other cases of serious disorder so it is difficult to provide any longitudinal data or analysis.

I have been able to gather some data on disorder in North Belfast from officers in the District Command Unit. These reveal the figures for riots and disturbances in key interface areas between 1996 and 2001 (Table 3.1). In a recent interview with senior officers from the North Belfast DCU they stated that there had been 174 cases of riot between June 2001 and June 2002 and 28 riots between June 2002 and June 2003. There has been one case of riot since October 2002.

On the basis of the current research it is no possible to indicate any differences between disorder in Belfast and other locations.

	1996	1997	1998	1999	2000	2001	Total
СРА	N/a	0	1	4	0/47	2/88	7/135
Alliance	N/a	0	2	1	0/32	0/39	3/71
Torrens	N/a	0	0	1	0/124	2/44	3/168
Westland	N/a	5	8	4	0/52	0/14	17/68
Duncairn	17	37	9	8	0/28	2/27	71/55
Limestone	44	21	20	51	0/39	43/51	189/90
Whitewell	29	10	27	17	0/42	10/65	93/107
Total	90	73	67	86	0/364	69/328	383/694

Note: For 2000/2001 the PSNI provided separate categories of riot and disturbances. The first figure is for cases of riot the second for cases of disturbance.

## What is the context of disorderly crowds: are they inter-communal, anti-police or are other factors more significant?

The disorder in Northern Ireland in recent years has largely involved the police and members of one of the two main communities. In some cases the police have clearly been the target of the violence; in other cases the police have been a surrogate target, chosen because of the inability of the disorderly crowd to confront the primary target of their hostility.

In the early phase of the current cycle of parade disputes (1995-1998), the police were often the direct target of protesters in a number of prominent locations, notably at events on the Lower Ormeau Road in Belfast, at Drumcree and in Derry/Londonderry. One reason was the fact that at this time the police had responsibility to impose a range of restrictions on events and the use of force was aimed at getting the police to change their original decision. This was most effectively achieved at Drumcree in 1996. However since 1998 the Parades Commission have made such determinations and the police have simply enforced them. Since this time there has been little attempt to target the police in opposition to a determination by the Parades Commission.

The reform of the police service has also contributed to this shift away from direct aggression towards the police in some areas, although in some recent particularly contentious situation such as in East Belfast and in relation to the Holy Cross dispute, the police have been the primary target of violence.

There have probably been few occasions in recent years when there has been a sustained and riotous direct confrontation between members of the two main communities without any police involvement. Anecdotal evidence suggests that recreational rioting and the early phases of interface disorder, before the police had been able to intervene, would the primary source of this form of violence.

### Do alcohol and/or drugs play a role in crowd disorder?

Alcohol was not a prominent presence at any of the events I attended during the summer of 2003. However, it has been a significant factor at a number of events that I have observed in previous years and which have ended in violence and disorder. Not only does the alcohol have an impact on people's behaviour, but the bottle and cans can and do serve as effective missiles.

The role of alcohol has long been acknowledged as a contributory factor in disorder in Northern Ireland, the public order legislation was amended in 1997 to increase police powers with regard to the control of alcohol at parades and this issue was also addressed in the 1998 Public Processions Act. However, as noted in the Quigley review of the Parades Commission (2002:258-259) alcohol remains a significant factor at many public events and Quigley argued that the current legislation is either insufficient, ineffective or under-enforced.

There have been few sustained attempts to reduce the consumption of alcohol at parades or to reduce disorder. Three examples are worth noting however.

- Significant attempts have been made over several years in Derry/Londonderry to limit access to alcohol and reduce on-street drinking around the Apprentice Boys two main parades. This has been a factor in ongoing attempts to improve behaviour during the events;
- Second the police were permitted to enforce the closure of the Cavehill Inn in North Belfast on the occasion of a Rangers-Celtic match in December 2002 because of trouble caused by the clientele related to previous Old Firm matches;
- The third example has been the Get Home Safe campaign involving the police, publicans and numerous other agencies and aimed at reducing low-level disorder in South Belfast as the bars close.

These are three limited initiatives however and alcohol remains a significant factor in influencing the atmosphere at many major public events.

### What makes the disorder stop?

A number of factors can influence the ending of periods of public disorder. In recent years I have witnessed the following:

- clashes between protesters and the police on Springfield Road coming to an end as a result of a torrential downpour of rain;
- attacks by nationalist youths on the police in Derry ending at 5pm promptly as, according to one local person, the rioters went home for their tea;
- persistent disorder and abuse at a police line at a band parade in Downpatrick ending with the intervention of a local 'community leader';
- on a number of occasions the police appear to have been prepared to allow attacks on their officers to continue until the rioters ran out of steam;
- in some cases the disorder has been allowed to continue until the number of rioters dropped to sufficient levels such that the police were able to disperse them by moving forward in a line.

• • •

Chapter Five

### Conclusions

The foregoing sections have illustrated that the relatively peaceful summer of 2003 was due to a variety of actions and approaches involving a wide range of organisations working at a number of different levels. The peaceful summer in which 'nothing happened' was not a chance occurrence, nor a result of good fortune, but was a result of considerable work by a wide range of people at a number of different events and locations over a sustained period of time.

It is broadly agreed that all of the key political, paramilitary and community actors wanted the 2003 marching season to be peaceful and that this desire was broadly disseminated within and between the relevant communities in the run up to the marching season.

Furthermore this desire for a peaceful summer was also translated into action on the ground by a broad range of organisations. Community networks mobilised to respond to potential disorder at interfaces; protests over parades were well stewarded and protesters kept informed of intentions and unfolding events; the parades themselves were well marshalled and largely well ordered; and a diverse range of monitoring groups were mobilised to support the work of other groups and to improve communication between key parties.

The PSNI also played their part in continuing their revisions to their approaches to the management of public order. There was a greater willingness to work in partnership with community-based groups and to share strategies for event management; there was a more sensitive deployment of police officers and vehicles on the ground; and a greater willingness to stand back and let partner groups intervene at potential flashpoint incidents.

This last point is worth re-iterating, at each of the main events there were minor incidents of missile throwing, verbal abuse, taunts and other things, both towards the police or towards the opposing group, whether paraders or protesters, that could have sparked a response from within the target group, which in turn could have escalated a situation and provoked violence. The missile-throwing incident at the Tour of the North could have provoked a hostile response from nationalists if the crowd were not well

organised and stewarded. If the police had not been willing to support and facilitate the agreement for a protest at the Whiterock parade they could have faced a more hostile protest. In both cases this could have set the scene for a very different, and more confrontational summer. In the end the summer resulted in a relatively minor number of incidents, with few outbreaks of violence while no baton rounds were fired by the police.

Some PSNI officers also feel that the quiet summer was in part due to other initiatives that had been put in place over the previous year, including the erection of CCTV cameras at key interfaces, the more sophisticated use of video for evidence gathering and a greater willingness to prosecute people involved in public disorder. These may well have contributed to the situation, although many within the nationalist community are sceptical about the use of CCTV and the lenient sentences for those charged with rioting at Drumcree in 2002 may undermine the deterrent effect of criminal proceedings.

Ultimately it is impossible to fully evaluate the relative merits of all or any of these activities based on one summer. At this stage it is impossible to judge whether the quiet summer of 2003 is the start of a new cycle in which protests against parades are peaceful, well ordered and are more sensitive to the local context and in which more established and mutually respectful relationships are build between the police and local communities. Or whether the summer of 2003 was an aberrant year. Policing opinion was varied. For example, one senior officer thought that levels of violence fluctuated in five years cycles, another thought that serious organised riots only occurred once every two years. These questions will only be answered in time.

Nevertheless there are a number of actions that could be initiated that could contribute to building on the summer of 2003:

- The PSNI should review the range of approaches to event management from within different DCUs to ensure that best practice is widely disseminated and built upon, both between DCUs and within DCUs. My impression from the work on this study is that most emphasis has been given to developing proventative and preventative strategies, policies and procedures, and there is a need to ensure that equal weight is given to ensuring the PSNI increases its capacity as a learning organisation.
- There now seems to be general acknowledgement of the value of having a diverse range of community-based initiatives working in the realm of managing public order. However, one recurrent complaint from within this sector has been the lack of funding to support and help develop such initiatives, which overwhelmingly rely on volunteers and good-will. The Patten Report recommended that DPPs should have the capacity to provide financial support to improve local policing (Recommendation 32). This recommendation has not been implemented, but the Policing Board might usefully explore how such localised 'policing' initiatives might be encouraged and funded in the future.
- I have already noted the current lack of police data on public disorder in Northern Ireland. A more structured recording and collating process on outbreak of disorder and riots would allow for a more detailed analysis of trends and developments than is possible at present.
- The police are also exploring other options for public order management including the use of CCTV and prosecutions. However there has been no formal evaluation of the use of CCTVs to indicate whether they have a significant impact or whether they displace activity to other locations. Nor has there been any analysis of the prosecution process for public order offences, for example no-one

- could tell me why it takes over a year to bring people to court for trial or why sentences for public disorder in Northern Ireland are so different from recent cases in England and Wales. Research and evaluation of these activities should be considered a priority.
- The Third Phase Report noted that there had been no sustained research 'over time' into public disorder in interface situations in Northern Ireland and felt that this would be an area that would repay further scrutiny. This report is the first step in carrying out such research. The findings presented here are thus an initial attempt to address this current gap in our research and knowledge on crowd behaviour and disorder in Northern Ireland."

## THE INTERNATIONAL CONTEXT

### A. The International Law Enforcement Forum

- 1. The phase 3 report provided a summary of the work being conducted under the auspices of the International Law Enforcement Forum hosted by Pennsylvania State University (October 2002). The link with Penn State can be traced back to a visit of the Patten Commission to the Institute for Non-Lethal Defense Technologies at the University which was referenced in the report of the Commission in which they commended the University's work in relation to less lethal weapons. The closer ties that have subsequently been forged by Steering Group members with Penn State have provided an opportunity for subject matter experts in areas of policy, operations, technical and medical effects, to jointly consider issues of requirement, effectiveness and acceptability of less lethal technologies and their application. It was as a result of this interaction that the International Law Enforcement Forum (ILEF) on Minimal Force Options and issues associated with Less Lethal Options was established.
- 2. A summary of the 2002 ILEF forum was provided in the phase 3 report (pages 28 onwards) and subsequently published on the internet see: http://www.nldt.org/publications.php
- 3. One of the conclusions of the 2002 ILEF meeting was that there was a need to "establish a small core group that puts numbers to measurable parameters that define our operational needs." The intention was to develop an internationalised operational requirement which could better inform policy and technical development in this area and also provide manufacturers with a clear statement of operational need. There was also a recognition that the UK ACPO operational requirement, published in the phase 2 report in November 2001, provided a beginning on which the group could build.
- 4. It would be a small group, with funding, and a charter to describe a certain number of quantifiable requirements.
- 5. In furtherance of this recommendation a group of 14 practitioners drawn from across the United States, Canada and the UK formed in 2003 an Electronic Operational Requirements Group, utilising an internet based process, hosted and moderated by Penn State with the assistance of a UK adviser.
- 6. This electronic workshop has permitted the individuals to participate in an in-depth study without severely impacting personal schedules or finances. An established technique was used whereby delegates were requested to respond to a set of open questions. The responses were then collated by the moderators and reissued for further clarification.
- 7. The group's findings thus far will be presented at the 3rd International Law Enforcement Forum which will on this occasion be held in England on 3 and 4 February 2004.
- 8. The third International Law Enforcement Forum will be hosted and facilitated by the Police Scientific Development Branch and attendance has been broadened to include members from across Europe and further abroad.
- 9. The first two days will as in previous years comprise a series of keynote presentations and updates on international developments and on work taken forward collaboratively in respect of the recommendations of last year's report. These will also include international work on the establishment of

- databases and research into medical outcomes. There will also be several workshops designed to examine in detail key questions which have arisen during the year. It is planned, as with the 2002 meeting, to publish a report on the discussions in due course.
- 10. This year a third day will be added to the event and will take the form of an information sharing and consultation day. The event will be held at a location in London on 5 February 2004 so as to permit maximum attendance by a wide range of interest groups including professional bodies (law, medicine, and policy makers and police staff associations), non-government organisations and human rights groups. The focus of the day will be on what should be the response of Governments and Law Enforcement Officials to Article 2 of the United Nations Basic Principles on the use of Force and Firearms, which states that:

'Governments and law enforcement agencies should develop a range of means as broad as possible and equip law enforcement officials with various types of weapons and ammunition that would allow for a differentiated use of force and firearms.'

### B. Use of Less Lethal Technologies in the International Context

- 11. Of course, the PSNI is not the only police force to have to deal with major public order situations. The phase 2 and 3 reports detailed a number of instances of serious public disorder, several of them overseas. Since then there have been numerous reports of other countries' experience of serious and localised public disorder that have resulted in the use of crowd control measures by the police and security forces. Some examples, (drawn from police and press reports) are set out below:
  - (a) 1 April 2002: Prince George's County, Maryland Police Department utilised the FN 303 to assist them in quelling a riot at the University of Maryland. The engagement distances between the officer and subject ranged from 10 feet to 102 yards, with the average range of about 25 feet. Between 130-132 subjects that were throwing bottles/bricks were struck by FN 303 projectiles. There were no reports of injury from any of the 130 plus subjects struck by FN 303 projectiles. The FN303 is a Belgian made weapon which fires 17 millimetre rounds which can contain a variety of irritant substances.
  - (b) 1 January 2003 Alameda County, CA Sheriff's Department assisted Oakland Police Department in quelling a riot after the 2003 Super Bowl game. The FN 303 was deployed on 60-70 rioters who were setting fires and breaking windows. The engagement distances between the officers and rioter have been reported as ranging from 15 feet to 65 yards. There were no reports of injuries from persons struck by FN 303 projectiles.
  - (c) 18 February 2003 Colorado Springs police used riot gear and 'tear' gas to disperse participants as the demonstration was winding down. It was estimated that least 3,000 people from around Colorado rallied in Palmer Park to protest a likely war with Iraq.
  - (d) 7 April 2003 An anti-war demonstration at the Port of Oakland resulted in Oakland Police using a variety of less lethal weapons, these included firing with wooden dowels, baton rounds, bean bags, sting balls, concussion grenades, CS grenades and other less lethal weapons when protesters at the gates of two shipping lines refused an order to disperse.

- (e) As international leaders were meeting in Evian the Group of Eight (G8) on Sunday 1st June 2003 protests erupted into violence. It was reported that approximately 50,000 people gathered for a generally peaceful protest on Sunday, arguing that the world's richest nations were doing nothing to help the poorest.
  - But violence broke out in Geneva as masked rioters destroyed and looted shops and police used tear gas and water cannon to clear the streets. The violence which occurred on the first day of the G8 meeting on Sunday was not repeated on Monday.
- (f) 21 November 2003 Miami, Florida police used baton, pepper spray and tear gas to push back protesters near the site of international talks aimed at creating a free-trade zone spanning the Western Hemisphere. 74 people were arrested and 42 protestors were injured, including 10 who had to be hospitalised. Three police officers were also slightly injured. Many of the protesters wore gas masks and bandannas to protect themselves from the gas. At least one canister of pepper spray was thrown back at police. Backed by armoured personnel carriers, officers in riot gear pushed demonstrators about 300 yards away from the Bayfront Park Ampitheater.
  - Protesters hurled rocks, set blazes and fired slingshots. Riot police used rubber bullets, long batons, concussion grenades and stun guns to push back the demonstrators.
- (g) Amnesty International published a report entitled "The Pain Merchants" on 2 December 2003.

# THE INTRODUCTION OF NEW WATER CANNON TO THE POLICE SERVICE OF NORTHERN IRELAND

### **Introduction and Historical Context**

- For the past five years the police service in Northern Ireland has had vehicle-mounted water cannons available as a tactical option for the policing of disorder but the use of water cannon in Northern Ireland is not entirely a new concept.
- The adjacent article from the Newsletter of 13th October 1969 reports
  the use of water hoses on rival mobs in Belfast in the early 1860's.
  Historically the police in Northern Ireland have used water cannon
  vehicles as early as October 1964.
- In the early 1960s, the police, in preparation for the growing civil unrest in Northern Ireland, used a modified Austin Fire Tender as a water cannon. The vehicle had been obtained from the National Fire Service and modified for public order duties by mounting two water monitors on the roof. A rudimentary wire cage protected the cannon operators from missiles. The earliest recorded use of this type of vehicle was on the 1st October 1964 when it was used during the Divis Street riots in Belfast.

### Water cannon

. SIR - Yes, it was indeed Captain Shaw, from Cork, the "Captain Shaw" of "Iolanthe" who proved that the fire hose was mighter than the baton when he was superintendent of the Belfast Borough Police and also the Fire Brugade at the beginning of the 1860.

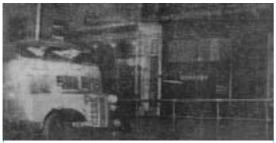
There is little doubt the

There is fittle deam the rival faction righting moles who took to the streets in those days were interrupting the five fighting operations, so Shaw ordered his firemen to turn their "cool cascade" on the rioters.

He later became Chief of the London Fire Brigade and one of the top bruss of the fire engineering world and being a favourite of Queen Victoria was elevated to the baronetage -- Yours &c., (TOLIN JOHNSTON ROBE,

COLIN JOHNSTON ROBB Battynahuselt

Newsletter 13 October 1969.



Modified Austin Fire Tender - Divis Street, Belfast 2 October 1964 (Photo: Police Museum)

4. The Austin water cannon ended its service around 1966 when a small number of Commer Armoured Personnel Carriers, which were already in police service, were modified as vehicle-mounted water cannon. The vehicles were fitted with two water tanks, two Coventry Climax water pumps and two monitors. Again the cannon operators were exposed with only a wire cage for protection, however the rest of the crew had some protection afforded by steel plating.



Modified Austin Fire Tender - (Photo: Police Museum)



Water Cannon vehicle based on modified Commer Armoured Personnel Carrier - 1968 (Photo: Police Museum)

In 1969 some of the Commer water cannon vehicles were operated by the military and saw action mainly in Londonderry. Generally the water cannons of the day were considered cumbersome and ineffective. The water cannon in the adjacent picture seem to be having little effect on the crowd. Vehicle and water pump technology limited manoeuvrability, water capacity and pressure output. These water cannons were based on existing vehicles which were modified 'in-house' and were not specifically designed as water cannons. It is believed that water cannon, as a public order option, were abandoned around 1971. However, the concept of water cannon to assist in the policing of disorder had been firmly established.



Commer Water Cannon - December 1968 (Photo PSNI)

### **New Technology**

- 6. The constant drive to improve fire-fighting capability has led to significant advances in vehicle and water pump technology. Specialist fire-fighting vehicle manufacturers around the world are constantly developing this technology to improve effectiveness. A natural spin-off in this field has been the development of vehicle-mounted water cannons for use by law enforcement agencies, particularly in Europe. The French, German, Belgian, Swiss, Italian and Singapore police all have water cannons available whilst other countries are actively seeking out manufacturers.
- 7. In the late 1980's the Belgian Gendarmerie (now the Belgian Federal Police) placed an order with a local manufacturer of fire-fighting vehicles for eighteen water cannons. Working with the manufacturer the Gendarmerie developed a modern and effective specification and over the following years the vehicles were delivered. The Belgian Gendarmerie has gained extensive experience in the use of water cannon to police significant protests and disorder over the last 15 years. The original Belgian water cannons are now reaching the end of their working life and the Belgian Federal Police are looking towards replacing them.

## Introduction of Modern Water Cannon Vehicles into the Police Service of Northern Ireland

- 8. In mid 1999, prior to the publication of the Report of the Independent Commission on Policing for Northern Ireland (The Patten report) in September of that year, the police service in Northern Ireland introduced two vehicle-mounted water cannons as a public order tactical option for the duration of the marching season. At that time water cannon were, and still are, seen as another public order tactical option that might reduce reliance on baton rounds, or defer the point at which their use becomes necessary. The vehicles were deployed to several contentious parade venues including Drumcree, Lurgan and Londonderry, and were often seen in public but were not actually used during 1999.
- The introduction of water cannon in 1999 came about as the result of international co-operation between the then Belgian Gendarmerie and the then Royal Ulster Constabulary (now the Police Service of Northern Ireland) based on personal contact between senior officers from both forces. This arrangement continued in 2000, 2001, 2002 and 2003.
- 10. Despite being between 10-15 years old the Belgian Mol water cannons represented a major advance in this type of technology from the modified water cannons used in Northern Ireland in the 1960's and 1970's. The Belgian vehicles were successfully deployed, and used, to assist in the policing of serious disorder during the 2000, 2001 and 2002 marching seasons. The 2003 marching season saw the deployment of the Belgian water cannons but due to the comparative calm and low level of disorder they were not used.

11. However due to greater operational demand in Belgium it was becoming increasingly difficult for the Belgian Authorities to guarantee the continuance of the loan arrangement. Whilst PSNI remains extremely grateful for the assistance and co-operation of their Belgian colleagues there was a growing realisation that the arrangement would sooner or later come to an end.





MOL Water Cannon on loan to PSNI - New Federal Police Livery - (Photo: PSNI)

### The Police Service of Northern Ireland Decision to Procure Water Cannon

- 12. The Patten Report, at paragraph 9.16 on page 55, acknowledges that water cannon were worthy of exploration as an additional tactical option and recognised that new technology had transformed what used to be a rather ineffective weapon into something which looked much more promising for police purposes. The report also acknowledged and welcomed the fact that the police in Northern Ireland were looking into water cannon and that they were available at Drumcree in July 1999.
- 13. This approach is consistent with Article 2 of the United Nations Basic Principles on the Use of Force and Firearms which states: -

'Governments and law enforcement agencies should develop a range of means as broad as possible and equip law enforcement officials with various types of weapons and ammunition that would allow for a differential use of force and firearms.'

- 14. Whilst the police in Northern Ireland continued to deploy water cannon vehicles on loan from Belgium for the 2000 and 2001 marching seasons the Steering Group, based on research by PSDB identified vehicle mounted water cannon as one of five priority technologies against the police Operational Requirement for a less lethal tactical option and commissioned further and immediate investigation.
- 15. PSDB identified 15 possible manufacturers who were invited to submit information about their products. Five manufacturers replied and each was invited to register their interest to supply water cannon vehicles to an outline PSNI specification.
- 16. In 2002 PSNI, in partnership with the Northern Ireland Policing Board, the Association of Chief Police Officers for England Wales and Northern Ireland (ACPO) and the Northern Ireland Office, took the decision to procure six water cannon vehicles to service operational requirements in Northern Ireland. Factors influencing this decision were the relatively successful deployments of the Belgian water cannons in 1999 2001, the continuing requests to the Belgian authorities and the increasing uncertainty about the arrangement, and the preliminary findings of the Steering Group's research. Whilst it was agreed that any water cannon, as with other potentially less lethal technologies, should be subject to full medical evaluation it was also recognised that the procurement of such vehicles would have a long lead in period. Therefore any water cannon purchased would be subject to full medical evaluation and approval before it could enter service.

The Steering Group continued to direct research in respect of water cannon and as a result, on the 18 July 2002, the NIO Minister of State, Jane Kennedy gave the following answer to a Parliamentary Question:

> "The Police Service of Northern Ireland, following discussion with the Northern Ireland Policing Board and ACPO, will shortly place an order for six new vehicle-mounted water cannon. It is hoped that the water cannon will be delivered before the summer of 2003.

> The decision reflects the particular circumstances of Northern Ireland. It follows receipt of an interim statement, compiled by the independent DSAC sub-committee on the medical implications of less lethal weapons, on the medical implications of the use of vehicle-mounted water cannon in public order situations. The DSAC Committee is scheduled to complete the evaluation of vehiclemounted water cannon before the systems enter service.

I have today placed a copy of the Sub-committee's statement in the Library of the House."

- 18. The interim DOMILL statement is reproduced in full at pages 39 - 42 of the Steering Group's third report published in December 2002.
- 19. The announcement by the Minister was welcomed by the Policing Board and the Chairman, Professor Desmond Rea, said in a statement published on the same day:
  - "The Policing Board fully supported the proposal by the Acting Chief Constable to purchase the water cannon and I am pleased that approval has been given to proceed.

We recently saw the successful deployment of water cannon to deal with public order situations in Belfast and Drumcree. Whilst we understand water cannon is not effective in all situations, we believe it is a positive first step."

- 20. Following the announcement in July a project team led by PSNI and including representatives from ACPO (England and Wales) and PSDB was set up to procure the six water cannon. An outline specification was circulated to a number of the previously identified manufacturers in Europe. Only two manufacturers showed interest in the proposal, a German company, and Somati the manufacturers of the Mol vehicles (used by the Belgian Federal Police).
- 21. The project team visited both manufacturers and scored each against an agreed set of criteria. In August 2002 a contract was negotiated with Somati to supply six RCV9000 water cannon vehicles at a cost of £3.5 million. The first two vehicles were delivered to PSNI in September 2003. In compliance with the interim DOMILL statement Dstl are replicating the tests previously carried out with the Mol vehicles on





The RCV 9000 Vehicle - Mounted Water Cannon

loan from Belgium with the new PSNI vehicles at the Somati factory. The remaining four vehicles will be delivered in pairs early 2004 and will again be subject to stringent testing before they are introduced into service.

- 22. Outwardly the new RCV 9000 vehicles appear very much like the existing Mol vehicles that have been seen during the summer in Northern Ireland for the past 5 years. They are similar in size and appearance but this is where the similarity ends. The new PSNI vehicles combine the latest vehicle and water pump technology with computerised touch screen controls and video equipment.
- 23. The RCV9000 water cannon vehicle consists of a six-wheel drive chassis on which is mounted a superstructure consisting of a protected crew cabin, a pump compartment and a water tank. Within the crew cabin there is a comprehensive set of controls and recording equipment to capture data from sensors monitoring water pressure and temperature and date and time of use. Each vehicle has two water cannons mounted on the roof of the cab that are operated individually by a joystick control.
- 24. The RCV9000 can discharge water in a variety of modes including:
  - a. Spray or Diffused Mode;
  - b. Short bursts of water jets;
  - c. Continuous water jets.
- 25. In each of these modes water pressure can be applied within the available range. This flexibility makes water cannon a graduated and flexible application of force ranging from use of the water cannon in spray or diffused mode to deter or discourage unlawful protestors from remaining in an area, to forceful water jets that can physically push people to disperse them. This represents a use of force option that may be considered appropriate in a variety of situations falling short of serious disorder and riots where its use may prevent the escalation of violence.
- 26. The vehicles are equipped with a public address system, distinctive audible sirens and blue flashing lights. A high intensity light bar is fitted to the front of the cab above the windscreen. The PSNI Livery is white paint with 'POLICE' signs and vehicle identification number ('001' '006') in high visibility blue lettering.
- 27. The RCV9000 vehicles are also equipped with video cameras mounted beside each cannon, behind the front windscreen and on a telescopic mast mounted to the rear of the cab. An additional two cameras are mounted at the rear of the body as a safety aid for the driver before and during reversing.
- 28. The cannon mounted cameras are primarily intended to be an aiming aid for the cannon operators before the cannons are used. When in use the spray from the water jets generally obscures the image that these cameras can capture.
- 29. The combination of the various cameras provides the crew with 360° vision around the vehicle, primarily for road safety purposes and the safety of the crew and others deployed in the vicinity. Images from all the cameras (except the reversing cameras) can be recorded although these images may be obscured by spray depending on prevailing conditions.

### Vehicle Mounted Water Cannon - A National UK Tactical Option

- 30. The work of the Steering Group has, from its inception, been based on the search for acceptable, effective and less potentially lethal alternatives to baton rounds and a broader range of public order equipment for the police service in the United Kingdom. Although the catalyst for the Steering Group was the Patten Report, any potential research would impact on and, indeed benefit, policing throughout the rest of the United Kingdom and as such the Steering Group includes national policing representatives from HMIC, the Home Office, ACPO, PSDB and ACPO(S).
- 31. The research and purchase of vehicle mounted water cannon by PSNI is aimed primarily at addressing the operational need in Northern Ireland but ACPO, on behalf of police forces in England and Wales, has expressed interest in water cannon as another tactical option and as such the Police Service of Northern Ireland led water cannon project team included representatives from English forces. Whilst primarilly developed for use in Northern Ireland, ACPO are supportive of their introduction and it was agreed at an early stage of the water cannon project that there should be national ACPO guidelines on the deployment and use of water cannon. Draft guidelines submitted to the ACPO Conflict Management Committee have been finalised. The guidelines were previously circulated at draft stage to a number of interested parties, several of whom provided valuable comment. The final text took account of those comments.
- 32. The ACPO Guidelines draw heavily on international human rights conventions including the UN Code of Conduct for Law Enforcement Officials and the Basic Principles on the Use of Force and Firearms. They also embrace the PSNI Code of Ethics and cover issues such as levels of authority to deploy and use water cannon, the use of force and human rights and the roles and responsibilities of each of the crewmembers. In addition guidance is provided on potential risks arising from the use of water cannon.
- 33. The police service in Northern Ireland has pioneered the deployment and use of water cannon for the rest of the United Kingdom. Whilst it would be highly desirable that such equipment would not be necessary, the police service must maintain the capability to perform its basic functions within a democratic society, including the protection of life and property and keeping the peace. Accountability for any use of force option is to the law and the Northern Ireland Policing Board.
- 34. The introduction of water cannon provides the police service with another tactical option, thereby broadening the range of public order equipment and tactics. Water cannon lie within a flexible and graduated response to policing disorder and unlawful protest if resolution by non-violent means cannot be achieved. In striving to manage conflict without resort to force PSNI have integrated their approach to policing disorder with their community policing strategy by empowering District Commanders and public order commanders on the ground to take a problem solving approach to potential conflict situations. By working in partnership with the community, event organisers and other agencies too it is hoped that many conflict situations can be avoided or minimised. However should the use of force be unavoidable, water cannon will be available, if considered an appropriate tactical option.

### **Training and Operational Availability**

35. Based on the initial and refresher training provided by the Belgian police and technical training provided by the manufacturer, the PSNI officers who have actually deployed and used water cannon over the past 5 years have developed training packages for water cannon crewmembers, commanders and operational officers at all levels. The training for the RCV 9000 vehicles brings together initial training,

- technical training, the operational experience gained in Northern Ireland, with the advice offered by Dstl, DOMILL, and ACPO and includes legal aspects on the use of force and human rights issues.
- 36. When all six vehicles enter service before the summer of 2004 PSNI plan to have two vehicles strategically located at each of three locations to provide province-wide coverage and to allow for mutual support between regions for large single events.



PSNI RCV 9000 Water Cannons on exercise (Photo: PSNI)

### **Testing - Introduction**

- 37. The decision to purchase water cannon for the Police Service of Northern Ireland was made during 2002 and, after a competitive tender process, six RCV 9000 vehicles were ordered from Somati. These are new vehicles designed by a company, based in Belgium, with a track record in the production of fire fighting and public order equipment. The water cannon have been assessed against the Strategic Audit Framework<sup>9</sup>. As part of this, it is necessary to have a medical opinion from independent medical advisers on the use of new equipment. These independent medical advisers form the DSAC sub-committee on the Medical Implications of Less-lethal weapons (DOMILL). They were first consulted during the deployment of loaned Belgian Mol Water Cannon in 2002 and produced an interim medical statement on the medical implications of use of the Mol water cannon in Northern Ireland<sup>10</sup>.
- 38. The interim medical statement principally comprised: a literature review of the injuries sustained by the use worldwide of water cannon; injuries caused by equipment that could be regarded as comparable (such as high-powered water jets and industrial processes); technical data obtained during the survey. The study also reviewed news reports on the use of water cannon by other police forces. The use of the vehicles within the formal PSNI guidance was also considered and the work culminated in the publication of the interim medical statement in June 2002<sup>10</sup>, which recommended that the training and guidance should reflect the risks from the displacement of people and objects, and that experimental testing of any new water cannon system should be undertaken to support the final medical statement. This initial statement also identified the information that would be required on new water cannon before the issue of the final medical statement.

### **Literature Review Process**

39. The review process included an assessment of the use of the equipment by other countries, the use of comparable equipment and the review of medical issues/reported injuries associated with similar equipment and technologies. The medical review also considered any injury mitigation provided by the use of the equipment within the guidance for users, such that the complete hazards and the total risks could be considered. This review was presented to DOMILL to aid the production of the interim medical statement that advised on the risks from the Mol water cannon if the equipment was used within defined operational guidance and policy.

- 9 Chapter 4 of Patten Recommendations 69 and 70 Relating to Public Order Equipment, A Research Programme into Alternative Policing Approaches Towards the Management of Conflict, Second Report, Dec 2001
- 10 Interim Statement On the Medical Implications of the Use of Vehicle-Mounted Water Cannon In a Public Order Role, http://www.nio.gov.uk/pdf/medreport.pdf

40. Little evidence was available in the technical literature on the direct effects of water cannon, so the search of the technical journals was expanded to include industrial processes that included human contact with high pressure water jets (usually during accidents), medical reports of hydraulic injuries, children's toys, surgical equipment, meat processing equipment and crowd control devices produced within other programmes. The review also included newspaper, magazine and Internet reports relating to the use of water cannon.

### **Testing of Existing Vehicle Design**

- 41. Since the Somati vehicles to be purchased by PSNI were a new design, it was essential to provide baseline data on the injury causing potential of similar water cannon as part of the experimental programme requested by DOMILL. The Mol MSB 18 water cannon loaned from the Belgian Police were examined to determine the effects of the loading under a number of pre-set conditions. These particular vehicles were chosen for this exercise because they had been used previously by the PSNI within a set of guidelines that would form the basis of the operators' instructions for the new vehicles. Additionally, the Mol vehicles had been used for many years in Belgium, with very few reported injuries. The results from the testing of the Mol MSB 18 vehicles could then be used for comparison with the results from tests on the new vehicles to assist in the production of an injury assessment.
- 42. The opportunity was taken to test the Mol vehicles in October 2002 using PSNI staff to operate the vehicles. The targets chosen for these tests were a Hybrid III automotive test device (crash test dummy), a chest injury rig and an abdominal injury rig and a specifically designed force plate rig. Additionally, a test was devised to measure debris projection.
- 43. The Hybrid III dummy was tested in restrained and free-standing conditions.

  These conditions were chosen to represent a subject struck by the water jet when adjacent to a wall and a person toppled by the force of the jet. These tests were carried



Figure 1: Restrained Hybrid III dummy during water impact

- out at different ranges from the vehicle. The Hybrid III dummy was chosen for the tests because it has a pedigree of human injury testing and has several reference measures that may be used to predict the severity of injury that may be caused. The impact of the water jet against the Hybrid III dummy can be seen in Figure 1.
- 44. One of the risks that had been identified during the literature search was the potential for debris to be projected by a water jet thus causing injury, although there were actually very few reported injuries in the literature. Further investigations were initiated to establish whether or not this was a realistic concern. The test used gravel placed a known distance from a 1m high concrete wall and the water jet swept (as it could be in public order use) towards the wall. The wall was used to give a height reference. The premise was that any debris projected over the wall may produce an ocular injury risk to personnel in the crowd. These tests were filmed and the resulting energy of the debris calculated.

- A thoracic injury rig was used to determine whether any body wall displacement induced injuries could 45. be detected during the tests, directly due to the effect of the water jet. The blunt trauma rig had been developed by Dstl to assess internal trauma during impacts that cause significant body wall displacement.
- The specifically designed force plate rig was 46. used to measure the pressure (or the force) produced by the water jet with range. The rig comprised different sized force plates to represent different parts of the body, such as the eye socket and the chest frontal area. The use of this plate is shown in Figure 2. The direct force or force per unit area (pressure), could be used to provide an estimate of the injury causing potential, effects on the body (as an unrestrained object), or the absolute power of the jet with range. These tests were carried out with different examples of the same type of vehicle, at different ranges, with varying



Figure 2: Force plate rig

- pressure settings of the pump and with different volumes of water in the tank to determine if any of these had an effect on the injury causing potential of the water stream. These approaches enabled the direct comparison of water cannon output between individual vehicles and vehicle designs.
- The tests showed that there were potential hazards from projected debris, for eye injury from direct impact of the jet and the possibility of injury to people from being thrown against objects, if the use of the water cannon jets was not appropriately controlled. The tests indicated that direct injury from the impact of the water jet to the body wall was considered to be unlikely. It was concluded by DOMILL that the guidance for the use of water cannon reduced the risks and this was reinforced by the inclusion of the injury risks in the training syllabus.

### **Assessment of Somati RCV 9000**

- In order to examine the injury causing potential of the Somati vehicles purchased by PSNI, DOMILL requested testing of the new vehicles using the Hybrid III, force plate rig and debris tests, before they were deployed.
- 49 Dstl carried out these tests on behalf of DOMILL at the Somati factory in Belgium. The first two vehicles to be manufactured were assessed prior to delivery to the PSNI. The results from these tests were assessed to determine whether the RCV 9000 had a different injury causing potential to the existing vehicles (Mol MSB 18).
- 50. Parallel to the assessment of the PSNI vehicles, the initial literature review was updated to reflect the use of the water cannon in Northern Ireland during the previous twelve months and the review of the worldwide literature was re-reviewed to determine whether any significant new injuries had been reported. Overall, there were no reported fatalities and very few serious injuries reported as a result of the use of water cannon within approved guidelines.

- 51. The guidelines for the use of water cannon produced by the Association of Chief Police Officers has also been reviewed; this review has formed part of the DOMILL assessment.
- 52. The tests showed that it was possible for injury to be caused as a result of being struck by the water jet and thrown against an object or from debris, energised by the jet and propelled toward a subject, however there was no significant difference between the injury causing potential of the two vehicles (Mol & Somati or between the first two Somati vehicles delivered to PSNI). The models used did not indicate that the new vehicles had a more injurious effect than the Belgian Mol MSB 18s.

### Final medical statement

- 53. The results from the experimental work on the PSNI (Somati RCV 9000) and the Belgian (Mol MSB 18) vehicles were passed to DOMILL for review and comparison. The updated review of the literature (medical and technical) and the assessment of the guidelines have also been submitted to DOMILL for final evaluation.
- 54. At the time of writing, the final medical tests have yet to take place. It is expected that they will be concluded very shortly, with publication of the DOMILL medical evaluation and the ACPO guidelines paving the way for PSNI to introduce its Somati water cannon in the near future.

# UK USE OF LESS LETHAL TECHNOLOGIES

### A. L21A1 Baton Rounds

- 1. In February 2003 the Police Complaints Authority for England and Wales published "A review of shootings by Police in England and Wales from 1998 to 2001". The concluding paragraph, on page 114, read as follows:
  - "Similarly, the development of less lethal options including both the application of existing tactical options such as negotiators and police dogs and the development of new technologies must be addressed with the utmost urgency to ensure that the police response is consistent with the requirements of human rights legislation. Further, there are clearly identified issues in the post-incident period in which the co-ordination of the investigators with the PCA and the CPS needs to be improved to increase the inclusion of bereaved families. There is much in the review for those planning the future IPCC to take account of as new approaches to investigation are devised and introduced."
- 2. Since the baton round has been introduced as a less lethal weapon for police firearms officers, there have a been a total of 21 baton rounds fired against individuals in 17 incidents in Great Britain see table below.

### **GB** Discharges of the Baton Gun

1.	Male subject had 8 inch knife: hit at 6 metres	North Wales Police	27th February 2002
2.	Sword and Gun: baton round at 8 metres	Surrey Police	7th April 2002
3.	Thunder flashes, broken glass and a machete: baton round fired at 15 feet	Dorset Police	24th November 2002
4.	Sword: baton round at 8 metres	Gwent Police	28th November 2002
5.	Samurai sword post hostage situation: baton round at 15 metres then CS	Suffolk Constabulary	18th December 2002
6.	Man 60yrs suicidal armed with rifle (air): 25 metres	Surrey Police	19th May 2003
7.	18 year old drink/drugs knife self harming: 3 metres	Gloucestershire Constabulary	20th July 2003
8.	Man with Schizophrenia, sword: 5 rounds hit 3	Greater Manchester Police	20th July 2003

9.	Man with hand gun: baton round Taser and Dog	Metropolitan Police	4th August 2003
10.	Drink, drugs, stabbed dog: 1 baton round at 20 feet	North Yorkshire Police	13th August 2003
11.	Man with knife: 3-4 metres	Suffolk Constabulary	13th August 2003
12.	Woman with Knife	Gloucestershire Constabulary	8th September 2003
13.	Discharging Air rifle: struck once 10 metres	Suffolk Constabulary	19th October 2003
14.	Man with axe and hammer	Dorset Police	2nd November 2003
15.	Man with handgun at 15 metres	Wiltshire Police	17th November 2003
16.	Man with 5 feet long garden implement	Devon and Cornwall Constabulary	1st December 2003
17.	Man with handgun at 15 metres	Nottinghamshire Police	5th January 2004

### The use of baton rounds across the UK: Case experiences in GB

3. There has at the time of writing been no use of baton rounds in Northern Ireland since September 2002. However as shown above there have been a number of rounds fired by police forces in Great Britain in potential firearms situations. Set out below are details of some of the incidents, drawing on contemporary accounts. It can be clearly seen that in each incident the use of baton rounds assisted police in neutralising a threat posed by a specific individual either to themselves or others. Without recourse to the L21A1, lethal force might well have been used.

### Case 1 - BATON ROUND DISCHARGE - NORTH YORKSHIRE

Police were called to the Ravenfield Road area on the east side of Thirsk at 2.22 this morning (13 August) by a report of an agitated young local man in the streets who was believed to have a knife.

Officers found he had two knives and was threatening to harm both himself and any officers who came near. Despite protracted negotiations with officers, the man became increasingly agitated and began to harm himself.

He was moving towards a residential area as it became light and the decision was taken to restrain him for the protection of himself, officers and residents.

A CS spray was used without effect. A police dog was sent to hold him but he slashed the animal twice; a baton round was fired at the man, he fell down and was restrained.

He was treated at Friarage Hospital for self-inflicted knife wounds and for bruising and is now at Northallerton police Station.

The dog – a German Shepherd named Alf – was treated by a vet for cuts to his legs and will be back at work for his next shift tonight.

As is normal practice, the Police Complaints Authority have been notified.

Assistant Chief Constable Peter Bagshaw said this was the first time a baton round had been fired at a person in North Yorkshire. He was pleased with the satisfactory conclusion of a potentially tragic situation.

Mr Bagshaw said: "By starting with negotiation then moving through a series of stages of non-lethal containment our officers avoided serious injury being inflicted on any of those involved. The public were kept safe and we prevented this unhappy young man from inflicting serious harm to himself."

## Case 2 - BATON ROUND AND TASER USED BY POLICE IN HOUNSLOW TO ARREST GUNMAN

Officers from the Metropolitan Police Service went to an address in Hounslow at around 10.45 pm on Sunday 3 August following a call from a man who said he had a gunshot wound.

When they arrived they found the man carrying two hand guns. They offered him first aid and attempted to negotiate with him for about 45 minutes. The decision was made to deploy less-lethal weapons as well as conventional firearms. He came towards officers with a firearm in his hand. A firearms officer discharged a baton round at the man which hit him in the abdomen and he fell to the ground. He tried to get up again and police decided to use a Taser to disable him. He was then arrested and taken by ambulance to hospital where he is currently being treated. His injuries are not life threatening.

An investigation is currently being conducted by the Professional Standards Department of the MPS under the supervision of the Police Complaints Authority.

This was the first occasion where officers from the MPS have used either a baton round or a Taser operationally. Both are less lethal options. Firearms were deployed and were available at all times but were not used.

A large quantity of knives, firearms and ammunition were later found in the man's flat.

Local detectives are investigating how he received his original injury prior to police involvement.

### Case 3 - BATON ROUND USED TO RESOLVE GLOUCESTER INCIDENT

At approximately 2:47 am on Sunday 20 July 2003 armed officers were sent to a house in the Coney Hill area of Gloucester where unarmed officers were responding to a 999 call reporting a disturbance at the premises.

On their arrival the officers were confronted by an 18-year-old man armed with a knife who was presenting a threat both to himself and others, including police officers at the scene.

Despite attempts to negotiate with the man the threats continued both to himself and the officers.

The incident was finally resolved safely when the man was disarmed and arrested following the discharge by police of a single baton round.

Paramedics were able to offer the man immediate medical assistance. He was then taken to Gloucestershire Royal Hospital by ambulance where he was admitted for further treatment.

The man is now in police custody at Gloucester Central Police Station. A criminal investigation into his conduct is proceeding.

The incident has been referred by Gloucestershire Constabulary to the independent Police Complaints Authority (PCA), and a Senior Investigating Officer from the force has been appointed to undertake a PCA supervised review of the circumstances of the use of the baton round.

## B. The introduction of CS sprays to the Police Service of Northern Ireland

- 4. In 1994, the Police Scientific Development Branch was tasked by the Home Office and the Association of Chief Police Officers, with identifying a suitable incapacitant spray for use by police officers on routine patrol duties. Following consultation with the Department of Health, the Chemical and Biological Defence Establishment at Porton Down, and international users of the sprays, CS was identified as the most appropriate incapacitant on the grounds of effectiveness and safety.
- 5. Subsequently in August 1996 approval was given to the Chief Constables of police forces in England and Wales to introduce CS spray. Following trials, it was believed that the spray was a safer option, both for the public and the police, than the use of batons. By October 1998, all but three of the 43 Forces in England and Wales had introduced the spray.
- 6. The introduction of CS spray was seen as providing an additional less lethal option for officers in their self-defence whilst dealing with violent offenders. Its use can be considered in the continuum of force.



- 7. In the HMIC 1997 Thematic Inspection Report on Officer Safety, it was highlighted that "The importance of officer safety requires it to permeate every aspect of policing, visibly and coherently throughout the entire structure of the Service. It should be constantly in everyone's mind, whether engaged in front line service delivery or at headquarters in the development of strategies. It is not an add on and lead must come from the top." The HMIC report recognising the importance of this issue, recommended that a chief officer be nominated to coordinate, lead and develop officer safety.
- 8. In the 1998/99 HMIC inspection of the Royal Ulster Constabulary, it was noted that when faced with a violent situation, an (RUC) officer had no means of defensive action between the inadequacies of the short baton and the potentially lethal use of the revolver. It was suggested by HMIC that, "the Force should consider filling this gap by issuing the more versatile long baton (fixed or extending) and even the issue of CS spray as in England and Wales." Subsequent to this, research was carried out and a new extendable baton, the 2PX, was introduced as a replacement for the traditional short wooden truncheon.

- 9. In 2000 the Police Complaints Authority (PCA) for England and Wales carried out an analysis of every fully investigated complaint about the use of CS spray for a year long period beginning in November 1998 and ending in October 1999. In addition the PCA drew together statistics provided by HMIC and the ACPO Self Defence and Restraint Committee. The PCA identified a significant decrease in assaults on police officers in Forces where CS spray was used; a reduction in the number of working days lost as a result of assaults in forces issued with sprays from 41,166 to 33,866 (an average of 183 days per force); and a decrease in the number of complaints concerning police use of batons.
- 10. It was against this backdrop that a programme was implemented to assess and research the local need for such a development to fill the capability gap between the use of the baton and lethal force. Approval to proceed with the acquisition and issue of CS spray to the Police Service of Northern Ireland was ultimately sought and obtained from the Northern Ireland Policing Board in February 2003. The Northern Ireland Office is providing finance for its introduction.
- 11. The issue of CS spray to the Police Service of Northern Ireland is seen not as an alternative to Baton Rounds, nor as a tool for deployment in incidents of major public disorder. Its use however may be appropriate in violent incidents such as pub fights etc where officers may use it to defend themselves or others or to effect arrest.
- 12. CS incapacitant sprays are not designed for use in major crowd control situations, maintaining or restoring public order, based in the circumstances of extreme violent disorder that may be faced by the police in Northern Ireland. However the possibility of its use in public disorder situations cannot be discounted as it represents a level of force that may be appropriate and reasonable in the circumstances; for example it may be appropriate for use in self-defence where an officer becomes isolated in a crowd situation. Use of the spray could prevent the situation escalating such that the use of Baton Rounds or indeed conventional firearms was required. It may also be used against violent offenders, other than those armed with firearms or other weapons, where failure to induce 'immediate' incapacitation would increase risks to all present.
- 13. It is intended that CS spray may be used as a response option when an officer finds it necessary and proportional to defend him/herself or others or effect arrest or prevent the commission of an offence when lower levels of force have been ineffective or the officer considers lower levels of force would be ineffective or inappropriate in the circumstances. It will allow police officers in Northern Ireland an alternative means of dealing with violent situations with a more proportionate and appropriate response by enhancing the continuum of such methods available. In this way it potentially makes such situations safer for all.
- 14. In the recently published report 'A study of complaints involving the use of Batons by the Police in Northern Ireland,' the Police Ombudsman compared statistics between complaints involving baton use reported to other UK Police Forces and those reported to the Police Ombudsman for Northern Ireland. In the report it is highlighted that "by October 1998 all but three of the 43 forces in England and Wales had introduced CS spray, with a consequent diminution in baton use."
- 15. It is also noted in the report that, "The possible introduction of CS spray by the police may have an effect on the levels of complaints of baton use, but it is vital that the misuse of CS spray is not allowed." Both the Police Service and the Police Ombudsman will be working together to ensure that this does happen.
- 16. As expressed by the research carried out by the Police Ombudsman and published in the report, owing to local circumstances police officers in Northern Ireland are more likely to be exposed to violence in the course of their duties than are those in other areas of Great Britain. The report also acknowledges the

high number of assaults upon Police Service of Northern Ireland officers and the risks of injury to which they are exposed. It is highlighted that police officers in Northern Ireland are six times more likely to be assaulted than their colleagues in Great Britain.

- 17. In coming to a decision to introduce CS spray, the statement of the Committees on Toxicity, Mutagenicity and Carcinogenity of Chemicals in Food, Consumer Products and the Environment, was taken into account. The advice of the Committees on the use of CS spray was sought by the Department of Health with the support of the Home Office. The Committee considered that the available data regarding the use of CS did not in general raise concerns regarding the health effects of the spray itself. They did however highlight the need for further research, which is continuing to examine any long-term effects, if any, of exposure to CS.
- 18. CS is a white crystalline solid first made by Corson and Stoughton in 1928. There are three compounds used in CS spray, they are CS (0-chlorobenzylidene malononitrile), MIBK (methyl isobutyl ketone) and nitrogen gas. The CS spray used by the police forces in the UK consists of a 5% solution of CS in MIBK in a canister with nitrogen as a propellant.
- 19. Whilst no long term data is currently available concerning the use of CS spray by other UK police services, it should be noted that the French Gendarmerie have used the same combination of CS with MIBK, at the same concentration, since 1984 with no reported long term health effects for those exposed
- 20. Concerns have been raised that the deployment of CS onto the streets of Northern Ireland would invoke memories of the early 'troubles' and street disorder of the late 1960's and early 1970's. However the irritant in its current form is dispensed from a hand held aerosol canister in a liquid stream, not as gas or smoke as it was historically. The liquid stream is directional, discriminate and has a maximum range of around 3 metres. Maximum accuracy however will be achieved over a distance of 1.25-2 metres.
- 21. The guidelines for the use of CS spray by the Police Service of Northern Ireland will be in keeping with the guidance given by the Association of Chief Police Officers (ACPO) and used by forces in England, Wales and Scotland. They will also be audited to ensure that they are Human Rights compliant. Work is currently underway to prepare policy in the form of a General Order regarding operational use of the spray. Consultation has taken place with the Northern Ireland Human Rights Commission, the Committee on the Administration of Justice and the Police Ombudsman for Northern Ireland. The comments raised by each of these groups have been considered in these guidelines.
- The Police Service of Northern Ireland intend introducing CS spray, which is currently the only Incapacitant spray approved by the Home office and ACPO and which is supported by evidence from the Independent Committee on the Toxicity of Chemicals in Food, Consumer Products and the Environment
- 23. Legislation regarding the use of force is enshrined in both domestic and international law and indeed within the Police Service Code of Ethics. Furthermore, case law has set down the principles that must be followed by officers responsible for planning and controlling operations where the use of force is a possibility, to minimise to the greatest extent possible, recourse to the use of any force.



Example of Hand Held CS Incapacitant Spray

- 24. Police officers in carrying out their duties shall as far as possible apply non-violent methods before resorting to the use of force. Appropriate training develops police officers' ability to resolve conflict through the use of communication skills and empty-handed techniques prior to the application of any type of force. The use of CS spray as an option by police officers to protect themselves or others will be monitored and recorded to ensure transparency and accountability. It is fully accepted that there is a need for CS spray to be used within both the legal framework and operational guidelines.
- 25. The tendering process for the introduction of CS spray has commenced and it is hoped that it will be completed to allow training and deployment by the summer of 2004. Only those officers who have been trained in line with ACPO standards will be issued with the spray.
- 26. It is intended that all operational officers, from Part-Time Reserve to Inspector rank (or above if required) who have contact with the public, will be trained in the use of CS spray.
- 27. Police Officers in Northern Ireland have to carry lethal and non-lethal weapons to protect both themselves and other members of the community. As a Public Service organisation the Police Service of Northern Ireland would be found wanting and indeed neglectful if it did not provide its officers with the adequate resources and equipment to carry out this function.

# C. Operational Trial of Taser in England and Wales

- 28. A 12-month operational trial of taser was launched on April 21, 2003. Five police forces are taking part in the trial: Lincolnshire Police, the Metropolitan Police, Northamptonshire Police, North Wales Police and Thames Valley Police. At the time of this report the trial is continuing. The trial is being independently evaluated by PricewaterhouseCoopers. The opportunity has been taken in the interests of transparency to include full papers relating to the Taser trial. It should be noted again that the taser is not designed nor suitable for use as a crowd control technology.
- 29. In light of the Human Rights Act, the need for a range of 'less lethal' options, in handling conflict management, has become an imperative for the service. Police are required to justify any use of force, showing that it was proportionate and legal, and that there was, at the time, an absolute necessity, particularly where potentially lethal force is used. Available less lethal technologies work in different ways and each may offer unique advantages in specific circumstances. The Association of Chief Police Officers (ACPO) believe that extending the range of options available is likely to provide the most appropriate response to any given situation. This will include the taser.
- 30. Taser is not a replacement for conventional weapons, but is an option that should be considered alongside others, such as negotiation, dogs and baton guns. These do not constitute a hierarchy of lawful force and should be viewed as a range of approved options from which the most proportionate and appropriate should be selected.
- 31. This chapter contains a full set of the ACPO policy documents for the taser trials. Operational guidance on police use has been written to inform and support decision making in relation to an operational trial stipulating training, deployment and use. Throughout the trial, the issue, deployment and use of the taser will conform to the well established guidance already laid down in the ACPO Manual of Guidance on Police Use of Firearms.
- 32. Taser use throughout the trial has been deliberately constrained by policy as ACPO felt that the operational benefits of a wider deployment of taser were outweighed by residual medical concerns identified by DOMILL, particularly in respect of special population groups. An update on the progress of the medical evaluation is included later in this chapter.

- 33. ACPO policy has restricted issue of taser to selected firearms officers within the 5 trial forces. Taser has only been deployed in circumstances where use of firearms was authorised and is only deployed alongside conventional firearms.
- 34. For the purposes of the trial the term 'use of the taser' is used to describe any of the following actions carried out in an operational setting:
  - (a) Drawing of a device in circumstances where any person perceives the action as a use of force or threat of a use of force, whether or not this is accompanied by a verbal warning, sparking of the device or placing of the laser sight red dot onto a subject;
  - (b) Firing of a device so that the barbs are discharged at a subject;
  - (c) Application and discharge of a device in 'touch stun mode' to a subject.
- 35. For the purposes of the trial any 'uses' under the second or third of the categories in the previous paragraph are referred to the Police Complaints Authority (PCA) for their information and a decision as to whether they will supervise the investigation. In relation to any use that falls into the first category above, the PCA is notified by the ACPO Firearms Secretariat who can give advice where necessary.
- 36. To facilitate an independent review of the trial, evaluation forms have been completed after each incident to provide data to the reviewer, PricewaterhouseCoopers. Evaluation questionnaires are completed on every occasion where taser is deployed to a policing operation where the use of firearms has been authorised. The findings of PricewaterhouseCoopers interim review are outlined later in this chapter.

## Further Studies on the Medical Implications of Use of the M26 Advanced Taser.

- 37. The DOMILL statement, set out in the Steering Group's third report, on the medical implications of the use within ACPO Guidelines of the M26 Advanced Taser made recommendations for further work: research should be undertaken to clarify the cardiac hazards associated with use of the taser on individuals who could be considered to have a greater risk of adverse effects. The statement advised that the principal investigations should address:
  - (a) Accurate, quantitative estimates of the magnitude of the magnetic and electric field strengths from the M26 in potentially vulnerable parts of the body (the heart);
  - (b) Possible hypersusceptibility to taser currents arising from drugs commonly used illegally in the UK, acidosis and pre-existing disease;
  - (c) A more thorough review of the vulnerability of pacemakers and other implanted devices to the taser output.

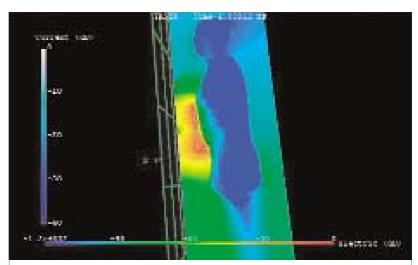
DOMILL did not consider it essential from a medical perspective that the studies be completed before the ACPO trial.

38. This work is being undertaken on behalf of DOMILL by Biomedical Sciences, Defence Science and Technology Laboratory (Dstl) at Porton. It is funded by the Home Office.

### **Taser Current Modelling**

39. The purpose of the quantitative modelling of the distribution of taser currents in the body is to predict the magnitude of the currents in the heart. These currents will then be applied to isolated beating hearts in vitro, to determine if the currents disturb the rhythm of the heart.

40. The modelling is innovative and complex. In simple terms, it takes geometric data of the body from medical imaging as a mesh, assigns electrical properties to each block of tissue, and sets boundary conditions that determine how the current flows into, within and out of the model and its components. The model then calculates the magnitude and distribution of the current in time steps.



The electric field strength one nanosecond after injection of an extremely short duration electrical pulse. The electric field in the air and body is shown. The current injection points are also evident on the front of the chest. Injecting these very short duration pulses enables subsequent calculations on the fields from the longer duration taser pulses.

41. The model is close to its final stage of develop-

ment; there have been achievements and setbacks. There are still some critical issues to be resolved such as deficiencies in the frequency-dependent tissue electrical properties data at the relatively low frequencies of taser pulses, and the inclusion of skin in the model (representing such a thin layer raises problems regarding the resolution of the model and computer resources and time needed to run it). When resolved, the model will be used to calculate the currents in the heart for a number of scenarios, focussed principally on the separation of taser current injection barbs.

## Hyper-susceptibility of the heart and drugs.

- 42. There are two aspects to these studies:
  - a. Investigation of the effect of drugs of abuse on the susceptibility of the heart to an arrhythmia (disruption of the normal rhythm, that in extreme circumstances may lead to death very rapidly);
     certain drugs could increase the risk of a serious arrhythmia from application of external energy,
     such as a blow or a taser pulse;
  - b. Investigation of the direct effects of taser currents on the rhythmicity of the isolated beating heart.
- 43. The potential hyper-susceptibility of the heart to drugs of abuse was investigated using the sheep Purkinje fibre preparation. These fibres conduct electrical impulses in the heart. They can be removed from the heart and maintained in a viable condition in the laboratory. Their ability to conduct electrical impulses can be assessed by stimulating them electrically, and observing the response an "action potential" that in the body will contract the heart muscle. If the action potential is prolonged by drugs, it is assessed that this may increase the risk of an arrhythmia. The test is used in the pharmaceutical industry for assessing the cardiac risks associated with drugs being considered for therapeutic use. The drugs of abuse tested in the Purkinje fibre model were:

- (+)-Methamphetamine;
- Morphine (heroin metabolite);

The drugs of abuse tested in the Purkinje fibre model were:

- D9-tetrahydrocannabinol;
- MDMA (Ecstasy);

Cocaine:

- Phencyclidine (PCP/Angel Dust);
- Cocaethylene (major metabolite formed when cocaine is used concurrently with alcohol).
- 44. The technical work was completed successfully in November 2003, and the data are currently being evaluated and reported. DOMILL will review and interpret the data in January 2004. The work on isolated beating hearts to determine if taser currents disturb their rhythm is scheduled to start in January 2004.

## Susceptibility of Pacemakers to Taser Pulses

45. The scope of the review extended beyond pacemakers to encompass a wide range of implantable electrical devices such as cardioverter defibrillators, cochlear implants, and other neurostimulators. A draft report was offered to DOMILL by Dstl in 2003; subsequent to further requirements from DOMILL, the final report will be considered by them in January 2004.

# **Interim Review of Operational Trial of Taser**

- 46. An interim review of the trial was carried out by PricewaterhouseCoopers six months into the trial period. PricewaterhouseCoopers gathered information from two main sources
  - Completed taser deployment forms passed on through ACPO Police Use of Firearms Secretariat;
  - Interviews and meetings with officers in the trial forces.
- 47. The findings of that review are outlined below:-
  - A 12-month operational trial of Taser was launched on April 21, 2003. Its terms of reference are to
    evaluate how successfully Taser devices have been used as a supplementary option to other
    deployment methods, namely firearms, dogs, baton rounds and irritant spray. The trial is being
    independently evaluated by PricewaterhouseCoopers.
  - Five police forces are taking part in the trial: Lincolnshire Police; the Metropolitan Police; Northamptonshire Police; North Wales Police and Thames Valley Police.
  - During the trial, Taser will be deployed to policing operations where the use of firearms has been authorised. Officers involved will complete a questionnaire for every deployment.
  - The independent evaluators define usage as either drawing the device in circumstances where
    persons perceive the action as the threat or use of force; firing the device; using it in touch stun
    mode. All uses that fall into the last two categories are referred to the Police Complaints Authority.
  - For the interim report, the consultants have assessed whether Taser appears to have been effective where it has been used, based on the judgement of the police force deploying it.

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- Taser has been used in 30 incidents, 29 of which involved a human subject (one involved a dog).
- Each of the 29 uses resulted in an arrest.
- In the majority of cases, production of the Taser was enough to ensure compliance by the subject
   particularly when the red dot sight is applied.
- Taser was discharged in six incidents, in each case incapacitating the subject and allowing police
  officers to make an arrest.
- In three cases, more than one discharge was needed to subdue the subject. It is reasonable to expect at this early stage to be at an early point on the learning curve and that better training and experience might produce better results.
- Taser appears to have a strong deterrent effect and is highly effective at the de-escalation of potentially violent situations.
- Taser reduces the risk to officers called to deal with a violent offender because it can be fired from a distance. It is also a strategic option in helping to resolve incidents before the risk of harm is heightened.
- Some officers questioned the reliability of the technology, raising concerns particularly about the reliability of the battery packs. It is hoped that a new design Taser will address some of these problems.
- A number of officers thought the trial should be broader and include the opportunities to use Taser to resolve violent incidents that do not otherwise meet the criteria for firearms deployment.
- Officers were generally content with the training package, however some felt that if Taser were rolled out to non-firearms officers, the training programme would have to be extended. Some also felt the need for more realistic training ground scenarios.
- Taser deployment and usage has been lower than might have been expected because of the parameters deliberately set by ACPO for the trial.
- Where Taser has been deployed it has unfailingly secured a positive outcome.
- Taser has a high visual deterrent value that can enable officers to de-escalate situations relatively quickly and easily.
- Multiple Taser discharges were necessary to bring the subject under control at three incidents on two of these occasions Taser firings did not appear to go right the first time. This might be expected to be related to lack of experience or training of the officers concerned because of the early stage in the operational trial.
- There were a number of minor operational problems concerning the technology, particularly with reference to the size of Taser, the robustness of the battery packs and the accuracy of serial number and date recording.

#### **Final Evaluation**

- 49. The operational trial of taser is scheduled to continue in its present format until April 2004. The results of the continuing medical evaluation and the report of the independent assessor will allow ACPO and the Home Office to make an informed decision as to the future of the trial at the end of this period.
- 50. A low number of taser uses has been recorded to date; this is a result of the deliberate constraints laid down in the ACPO trial policy. To date all incidents where taser has been used have been successfully resolved resulting in arrests without serious injury to the subject or recourse to conventional firearms.
- 51. The trial has usefully raised a number of important points about effectiveness and reliability of the taser equipment allowing these points to be addressed prior to any possible wider deployment of taser.

#### **Reference Documents:**

52. The following press release was issued on 24 November 2003:

#### **Press Release**

## TRIAL GOING WELL SIX MONTHS ON

"The 12-month operational trial of taser, the hand-held electrical weapon designed to incapacitate rather than lethally injure, is continuing and an interim report produced by independent consultants for the Association of Chief Police Officers suggests that the device has a number of operational benefits for police.

Five British police forces are taking part in the 12-month long trial – Lincolnshire Police, the Metropolitan Police, Northamptonshire Police, North Wales Police and Thames Valley Police – that began in April 2003. The parameters of the trial allow the taser to be used by trained specialist firearms officers in circumstances where they are authorised to draw weapons.

During the first six months of the trial, the taser has been drawn at 30 incidents and fired six times.

In each of the incidents where the taser was fired, a person was arrested without serious injury either to themselves, or to the police officers involved.

But perhaps one of the most striking findings of the first six months is the deterrent effect of the taser – in 22 incidents where the taser was drawn and not fired, its presence alone was sufficient to make the person who had posed a threat comply with police demands and allow the event to be brought to a peaceful conclusion.

The six-month interim report has also allowed operational officers taking part in the trial to raise issues that can be dealt with or looked at more closely as the trial continues. These included concerns from some about the reliability of the taser technology and also over the availability of realistic training ground scenarios.

Paul Acres, Chief Constable of Hertfordshire and ACPO conflict management portfolio chair, commented:

- "Our aim through the trial is to thoroughly research taser as a less lethal option whose use may be more appropriate than a conventional firearm in certain circumstances.
- "The evidence available so far is that taser is highly effective in de-escalating potentially violent situations and its visible deployment alone has brought the vast majority of incidents to a successful conclusion.
- "Some officers brought to our attention issues about the reliability of the taser technology and the training package currently available and these concerns have been picked up and will be addressed as the trial continues.
- "Where taser has been deployed it has invariably helped to bring a situation to a safe and positive end. We are constantly seeking less lethal options to resolve dangerous situations, though it is important to stress taser cannot be a replacement for firearms. Where officers face a threat from firearms they will meet that threat with firearms.
- "We look forward to the next six months of the trial and the final, independent, evaluation report."

ACPO is working closely with the Police Complaints Authority and the Home Office on the trial.

When the trial ends in April 2004, it will be independently evaluated and a report produced for ACPO by PricewaterhouseCoopers on the use of tasers."



# **Policy**

# 1 PURPOSE

1.1 This document sets out policy for a managed operational trial of taser.

## 2 BACKGROUND

- 2.1 In light of the Human Rights Act the need for a range of 'less lethal' options, in conflict management by Police, has become an imperative for the service. Police are required to justify any use of force, showing that it was proportionate and legal, and that there was, at the time, an absolute necessity, particularly where potentially lethal force is used. Available less lethal technologies work in different ways and each may offer unique advantages in specific circumstances. The Association of Chief Police Officers (ACPO) believe that extending the range of options available is likely to provide the most appropriate response to any given situation. This will include the taser.
- 2.2 Taser is not a replacement for conventional weapons, but is an option that should be considered alongside others, such as negotiation, dogs and baton guns. These do not constitute a hierarchy of lawful force and should be viewed as a range of approved options from which the most proportionate and appropriate should be selected.
- 2.3 The Conflict Management Model sets out the process by which a measured and appropriate response can be made to any situation involving conflict. The police use of force is governed by:
  - Common Law;
  - Section 3 Criminal Law Act 1967:
  - Section 117 Police and Criminal Evidence Act 1984;
  - The Human Rights Act 1998.
- 2.4 Nothing in this policy overrides the fundamental duty of police officers to protect life in accordance with the law and the European Convention on Human Rights.
- 2.5 Taser technology has been subject to rigorous assessment and testing by the Police Scientific Development Branch (PSDB) to determine how well it meets the operational requirement.

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- 2.6 In addition, a thorough programme of medical assessment has been undertaken by the Defence Science and Technology Laboratory (Dstl).
- 2.7 The results of these assessments have been considered by an independent body, the Defence Scientific Advisory Council's Sub-Committee on the Medical Implications of 'Less Lethal' technologies (DOMILL), who have issued a medical statement.

## 3 SCOPE

- 3.1 Although international experience illustrates that taser can be deployed in a wide variety of situations involving conflict, the ACPO feels currently that the operational benefits of a wider deployment are outweighed by the residual medical concerns identified by DOMILL; particularly in respect of special population groups.
- 3.2 For this reason it is felt that the use of the Taser should be deliberately constrained by policy for the purpose of the trial through a controlled and evaluated sample.
- 3.3 The ACPO consider that taser has a role in situations where individuals are armed or otherwise so dangerous that the use of a firearm, by an officer, may be necessary. As a consequence the policy for the trial will encompass the following:
  - The pilot will last for 12 months and will be managed by the ACPO to ensure a corporate approach;
  - Taser will be restricted to selected authorised firearms officers in the following forces;
    - Lincolnshire Police:
    - Metropolitan Police;
    - Northamptonshire Police;
    - North Wales Police;
    - Thames Valley Police.
  - Taser will only be deployed in circumstances where firearms officers are authorised to carry firearms:
  - Taser will be readily available and will only be deployed alongside conventional firearms;
  - The command structure will be in accordance with current advice contained within the Manual of Guidance on Police Use of Firearms with respect to conventional weaponry;
  - Officers will be trained in line with the above principles.

### 4 OPERATIONAL AND TRAINING ISSUES

- 4.1 Due to the diverse nature of policing operations it is not possible to provide a definitive list of circumstances where the use of taser would be appropriate. Operational guidance on police use has been written to inform and support decision making in relation to an operational trial stipulating training, deployment and use.
- 4.2 The intention is to provide Chief Officers, operational commanders and firearms officers, in participating police areas, with written guidance on the use of the equipment. Throughout the trial, the issue, deployment and use of the taser will conform to the well established guidance already laid down in the ACPO Manual of Guidance on Police Use of Firearms.

- 4.3 Detailed instruction on the characteristics, operation and use of the taser will be covered in the training and documentation provided to officers to be accredited in its use.
- 4.4 For the purposes of this trial no-one will be voluntarily subjected to the effects of taser under any circumstances.

## 5 POST INCIDENT PROCEDURES

- 5.1 Chapter 6 of the ACPO Manual on Police Use of Firearms sets out guidance to be used where conventional police firearms are discharged.
- 5.2 In situations where the taser is discharged, appropriate post incident procedures will be implemented depending on the nature of the injury or harm occasioned. An investigation will be undertaken by an Initial Investigating Officer.
- 5.3 For the purposes of this trial the term 'use of the taser' will include any of the following actions carried out in an operational setting:
- 5.4 Drawing of a device in circumstances where any person perceives the action as a use of force or threat of a use of force, whether or not this is accompanied by a verbal warning, sparking of the device or placing of the laser sight red dot onto a subject.
- 5.5 Firing of a device so that the barbs are discharged at a subject. Application and discharge of a device in 'touch stun mode' to a subject.
- 5.6 For the purposes of this trial, all uses which fall Into 2 or 3 above will be referred to the Police Complaints Authority (PCA) for their information and a decision as to whether they will supervise the investigation. In relation to any use that falls into 1 above, the PCA will be notified by the ACPO Firearms Secretariat, who can give advice where necessary.
- 5.7 In the event of an unintentional discharge where there has been no danger to the public, this will be subject to an internal investigation. In this case referral to the PCA will be a matter for individual Force management.

## **6 EVALUATION**

6.1 This trial will be independently evaluated.

Operational usage will be reviewed at regular intervals to ensure that emerging issues are properly reflected in training and operational guidance. Representatives of DSTL, DOMILL and PSDB will be invited to contribute to the process.

Evaluation questionnaires will be completed on every occasion where taser is deployed to a policing operation where the use of firearms has been authorised.

### 7 REVIEW

7.1 This policy will be subject to regular review.

# **Operational Trial of Taser**



# **Operational Guidance**

# Operational Trial of Taser Involving Authorised Firearms Officers.

# Notes for Guidance on Police Use

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## **Preface**

- 1.1 Managing conflict and responding to violence are core police functions. Police response is underpinned by Human Rights and in particular the obligation under Article 2 of the European Convention on Human Rights, to uphold the right to life.
- 1.2 This guidance is intended to inform a pilot project, designed to trial the M26 Advanced Taser (hereafter referred as the taser), electrical incapacitation device. The trial will be limited to authorised police firearms officers in nominated forces and will be subject to critical and independent review. The trial will have a duration of twelve months.
- 1.3 The use of the taser will be informed by reference to the ACPO Conflict Management Model, and is intended to provide firearms officers with an additional means of dealing with threats of serious violence. The availability or deployment of the taser should not be considered as a replacement for conventional firearms.
- 1.4 The decision to move to an operational trial has been informed by the detailed research programme on electrical incapacitation devices, undertaken on behalf of ACPO by the Police Scientific Development Branch (PSDB) of the Home Office. This included a review of the medical implications of the use of such devices.
- 1.5 Authorised Firearms Officers (AFOs) are, in accordance with the ACPO Manual of Guidance, on Police Use of Firearms, issued with firearms where the authorising officer has reason to suppose that they, in the course of their duty, may have to protect themselves or others from a person who is
  - in possession of a firearm; or
  - has immediate access to a firearm; or
  - is otherwise so dangerous that the officer's use of a firearm may be necessary.
- 1.6 The police use of force is governed by:
  - Common Law;
  - Section 3 Criminal Law Act 1967;
  - Section 117 Police and Criminal Evidence Act 1984;
  - The Human Rights Act 1998.
- 1.7 Article 2 of the UN Basic Principles on the use of Force and Firearms states that:

'Governments and law enforcement agencies should develop a range of means as broad as possible and equip law enforcement officials with various types of weapons and ammunition that would allow for a differentiated use of force and firearms.'

1.8 The trial of the taser is intended to provide firearms officers, in participating areas, with a differentiated use of force and firearms. The taser will, where appropriate, be deployed alongside conventional firearms and other less lethal technologies already on issue to firearms officers in participating forces.

- 1.9 Throughout the trial, the issue, deployment and use of the taser will conform to the well-established guidance already laid down in the ACPO Manual of Guidance on Police Use of Firearms. The following issues are therefore relevant:
  - The command issues as set out in the Manual deal with the management of incidents at which firearms officers are deployed as opposed to specific use of force options;
  - The authorisation to deploy firearms will include the full range of conventional firearms and less lethal weapons available to those officers;
  - The post incident procedures set out in the Manual are specific to the use of conventional weapons;
  - In situations where conventional firearms are not discharged, appropriate post incident procedures following the use of the taser will be implemented depending on the nature of the injury or harm occasioned.
- 2.0 The guidance will, if necessary, be refined during the trial and it is anticipated that the trial itself will inform the development of operational best practice.

#### 1 Introduction

- 1.1 The purpose of this guidance is to inform and support decision making in relation to the operational trial, training, deployment and use of the taser. All participating Forces will be evaluating the M26 Advanced Taser (hereafter referred to as the taser).
- 1.2 The intention is to provide Chief Officers, operational commanders and firearms officers with written guidance on the use of the equipment.
- 1.3 Detailed instruction on the characteristics, operation and use of the taser will be covered in the training and documentation provided to officers to be accredited in its use.

## 2 Description of equipment

- 2.1 The taser is a single shot weapon designed to temporarily incapacitate a subject through the use of an electrical current, which temporarily interferes with the body's neuromuscular system. The electrical output of the device is around 26 watts. The weapon is shaped like and shares the handling characteristics of a modern self-loading pistol.
- 2.2 The taser is laser-sighted and uses cartridges attached to the end of the 'barrel'. The cartridges project a pair of barbs or darts attached to insulated copper wires. The absolute maximum range of the device is currently 21 feet (6.4 metres); this being the length of the wires that carry the current and attach the barbs to the weapon. It may also be used in a direct contact stun mode.
- 2.3 The device delivers a sequence of very high voltage pulses of very short duration through the copper wires.
- 2.4 The normal reaction of a person exposed to the discharge of the taser is the loss of some voluntary muscle control resulting in the subject falling to the ground or 'freezing' on the spot. The device relies on physiological effects other than pain alone to achieve its objective.

## 3 Modes of operation

- 3.1 The taser may be operated with or without the cartridge designed to fire the wires and contact barbs.

  The electrical flow can therefore be delivered to a subject either by:
  - means of two barbs, attached to the weapon by fine insulated wires, fired into the subject or their clothing; or
  - direct contact with the device in 'touch stun' mode. This method of delivery can only be achieved when either no cartridge or a discharged cartridge is fitted.
- 3.2 To be effective, the taser batteries must be sufficiently charged, the wires connecting the barbs to the taser require to remain intact, both darts (or in 'touch stun mode' both electrodes) require to make contact with the subjects body or clothing.

#### 4 Effects of the Taser

- 4.1 In either mode the taser delivers its electrical charge in a five-second cycle (which can be broken or repeated), but once the cycle ends or is broken, the direct incapacitation effect ceases.
- 4.2 In most cases this application will be sufficient to render a subject incapable of continuing an attack and is likely to result in the subject collapsing to the ground. The effect is not intended nor is it likely to render the subject into a state of unconsciousness.
- 4.3 The effects are likely to be instantaneous. It should, however, be remembered that no incapacitating device, including conventional firearms, is universally effective and there may be individuals on whom the taser may not be effective at all or only partially so.
- 4.4 The direct incapacitating effect is only likely to last for as long as the electrical charge is being activated. The subject may recover immediately afterwards and could continue with their previous behaviour. It is therefore important that an incapacitated subject is approached and restrained quickly and effectively.
- 4.5 Whilst the 5 second cycle electrical charge can be repeated if the incapacitation effect does not appear to take effect, there may be technical or physiological reasons why the device is not working as expected on a particular individual, officers should therefore immediately consider other options.

#### 5 Issue/Possession

- 5.1 For the purpose of this trial the taser will only be issued alongside conventional firearms to authorised firearms officers who have successfully completed approved ACPO sponsored training in the use of the device. The authority for the issue of taser will therefore be in line with individual forces operating procedures for the issue of firearms.
- 5.2 Electrical Incapacitant Devices are classified as 'prohibited weapons' by virtue of Sec. 5 Firearms Act 1968. Police officers, whilst acting in their capacity as such, are exempt from the requirements of the legislation and do not need any additional legal authority to possess the taser.
- 5.3 The taser should not be regarded as a replacement for other routinely issued protective equipment or for conventional firearms but rather one of a number of options. An officer may also need to resort to another option if the device does not have the effect intended.

- 5.4 In circumstances where authorised firearms officers have been deployed to a situation, the authorisation to utilise their firearm will also include the authority to use any other less lethal option or technology with which they have been issued including where appropriate the taser.
- 5.5 It would be inappropriate for commanders or supervisory officers to attempt to restrict the deployment of an authorised firearms officer to a particular less lethal technology or use of force option.
- 5.6 The limited range and single shot capability of the taser are constraining factors. For this reason taser will only be deployed alongside conventional firearms.
- 5.7 The taser normally causes immediate incapacitation and its effect may also cause muscles to contract. This may result in immediate and involuntary clenching of the fingers and/or the arms rising uncontrollably. This potential reaction requires to be factored into any decision to utilise the taser against a subject actually holding what is believed to be a firearm, as the application of the taser may cause the subject to unintentionally and indiscriminately discharge the firearm.
- 5.8 However, if the firearm is merely close to hand the taser may be useful in preventing the subject gaining access to the weapon. Because of the extreme dangers, use in such circumstances should be carefully considered.

#### 6 Possession outside Force area

6.1 Firearms officers are on occasions deployed outside of their immediate Force area. Chief Officers in pilot Forces will agree a protocol with neighbouring Forces (Appendix A) that enables officers equipped with the taser to utilise the device should they be required to respond in a neighbouring Force area. Individual Chief Officers will remain vicariously liable in civil law for their own officers' actions. Guidance for the use of the taser, whether within or outside the Force area, is set out below.

### 7 Specific Risk factors

- 7.1 Occasions will arise where it is necessary to use the taser on a person who is exhibiting violent behaviour and who is also suffering from a mental disorder or illness. Where it is possible to discuss options with mental health professionals present at the scene, this should be considered.
- 7.2 In pre-planned joint activities such discussions could form part of any briefing for the event. Consultation with friends, relatives etc. who are likely to know the person well may also assist in deciding on the most appropriate use of force response. Consultation with Health Authorities and Social Services in this respect will form part of the implementation plan. (See independent medical statement Appendix 'B'). The final decision to use the taser in these circumstances will rest with the officer concerned.
- 7.3 Similarly where it becomes apparent that the subject has an existing medical condition or is under the influence of drugs, assessment of these additional risk factors should be made in determining the appropriate option.
- 7.4 Research by PSDB has demonstrated that there is a risk of flammability if someone has already been sprayed with an incapacitant containing a flammable solvent, this is the case with CS Spray and PAVA. Clearly, there is also a risk of flammability where the subjects clothing is doused with other flammable liquids. These might include, but are not limited to, lighter fuel, petrol and strong alcoholic spirits.

- 7.5 This heightened risk must be factored in assessing the 'appropriateness' and 'necessity' of using a taser. It is however recognised that there are circumstances where the only alternative may be the use of a conventional, potentially lethal firearm, or where activation of the taser irrespective of the additional risk is absolutely necessary to protect life.
- 7.6 The taser should not be utilised in an environment where, due to the presence of a flammable substance in the atmosphere or escaping gas, its use is likely to result in an even more hazardous situation.
- 7.7 The normal reaction of a person exposed to the discharge of a taser is the loss of some voluntary muscle control resulting in the subject falling to the ground or 'freezing' on the spot. For this reason there is clearly a possibility of some secondary injury to the tasered subject, caused by falling and striking a hard surface. Particular attention should therefore be paid to the immediate environment and to assessing any additional risk factors. This issue will be particularly relevant where the subject is located at some height above the ground where there is increased risk from a fall.
- 7.8 There is a specific risk of injury to the eye through penetration of a barb. Barb penetration in the neck or head may also increase the level of injury. For this reason the taser should not be aimed so as to strike the head or neck of a subject unless this is wholly unavoidable. The laser sight should not intentionally be aimed at the eyes of the subject.

## 8 Training

- 8.1 The aims and objectives of training in the use of the taser are contained in the Taser Training Programme manual.
- 8.2 Tactical training in the use of the taser should emphasise precautions in relation to the specific risk factors contained in this guidance.
- 8.3 Authorised Firearms Officers are trained in conflict management and must be aware of the dangers associated with the conditions known as positional asphyxia and excited delirium.
- 8.4 It is important that officers have an appreciation of the physical and psychological effects of electrical incapacitation devices.

### 9 Use

- 9.1 Use of the taser is one of a number of tactical options available to an officer who is faced with violence or the threat of violence. Its purpose is to temporarily incapacitate an individual in order to control and neutralise the threat that they pose.
- 9.2 The duration of the initial discharge and any subsequent discharge must be proportionate, lawful, appropriate, necessary and non-discriminate, in all the circumstances. The decision to use the taser is an individual one for which the officer will be accountable. The Conflict Management Model should assist officers in making such judgements.
- 9.3 Officers will carry out appropriate functions checks in accordance with their training whenever the weapon is issued.

- 9.4 When the taser is discharged at a subject, a large separation of the two barbs is desirable in order to provide maximum incapacitation. The separation of the barbs increases with range. It is also important that the barbs penetrate the subjects' skin or at least attach onto their clothing, otherwise the circuit cannot be completed.
- 9.5 The taser is sighted so that the top barb will strike in the area of the projected laser sight. It is acknowledged that there will be diminished accuracy and a fall off in trajectory at ranges in excess of 15 feet (4.6 metres). Ordinarily the taser should be aimed to strike the body mass below the neck. Because of the specific risks previously highlighted (para 7.8) the taser should not be aimed so as to strike the head or neck of a subject unless this is wholly unavoidable. The laser sight should not intentionally be aimed at the eyes of the subject.
- 9.6 In stun mode the taser should be pressed directly to the subjects body. Unless absolutely necessary in order to protect life the taser should not, due to increased factors, be applied directly to the subjects' neck or head.
- 9.7 The risk of an officer receiving an electric shock whilst handling a subject who is being tasered is low provided that the officer does not place any part of their body directly between the points of contact of the barbs on the subjects' body.

## 10 Oral and Visual warnings

- 10.1 Where circumstances permit, officers should give a clear warning of their intent to use the taser, giving sufficient time for the warnings to be observed, unless to do so would unduly place any person at risk, or would be clearly inappropriate or pointless in the circumstances of the incident.
- 10.2 It may in certain circumstances be appropriate to provide a visual display of the sparking effect of the unloaded taser in order to induce compliance, thus avoiding the need to actually discharge the taser at the subject.
- 10.3 The visual effect of the laser sight being directed at an individual may also have a deterrent effect.
  Officers should be aware that the pointing of a taser at an individual represents a use of force and may in certain circumstances constitute an assault.
- 10.4 Police officers shall give the clear verbal warning 'Taser, Taser' indicating to all persons in the vicinity that taser is being discharged.

### 11 Aftercare

- 11.1 Recovery from the direct effects of the taser should be almost instantaneous, once the current has been turned off. After application of the taser and once the subject has been properly restrained it is important that the officer provides verbal reassurance as to the temporary effects of the taser and instructs the subject to breathe normally. This will aid recovery and mitigate against hyperventilation.
- 11.2 The barbs are designed to penetrate either the clothing or the skin. Injuries caused by taser barbs penetrating the skin are normally minor. Ordinarily, the copper wire attached to the barbs should be broken or cut close to the barbs so as to avoid trailing wires. When doing this particular care must be taken to avoid pulling on the wires with the barbs still attached to the skin.

- 11.3 No attempt should be made to remove the barbs which have penetrated the skin. This should be done by a medical professional either at the scene, at a hospital or in the custody suite. However, officers also have a duty of care in relation to the well-being of individuals under their control. Where it is evident that the barbs are attached to clothing (with no penetration of the skin) they may be removed by gently pulling on the barbs. Care should be taken not to unnecessarily further damage the clothing.
- 11.4 Once the barbs are removed, they must be secured as evidence and any injury or damage noted. Barbs removed from the body should be considered as biohazards. It is important that suitable evidential containers are readily available. Once removed the barbs must be examined to ensure that they are complete.
- 11.5 More serious injuries could occur if the barbs were to strike a sensitive area such as the face, eyes, neck or genital areas. In the event of a person being struck in these areas only suitably qualified medical personnel should remove the barbs. In most cases such a resource is only likely to be available at a hospital.
- 11.6 Where officers are informed or come to believe that a person to whom the taser had been applied has a cardiac pacemaker in place, immediate referral should be made to a hospital. Similarly, if the subject is found to have any other pre-existing medical condition that might lead to increased medical risk immediate referral to a hospital should be considered.
- 11.7 During the operational trial all arrested persons who have been subjected to the discharge of a taser, must be examined by a Forensic Medical Examiner as soon as practicable.
- 11.8 Close monitoring of a subject throughout the period following application of the taser is of utmost importance. If the person is detained in a cell they should be subject to the same cell supervision provided for persons who have consumed alcohol or drugs. If there are any signs of adverse or unusual reactions then medical attention should be provided immediately and if necessary this must be given precedence over conveying the subject to the police station.
- 11.9 Experience from the use of tasers in other countries, which is supported by medical assessment in the UK, has shown that the persons most likely to be at greatest risk from any harmful effects of the taser device are those also suffering from the effects of drugs or who have been struggling violently. There are cases where such persons exposed to the effects of taser have died some time after being exposed although the cause is unlikely to have been taser itself. For this reason, such persons should be very closely monitored following exposure to the effects of the taser. In addition, and as highlighted in other guidance, if there is any suspicion at all that the violent behaviour of any subject is being caused by excited delirium, they should be treated as a medical emergency and conveyed directly to hospital.
- 11.10 At the earliest opportunity following arrival at the custody suite any person who has been subjected to a taser discharge should be given an information leaflet describing the taser, its mode of operation and effects. (See Appendix 'C'). This should be fully explained and recorded on the custody record.

#### 12. Post Incident Procedures

12.1 Taser will have been issued under a firearms authority. Chapter 6 of the ACPO Manual on Police Use of Firearms sets out guidance to be followed where conventional police firearms are discharged.

- 12.2 In situations where the taser is discharged, appropriate post incident procedures will be implemented depending on the nature of the injury or harm occasioned. An investigation will be undertaken by an Initial Investigating Officer.
- 12.3 For the purposes of this trial the term 'use of the taser' will include any of the following actions carried out in an operational setting:
  - drawing of a device in circumstances where any person perceives the action as a use of force or threat of a use of force, whether or not this is accompanied by a verbal warning, sparking of the device or placing of the laser sight red dot onto a subject;
  - 2. firing of a device so that the barbs are discharged at a subject;
  - 3. application and discharge of a device in 'touch stun mode' to a subject.
- 12.4 For the purposes of this trial, all uses which fall into 2 or 3 above will be referred to the Police Complaints Authority (PCA) for their information and a decision as to whether they will supervise the investigation. In relation to any use that falls into 1 above, the PCA will be notified by the ACPO Firearms Secretariat, who can give advice where necessary.
- 12.5 In the event of an unintentional discharge where there has been no danger to the public, this will be subject to an internal investigation. In this case referral to the PCA will be a matter for individual Force management.
- 12.6 In addition to the data logging system when a taser cartridge is discharged a number of Identification (AFID) tags are expelled. This provides an additional means of auditing of the weapon.
- 12.7 Following an operational discharge the data should be downloaded as soon as possible. This procedure should be undertaken by a suitably qualified officer as directed by the IIO.
- 12.8 The data record, cartridge, AFID tags and barbs will be secured and retained as evidence. With the approval of the investigating officer the taser may be returned to operational use.
- 12.9 The welfare of principal officers must be considered when undertaking any investigation following a critical incident even where little or no injury has been caused.

## 13. Battery Maintenance

13.1 Proper maintenance of the taser batteries is vitally important to the weapons operation. Guidance on this issue is included in maintenance forms for the device and batteries. (see appendix 'D' & 'E')

## 14. Dataport Auditing

- 14.1 An internal data logging system within the taser records the details of the previous 585 activations. This shows the exact time and date that the current was discharged. Details of activations can be downloaded via the dataport on to computer.
- 14.2 Taser data will be downloaded on a weekly basis. This information will be retained to provide an audit trail of the activation of each taser.

# 15. Storage and Administration

- 15.1 In storing the taser the following legislation must be complied with:
  - Health and Safety at Work etc. Act 1974;
  - Control of Substances Hazardous to Health Regulations 1989;
  - Management of the Health and Safety at Work Regulations 1992.
- 15.2 In addition the manufacturer's guidelines for storage of the taser should be considered.
- 15.3 A generic risk assessment regarding the taser is attached at Appendix 'F'. Individual forces should undertake appropriate risk assessments in respect of storage and carriage. Electrical devices should not be stored alongside pyrotechnics, ammunition, specialist munitions or flammable products.
- 15.4 A comprehensive list of Health and Safety legislation is provided at Appendix 'G'.
- 15.5 An evaluation form (see Appendix 'H') is to be completed for every operation where taser is deployed.

# Appendix A

## Association of Chief Police Officers - Operational Trial of Taser

#### **Cross Border Protocols**

The current situation across the region is that there are a number of Forces which have equipped officers with the taser.

On borders of Forces, it is not uncommon for armed officers to cross boundaries when operationally necessary.

With the likelihood of mutual aid between Forces a cross border protocol is required in the deployment of the taser.

It is clear that the Chief Constable of each Constabulary has a duty of care to their officers regardless of whether they are operating within their own Force boundaries or in adjacent Force areas.

In order to achieve a unified approach to this issue, the following draft protocol is proposed:

"It is agreed that the Chief Constable of a Constabulary has a duty of care to their officers, regardless of whether they are operating within their own or other force areas. It is agreed, therefore, that Forces will allow the carriage and operational use of the taser, as per national guidance in line with the Conflict Management Model"

ACPO Conflict Management, September 2002

# Appendix B

## Statement on the medical implications of the use of the M26 Advanced Taser

## **Background**

The role of the DSAC<sup>17</sup> Sub-committee on the Medical Implications of Less Lethal Weapons (DOMILL) is to provide the Secretary of State for the Home Department and the Secretary of State for Northern Ireland with:

- a. Advice on the medical implications of generic classes of less lethal (LL) weapon systems (which includes biophysical, pathological and clinical aspects);
- b. Independent statements on the medical implications of use of specific LL systems, when used according to the formal guidance provided to users;
- c. Advice on the risk of injury from identified LL systems striking specific areas of the body, in a format that would assist users in making tactical decisions, and developing guidance to users to minimise the risk of injury.

This advice is in support of the UK Government's requirements arising from:

- a. Recommendations 69 and 70 of the Patten report into policing in Northern Ireland<sup>18</sup>: (i) a research programme to find an acceptable, effective and less potentially lethal alternative to the Baton Round, (ii) provision of a broader range of public-order equipment to the police;
- b. The desire of the Association of Chief Police Officers (ACPO) to have a wider range of options in conflict management scenarios, including those most commonly associated with self-defence and restraint, and the police use of firearms.

In summer 2000, the Secretary of State for Northern Ireland set up a UK-wide inter-departmental Steering Group to co-ordinate a programme to address both requirements.

The report of the Steering Group on Phase 2 of the programme described the various classes of LL weapon systems being evaluated to address the requirements<sup>19</sup>. The report categorises the technologies according to the requirement for research and evaluation. Within Category A (devices which may be subject to research and evaluation immediately) are electrical incapacitation devices, specifically Tasers.

#### **Evaluation of Tasers**

Tasers are hand-held devices that propel two barbs at an individual. The barbs are intended to attach to the skin or clothing on the torso and/or lower limbs. A sequence of very short duration high voltage current pulses passes through wires connecting the device to the barbs. The current flows into the body and results in a loss of muscular control and in pain. Some models also enable direct contact of the Taser hand-set to the surface of an individual; two closely spaced fixed electrodes pass the current pulses into the subject. This manner of application is usually classed as use in "stun" or "probe" mode; pain is the principal local physiological effect.

<sup>17</sup> Defence Scientific Advisory Council.

<sup>18</sup> Report of the Independent Commission on Policing in Northern Ireland; September 1999.

Patten Report Recommendation 69 and 70 Relating to Public-Order Equipment – A research programme into alternative policing approaches towards the management of conflict. Second Report of the Steering Group; November 2001. www.nio.gov.uk/policing.htm.

The Police Scientific Development Branch of the Home Office has undertaken an evaluation of a number of commercially available Taser devices. The evaluation addressed barb accuracy and dispersion, the measurement of electrical output and reliability, a review of manufacturers' claims and handling characteristics in a number of test scenarios. DOMILL also undertook a general review of the medical implications of the use of Tasers.

On the basis of the objective technical and medical evaluations, and the policy underpinning the development of a broader range of options for conflict management in the UK, ACPO has proposed that an operational trial of the M26 Advanced Taser should take place. DOMILL was invited to provide this current statement for Ministers on the medical implications of the use of the M26 Advanced Taser in an operational trial.

## Guidance on use by police of the M26 Advanced Taser

The policy and practice defining the training for use, deployment and operational use of a weapon system is central to an assessment of the medical implications of that use. The ACPO Guidance states that an operational trial would be limited to firearms officers in selected police forces. The M26 Advanced Taser would provide firearms officers with additional means of dealing with threats of violence in which conventional firearms and other less lethal tactical options may be deployed. Such options include batons, sprays of sensory incapacitant, and "empty hand" physical restraint.

Deployment and use of the Taser would conform to the principles of guidance already laid down in the ACPO Manual of Guidance on Police Use of Firearms. The trial would be subjected to critical and independent review.

## Technical approach for the assessment of medical implications of use

The milestones placed upon DOMILL by the Steering Group dictated the nature of the technical approach: a wide-ranging review of literature and preliminary analytical studies on the biophysical interaction of Taser current pulses with the body. On behalf of DOMILL, the Defence Science and Technology Laboratory (Dstl) undertook a comprehensive review of information publicly available, and provided by manufacturers and police forces in North America. Over 800 references were acquired and reviewed. The review encompassed:

- a. basic neurophysiological science to consider the mechanism of the interaction with excitable tissues;
- peer-reviewed scientific and medical papers specifically addressing laboratory and operational use
  of Tasers and stun weapons: electrical output, risks to personnel, analyses of medical issues
  observed in hospital facilities in individuals subjected to Tasers, and the circumstances surrounding
  the deaths of personnel subjected to Tasers in the course of their arrest;
- c. evidence on the risks provided by manufacturers: scientific, medical, use on volunteers and records of operational use;
- d. the basis of the application of electrical safety standards and criteria to Taser outputs;
- e. newspaper reports of Taser use and complications arising from use;
- f. surveys of effectiveness and injuries observed and recorded by law enforcement agencies in the United States and Canada;
- g. peer-reviewed papers on the hazardous effects of electric fields on physiology.

The review by Dstl was conducted by cardiac and nerve electrophysiologists, physicists and engineers specialising in the interaction of electrical energy with the body, and trauma specialists.

Dstl also undertook computer-based modelling of the interaction of Taser pulses with the body. The primary purpose was to assess qualitatively the distribution of currents from Tasers in the body, and to determine semi-quantitatively the changes in current magnitude and distribution for different barb separations and Taser outputs.

DOMILL endorsed Dstl's approach and reviewed the substantial body of information compiled by Dstl. This statement is based on these data.

## **Classification of Taser outputs**

Tasers have been classed by users as "low-power" (5-7 Watt) or "high-power" (14-26 Watt). Tasers have been in use for over 20 years, principally in the US. Over most of this period, only low-power Tasers were available, deployed and used. High-power Tasers have been available and in use on volunteers and operationally for about two years; the M26 Advanced Taser is classed as high-power. Assessments undertaken by the PSDB showed that the principal differences in measured output between low- and high-power Tasers were the pulse repetition rate and pulse duration; differences in peak current and voltage between devices were also noted. Dstl modelling studies showed that the magnetic field strength in the body (an index of current) was greater with the high-power Tasers.

### The evidence of hazard and risk from the M26 Advanced Taser

The body of manufacturers' experimental evidence from biological models of the hazardous and intended effects of Taser on excitable tissues is not substantial, particularly with regard to the M26; the peer-reviewed evidence is even more limited. The epidemiological evidence to assess the hazards associated with use of the M26 Advanced Taser is not as robust as that for the low-power models. However, the manufacturer's database of over 1600 operational uses of the M26 and reports from law enforcement agencies in North America did offer some insight into the risks and nature of injuries.

#### Classification of injuries

Unintended adverse effects from the use of Tasers may be classed thus:

- Primary: immediate or delayed consequences of electrophysiological phenomena resulting directly
  from the current flow in the body; it is surmised from the known effects of electric fields and
  currents on the body (for example, lightning, electric fence controllers) that the organ of principal
  concern is the heart;
- Secondary: physical trauma directly associated with Taser use, principally injuries from the barbs and falls; the head is the principal area at risk;
- Coincidental: injuries received in the incident not directly related to Taser use e.g. baton use, self-inflicted wounds, gun-shot wounds.

It is notable that in two surveys from law-enforcement agencies in North America, more than half of the number of people confronted with the M26 Advanced Taser were impaired by alcohol, drugs or mental illness. Some drugs and metabolic consequences of muscular activity are believed to increase the susceptibility of the heart to potentially life-threatening disturbances of rhythm (arrhythmias).

#### Conclusions

On the basis of the evidence, the following conclusions are offered on the medical implications of the use of the M26 Advanced Taser in an operational trial that may be undertaken within the terms of the ACPO Guidance provided to DOMILL.

**Deaths:** Over the period of use of low-power Tasers, there have been a small number of deaths associated with a large number of operational uses. One paper discusses 16 deaths over a 4 year period in Los Angeles<sup>20</sup>. Other factors such as pre-existing heart disease and drug use were implicated in these reported deaths. On the available evidence, DOMILL considers it extremely unlikely that a death from primary injuries has been caused by a low-power Taser.

With regard to the high-power M26 Advanced Taser, the risk of death from primary injury is low and in common with low-power Tasers, is certainly very much lower than that from conventional firearms. Deaths have been reported to be associated with (but not necessarily caused directly by) use of the M26. DOMILL is not aware of any deaths from primary injuries with this weapon, in both operational and volunteer use in North America.

The confidence of the opinion of a very low risk of death from future use of the M26 is not as high as that for the low-power devices. This uncertainty arises from the smaller numbers of historical operational uses, and the dearth of information on the potentially adverse electrophysiological effects of the higher current flow in the body, particularly in subjects who may have a predisposition to cardiac arrhythmias arising from drug use, pre-existing heart disease or genetic factors.

DOMILL is not aware of any deaths arising from the secondary consequences of Taser use.

**Life-threatening and serious injuries:** The risk of life-threatening injuries and of other serious injuries such as the loss of an eye, is considered to be very low. The intuitive high risk of serious head injury from an uncontrolled collapse is not manifested in practice; most subjects apparently collapse in a semi-controlled manner.

The probability of impact of a barb on the surface of the eye is considered to be low. The impact of barbs on the head has occurred operationally; non-operational evaluation trials on targets have also resulted in head impacts. On the basis of trial data, it is probable that by employing the ACPO Guidance, fewer than 1% of upper barb impacts will hit the head. In the worst case of frontal application, the eyes are a small proportion of the presented area of the head.

The PSDB has shown in trials that the Taser may cause combustion of flammable solvents on the subject's clothing. This may result in serious burns to the torso and head; the Guidance to Users must highlight and control the risk from flammable liquids such as petrol on the subject.

**Other effects:** Falls may result in abrasions, scratches, minor lacerations, swellings and areas of redness on the skin. Minor secondary trauma from the penetration of the skin by the barbs will occur; there is sufficient experience from North America to effect simple removal by UK medical professionals.

Some of the barb penetrations will exhibit small circular burns; areas of skin where current has entered the body from barbs retained in clothing may also exhibit burns. These burns are likely to resolve within a few days, without complications and the need for medical intervention.

DOMILL is not aware of any evidence that the Taser would induce an epileptic seizure.

The M26 Taser has a US laser classification that indicates that it is potentially hazardous for *intrabeam* viewing of its sighting laser. The classification according to British Standards and the potential to cause injury must be determined.

**Use on drug and cardiac-impaired individuals:** It is believed that drugs such as cocaine and preexisting heart disease may lower the threshold for cardiac arrhythmias. Many of the 16 fatalities associated with use of the low-power Tasers in the Los Angeles survey had also taken PCP (phencyclidine) prior to the incident. PCP is also thought to be pro-arrhythmogenic but is infrequently encountered as a substance of abuse in the UK.

There is no experimental evidence that the aforementioned pro-arrhythmic factors increase the susceptibility of the heart to low- or high-power Tasers specifically, sufficient to cause an arrhythmic event. Nevertheless, there is sufficient indication from the forensic data and the known electrophysiological characteristics of the heart (and the effects of certain drugs on this) to express a view that excited, intoxicated individuals or those with pre-existing heart disease could be more prone to adverse effects from the M26 Taser, compared to unimpaired individuals. The ACPO Guidance to Users reflects this view.

**Overall:** From the available evidence on the use of the device, the risk of life-threatening or serious injuries from the M26 Advanced Taser appears to be very low.

#### Recommendations

Research should be undertaken to clarify the cardiac hazards associated with use of the Taser on individuals who could be considered to have a greater risk of adverse effects. The principal investigations should address:

- a. Accurate, quantitative estimates of the magnitude of the magnetic and electric field strengths from the M26 in potentially vulnerable parts of the body; this would require enhancement of the preliminary model developed by Dstl. These data will focus the investigations in (b) and (c) below;
- Possible hypersusceptibility to Taser currents arising from drugs commonly used illegally in the UK, acidosis and pre-existing disease; in vitro tissue models are available that could be used to address these issues;
- c. The vulnerability of pacemakers and other implanted devices; this issue requires a more thorough review. Experimental studies to assess electromagnetic incompatibility issues are currently not warranted and should await the outcome of the review.

DOMILL does not consider it *essential* from a medical perspective that these studies are completed before approval is considered for the M26 Advanced Taser trial under the terms of the ACPO Guidance.

The output of the sighting laser of the M26 Taser should be measured, classified according to British Standards and operated to reduce the risk from the ocular hazard.

Forensic Medical Examiners (FME) and appropriate clinical staff in the principal hospitals within the areas of the police forces participating in the trial should be briefed on the nature of the M26 Advanced Taser, clinical and operational experience from North America, and the presumed and known risk factors. Additionally, it is recommended that a paper be prepared addressing these issues and the wider policy underpinning use, for submission to an appropriate clinical journal.

At the end of any operational trial (or 6 months after commencement, whichever is earlier), the Home Office should provide DOMILL with a report outlining the circumstances of every use of the M26 Advanced Taser, the post-incident medical assessments undertaken by the FME, and the clinical consequences noted by the FME or clinical staff. DOMILL should be advised as soon as practical of any primary or secondary injury that could be classed as life-threatening, unexpected, or potentially leading to disability.

DOMILL should inspect the M26 Training Programme Manual to advise on the specific medical risk factors declared in the document.

DOMILL should be advised of any changes in:

- a. the specification or performance of the M26 Advanced Taser;
- b. the guidance to users, and training practices;
- c. the policy and practice of deployment, use and audit.

[signed]

Chairman, DSAC Sub-committee on the Medical Implications of Less Lethal Weapons.

# **Appendix C**



# Association of Chief Police Officers - Operational Trial of Taser

#### Information leaflet for persons upon whom the M26 Advanced Taser has been used.

You have been subjected to the effects of the M26 Advanced Taser. The taser passed short pulses of electricity into your body. The electricity made your muscles contract. You may have lost balance and fallen to the ground.

The device was used by a specially trained police officer.

During, or shortly after the use of the taser, you may have experienced the following:

- Dazed for several minutes;
- Muscle twitches;
- Loss of memory of the event;
- Unsteadiness, and a spinning sensation;
- Temporary tingling;
- Weakness in the limbs;
- Local aches and pains, and tissue swelling.

These sensations are normal effects of the taser.

If any of these effects are still present a day later, see a Doctor.

You may have two small marks like bee stings in your skin. These are small puncture wounds from the short needles used to inject the electricity directly into your skin. There may be small burns similar to sunburn around the marks. These should return to normal in a few days. If they do not and there is pain and swelling, you may have a local infection – see a Doctor.

If the probes only stuck in your clothing, you may still have two small areas of skin underneath that look sunburned.



# Association of Chief Police Officers - Operational Trial of Taser

#### Information for General Practitioners

#### Introduction

The Police are undertaking an operational trial of the M26 Advanced Taser. This equipment has been made available to specially trained firearms officers to provide them with a less lethal option in incidents where they are confronted with an armed individual, and the officers and members of the public are at risk of serious injury or death.

Tasers are hand-held devices that fire two barbs at an individual. The barbs are intended to attach to the skin or clothing on the torso and/or lower limbs. The barbs are attached to the taser handset by thin wires. A sequence of very short duration high voltage current pulses passes through wires connecting the handset to the barbs. The current flows into the body and results in a loss of muscular control and in pain. The M26 Advanced Taser also enables direct contact of the taser handset to the surface of an individual; two closely spaced fixed electrodes pass the current pulses into the subject. This manner of application is usually classed as use in "stun" or "probe" mode; pain is the principal local physiological effect.

The M26 Advanced Taser has been available and in use on volunteers and operationally for about three years in the US and Canada. Prior to this, lower power tasers were used for about 20 years.

The medical implications of use of the M26 Advanced Taser in the operational trial by the Police have been reviewed by an independent panel of clinicians, and their statement was part of the evidence considered by Government prior to the decision to authorise the trial.

## Classification of injuries

Unintended adverse effects from the use of tasers may be classed thus:

- Primary: immediate or delayed consequences of electrophysiological phenomena resulting directly from
  the current flow in the body; it is surmised from the known effects of electric fields and currents on the
  body (for example, lightning, electric fence controllers) that the organ of principal concern is the heart;
- Secondary: physical trauma directly associated with taser use, principally injuries from falls; the head is the principal area at risk;
- Coincidental: injuries received in the incident not directly related to taser use e.g. baton use, self-inflicted wounds, gun-shot wounds.

## Life-threatening and serious injuries

The risk of life-threatening injuries and of other serious injuries such as the loss of an eye, is considered to be very low. The intuitive high risk of serious head injury from an uncontrolled collapse is not manifested in practice; most subjects apparently collapse in a semi-controlled manner. A small number of deaths has occurred in the US during the use of low power tasers and the M26; the deaths were principally attributed to illegal drugs consumed by the subjects.

#### Other effects

Falls may result in abrasions, scratches, minor lacerations, swellings and areas of redness on the skin. Minor secondary trauma from the penetration of the skin by the barbs will occur. Some of the barb penetrations will exhibit small circular burns; areas of skin where current has entered the body from barbs retained in clothing may also exhibit burns. These burns are likely to resolve within a few days, without complications. The barbs will have been removed by medical staff; they were 8 mm in length with a 1 mm high barb about 3 mm from the tip. They were not "fish-hooked" in shape.

There is no evidence of any long term clinical effects of taser use.

#### **Pacemakers**

The evidence for the damage or disturbance to implanted electrical equipment such as pacemakers is limited and equivocal - be aware of the potential risk of damage to the device.

# For additional information

**Please Contact** 

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***** Police Station/HQ *****

***** Telephone Number *****
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# Association of Chief Police Officers - Operational Trial of Taser

Information for hospitals regarding the medical implications of the use of the M26 Advanced Taser on subjects

#### Introduction

The Police are undertaking an operational trial of the M26 Advanced Taser. This equipment has been made available to specially trained firearms officers to provide them with a less lethal option in incidents where they are confronted with an armed individual, and the officers and members of the public are at risk of serious injury or death.

Tasers are hand-held devices that propel two barbs at an individual. The barbs are intended to attach to the skin or clothing on the torso and/or lower limbs. The barbs are attached to the taser handset by thin wires. A sequence of very short duration high voltage current pulses passes through wires connecting the handset to the barbs. The current flows into the body and results in a loss of muscular control and in pain. The M26 Advanced Taser also enables direct contact of the taser handset to the surface of an individual; two closely spaced fixed electrodes pass the current pulses into the subject. This manner of application is usually classed as use in "stun" or "probe" mode; pain is the principal local physiological effect.

Tasers have been classed as "low-power" (5-7 Watt) or "high-power" (14-26 Watt). Tasers have been in use for over 20 years, principally in the US. Over most of this period, only low-power tasers were available, deployed and used. High-power tasers have been available and in use on volunteers and operationally for about three years in the US and Canada; the M26 Advanced Taser is classed as high-power.

The medical implications of use of the M26 Advanced Taser in the operational trial by the Police have been reviewed by an independent panel of clinicians, and their statement was part of the evidence considered by Government prior to the decision to authorise the trial.

The body of manufacturers' experimental evidence from biological models of the hazardous and intended effects of taser on excitable tissues is not substantial, particularly with regard to the M26; the peer-reviewed evidence is even more limited. The epidemiological evidence to assess the hazards associated with use of the M26 Advanced Taser is not as robust as that for the low-power models. However, the manufacturer's database of over nearly 2000 operational uses of the M26 and reports from law enforcement agencies in North America offers some insight into the risks and nature of injuries.

### Classification of injuries

Unintended adverse effects from the use of tasers may be classed thus:

- Primary: immediate or delayed consequences of electrophysiological phenomena resulting directly from the current flow in the body; it is surmised from the known effects of electric fields and currents on the body (for example, lightning, electric fence controllers) that the organ of principal concern is the heart;
- Secondary: physical trauma directly associated with taser use, principally injuries from falls; the head is the principal area at risk;
- Coincidental: injuries received in the incident not directly related to taser use e.g. baton use, self-inflicted wounds, gun-shot wounds.

It is notable that in two surveys from law-enforcement agencies in North America, more than half of the number of people confronted with the M26 Advanced Taser were impaired by alcohol, drugs or mental illness. Some drugs and the metabolic consequences of muscular activity are believed to increase the susceptibility of the heart to potentially life-threatening arrhythmias.

#### **Deaths**

Over the period of use of low-power tasers, there has been a small number of deaths associated with a large number of operational uses. Kornblum and Reedy discuss 16 deaths over a 4 year period in Los Angeles<sup>21</sup>. Other factors such as pre-existing heart disease and drug use were implicated in these deaths. The time interval between taser application and death ranged from 15 min. to 3 days; 5 deaths occurred at 15 min., 3 at 30 min. and 3 at 45 min. On the available evidence, it is considered extremely unlikely that a death from primary injuries has been caused by a low-power taser.

With regard to the high-power M26 Advanced Taser, the risk of death from primary injury is low and in common with low-power tasers, is certainly very much lower than that from conventional firearms. A small number of deaths has been reported to be associated with (but not necessarily caused directly by) use of the M26.

Deaths arising from the secondary consequences of taser use have not been reported.

### Life-threatening and serious injuries

The risk of life-threatening injuries and of other serious injuries such as the loss of an eye, is very low. The probability of impact of a barb on the surface of the eye is considered to be low. The impact of barbs on the head has occurred operationally; non-operational evaluation trials on targets have also resulted in head impacts.

The intuitive high risk of serious head injury from an uncontrolled collapse is not manifested in practice; most subjects apparently collapse in a semi-controlled manner.

### Other effects

Falls may result in abrasions, scratches, minor lacerations, swellings and areas of redness on the skin. Minor secondary trauma from the penetration of the skin by the barbs will occur. Some of the barb penetrations will exhibit small circular burns; areas of skin where current has entered the body from barbs retained in clothing may also exhibit burns. These burns are likely to resolve within a few days, without complications.

<sup>21</sup> Kornblum RH, Reedy SK (1991). Effects of the Taser in fatalities involving police confrontation. J Forensic Sci. Vol 36, 434-448. For a rebuttal of some of the conclusions of this paper, see Allen TB (1992). Discussion of "Effects of the Taser in fatalities involving police confrontation". Letter to Editor. J Forensic Sci. Vol 37, 956-958.

#### Barb removal

The current injection needles are 8 mm in length and have a 1 mm high barb about 3 mm from the tip. They are not "fish-hooked" in shape. It is believed that the normal practice in the US for removal of a barb from torso and limbs is to support the skin around the barb with fingers and withdraw the barb by gentle traction. Removal of barbs from areas such as the face and eye may require advice from appropriate clinical specialists.

## Use on drug- and cardiac-impaired individuals

It is believed that drugs such as cocaine and pre-existing heart disease may lower the threshold for cardiac arrhythmias. Many of the 16 fatalities associated with use of the low-power tasers in the Los Angeles survey had also taken PCP (phencyclidine) prior to the incident. PCP is also thought to be pro-arrhythmogenic but is infrequently encountered as a substance of abuse in the UK.

There is no experimental evidence that the aforementioned pro-arrhythmic factors increase the susceptibility of the heart to low- or high-power tasers specifically, sufficient to cause an arrhythmic event. Nevertheless, there is sufficient indication from the forensic data and the known electrophysiological characteristics of the heart (and the effects of certain drugs on this) to express a view that excited, intoxicated individuals or those with pre-existing heart disease could be more prone to adverse effects from the M26 Advanced Taser, compared to unimpaired individuals.

Admission for observation may be advisable.

#### **Acidosis**

Fish and Geddes<sup>22</sup> discuss the metabolic consequences of taser use and the metabolic status of agitated or intoxicated individuals on whom the taser may be used. Specifically, metabolic acidosis arising from physical activity (or clinical conditions) may increase the potential for ventricular arrhythmias particularly in the presence of phencyclidine and cocaine. Although individuals in a quiescent, relaxed state after taser use and exertion would be expected to compensate the metabolic acidosis quickly, those that remain agitated or are restrained in a way that could compromise normal breathing may remain vulnerable from potentially fatal quantities of ingested drugs. They recommend that the acid-base status of patients subjected to taser should be checked if they are agitated or unwell, and steps should be taken to restore the normal status.

#### **Pacemakers**

The evidence for the damage or disturbance to implanted electrical equipment such as pacemakers is limited and equivocal – be aware of the potential risk of damage to the device.

## For additional information

## **Please Contact**

```
***** Police Station/HQ *****

***** Telephone Number *****
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# **Appendix D**

# **Taser Battery Usage Form**

- The battery use log is to be completed every time the taser is operated, including the start of duty test.
- At the conclusion of seven days use of the tasers battery set, they are to be replaced by the fresh set, and recharged. The battery charge log should be completed after each recharge.

Taser Number.....

	Battery Pack 1		Battery Pack 2		
Date	Number of Activations	Running Total	Number of Activations	Running Total	Officer Completing/ Comments

# **Appendix E**

# **Taser Battery Recharging Form**

It is essential that this form is completed in order to monitor the recharging of the Taser Battery Packs.

- Each taser unit is issued with two sets of batteries. One set in the unit, and one spare set;
- Only batteries specified for use in accordance with the manufacturers recommendations should be used;
- The spare battery sets are to be on charge at all times;
- At the conclusion of the 30th recharging the battery sets are to be taken out of operational use and replaced.

T	aser	Ν	lum	ber:											
---	------	---	-----	------	--	--	--	--	--	--	--	--	--	--	--

	Battery Pack 1		Battery Pack 2		
ate	Number of Chargings	Running Total	Number of Chargings	Running Total	Officer Completing Comments

# Risk Assessment Taser

# Taser Use

WORK ACTIVITY		HAZARD	RISK	CONTROL MEASURES REQUIRED	IN	FURTHER ACTION REQUIRED	
Ref. No	Description		(H-M-L)		PLACE	By When	Person Responsible
1.	Taser Use	Injury to body from probes. Injury from falling due to incapacitation, ignition of flammable material by spark. Injury to eyes caused by laser sighting device.	М	Only trained staff to instruct the use of Taser, in accordance with the ACPO National Taser Training package. Only authorised staff to use operationally	ACPO Training Package	Review GRA Annually	By senior firearms officer
2.	Control of Taser and Cartridges	Malfunction of taser or cartridge leading to explosion or unexpected discharge	L	Taser and cartridge to be maintained in accordance with the manufacturers instructions and regularly inspected. Taser to be kept pointed in a safe direction. Taser should be kept securely when not in use.  Taser and cartridges showing signs of wear and damage should be removed from use.	National Policy on Inspection and Maintenance		

# Taser Training

WORK ACTIVITY		HAZARD	RISK	CONTROL MEASURES REQUIRED	IN	FURTHER ACTION REQUIRED	
Ref. No	Description		(H-M-L)		PLACE	By When	Person Responsible
1.	Taser Training	Injury to body from probes. Injury from falling due to incapacitation, ignition of flammable material by spark. Injury to eyes caused by laser sighting device.	M	Only trained staff to instruct the use of Taser, in accordance with the ACPO National Taser Training package.	ACPO Training Package	Review GRA Annually	By senior firearms officer
2.	Control of Taser and Cartridges	Malfunction of taser or cartridge leading to explosion or unexpected discharge	L	Taser and cartridge to be maintained in accordance with the manufacturers instructions and regularly inspected. Taser to be kept pointed in a safe direction. Taser should be kept securely when not in use.  Taser and cartridges showing signs of wear and damage should be removed from use.	National Policy on Inspection and Maintenance		
3.	Tactical training	Eye injuries from cartridge discharges at close quarters Injury to eyes caused by laser sighting device.	М	Provide students with suitable eye protection, and require it to be worn.			
4.	Control of Taser and cartridge during training	Risk of being effected by training cartridge (Blue) being mixed with live cartridge (Black and Yellow)	L	Ensure that all live cartridges are removed prior to commencement of training. All tasers to be proved to be unloaded prior to issue of training rounds. Student and instructor to visually check rounds are training rounds before issue.			

# Appendix G

# Relevant Health and Safety at Work Legislation.

# Health and Safety at work Legislation.

Since 1 July 1998, all police activities have been subject to health and safety at work legislation. This legislation is criminal law and breach of the legislation can result in criminal prosecution by the Health and Safety Executive (HSE) who are the enforcing authority.

The main pieces of health and safety legislation that cover the use of less lethal options are:-

- The Health and Safety at Work etc. Act 1974;
- The First Aid at Work Regulations 1989;
- The Electricity at Work Regulation 1989;
- The Personal Protective Equipment (PPE) Regulations 1992;
- The Manual Handling Operations Regulations 1992;
- The Police Health and Safety Act 1997;
- The Provision and Use of Work Equipment Regulations 1998;
- The Control of Substances Hazardous to Health (COSHH) Regulations 1998;
- The Management of Health and Safety at Work Regulations 1999;
- The Pressure Systems Safety Regulations 2000.

# **APPENDIX H**

TASER DEPLOYMENT REPORT								
Ford	Force reference number:							
THIS	DEPLC	YMENT FORM MUST BE COMPLETED ON EACH OCCASION THAT THE TASER IS DEPLOYED.						
1.	INCII	DENT DETAILS						
	a.	Time of Incident						
	b.	Date of Incident						
	C.	Incident Number						
	d.	Location (address) of incident						
		Postcode (first 3 characters, or full if known)						
	e.	Brief details of incident						
	f.	Spontaneous Pre-planned						
	g.	Visibility: Poor Average Good Good						
	h.	Resources in attendance:						
		i. Number of AFOs:						
		ii. Dogs: GPD Firearms Other						
		iii. Baton Gunner: No Yes						
		iv. Number of Tasers in attendance:						
		i. Was a Taser used?: No (complete sections 2 and 3 only)						
		Yes (complete sections 2, 3, 4, 5, 6, 7, 8 and 9)						
	j.	Number of Tasers used:						
		If more than one Taser was used, then please complete an additional form for each						
		Taser						

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2.	OUTCOME OF INCIDENT
	Briefly describe the result of the operation:
3.	FORM COMPLETED BY
	a. Name: Rank:
	b. Role in incident:
	c. Signed:
	d. Date:
	e. Force:
	If the Taser was not used, only this page needs to be completed.
	When completed please return this form to:
	when completed please return this form to.

4.	SUBJ	SUBJECT DETAILS (this page onwards is only to be completed if a Taser was used)						
	Taser	used on:						
	a.	Last Name:						
	b.	First Name:						
	C.	Other Names:						
	d.	Age (DOB):						
	e.	Address:						
						Postcode		
	f.	Male	Female					
	g.	Officer defined	d ethnicity (6+1)			Self def	ined ethnicity	(16+1)
	h.	Height:	Under 5 feet		5 – 6 fee	et 🗌	Over 6 feet	
	i.	Build:	Slight		Medium		Large	
	j.	Was the subje	ct under the influe	ence of:				
		Alcohol:	Yes	No 🗌	Was this	known prior to u	se: Yes	No 🗌
		Drugs:	Yes	No 🗌	Was this	known prior to u	se: Yes	No 🗌
	k.	Any known re	levant medical cor	ndition:				
	l.	Weapon:	Firearm	Knife		Pointed weapon	Blu	unt weapon
			Syringe	Missile		Other		
	For f	urther subjects	please complete a	ıdditional	forms			
5.		ER DETAILS						
		One:						
	a.	Serial Number						
	b.	Taser applicati	_	I	,			
		i) Drawn:	Yes L	1	No L			
		ii) Aimed:	Yes L		No 📙			

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		iii) Arced:	Yes		No 🗆	
		iv) Dischar	ged (fired): Yes		No (if yes complete 5	5.1)
		v) Stun Mo	ode: Yes		No (if yes complete 5	5.2)
	Subje	ect action to wa	arrant above action:			
	Prote	ect self	Prevent offence		Protect public	Secure evidence
	Effec	t arrest	Effect search		Prevent harm	Prevent escape
	Accio	dental	Remove handcuffs			
	Othe	r				
5.1.	If Tas	er was dischar	ged (fired) complete	the follo	owing section:	
	a.	Cartridge 1 nu	umber:			
	b.	Probe Contac	t:			
		Тор:	No Yes		Clothing penetration	Skin penetration
		Bottom:	No 🗌 Yes 🗌		Clothing penetration	Skin penetration
	C.	Distance betw	veen subject & firer (	m):		
	d.	Subject Orien	tation			
		Standing	Kneeling		Sitting Prone [	Moving
	If Mo	ving, details:				
	e.	Incapacitation	achieved:	Yes 🗌	No 🗌	
		Reason if uns	uccessful:			
	Cartr	idge reapplied:	Yes No I	f yes, h	ow many times:	
	If the	Taser was disc	charged for a 2nd tim	ne, pleas	se complete the following se	ection:
	f.	Cartridge 2 nu	umber:			
	g.	Probe Contac	t:			
		Тор:	No Yes		Clothing penetration	Skin penetration
		Bottom:	No Yes		Clothing penetration	Skin penetration

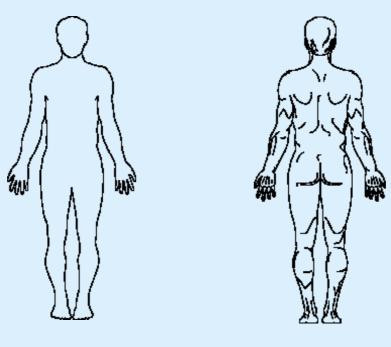
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	C.	Distance between subject & firer (m):
	d.	Subject Orientation
		Standing
	If Mo	oving, details:
	e.	Incapacitation achieved: Yes No No
		Reason if unsuccessful:
	Cart	ridge reapplied: Yes  No If yes, how many times:
5.2.	If stu	un mode was used, please complete the following section:
	a.	Subject Orientation:
		Standing
		If Moving, details:
	b.	Incapacitation achieved: Yes No No
		Reason if unsuccessful:
	If the	e Taser was used for a 2nd time in Stun Mode, please complete the following section:
	a.	Subject Orientation:
		Standing
		If Moving, details:
	b.	Incapacitation achieved: Yes No No
		Reason if unsuccessful:

# 6. PROBE PLACEMENT

# a. Application Points:

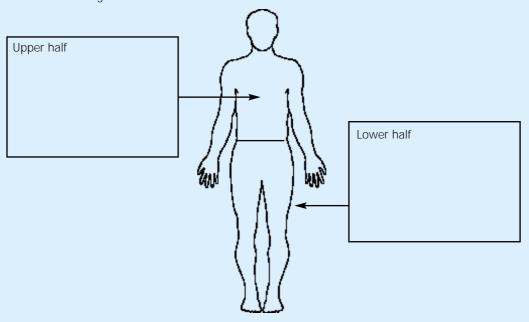
Using the below diagram, indicate the point of each probe attachment or stun mode application. (For multiple discharges please identify each by number)



Front Back

# b. Clothing:

Describe clothing whether Taser fired or stun mode used:



7.	AFTER CARE						
	Subje	ect requested probe removal: Yes No					
	a)	Probe removed by:					
		Officer (Clothing attachment)  Ambulance personnel  Subject					
		Force Medical Examiner Hospital staff					
	b)	Duration between probe discharge and removal:					
		Under 30 mins					
	c)	Did probe positioning delay transportation of the subject to police station?					
		No Yes (if yes give length of delay below)					
		Under 30 mins					
	d)	Injuries Sustained:					
		Primary (as a result of the Taser):					
		Secondary:					
		If Secondary injury, cause:					
	e)	Detained in Hospital: Yes No No					
		If detained, reason:					
		When a Force Medical Examiner has examined a subject, if possible, a copy of their report should be attached to this document					
	f)	Force Medical Examiners Report attached: Yes No					
8.	ADD	ITIONAL INFORMATION					
O.	Please comment further if not addressed above (i.e. issues from debrief):						

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9.	OFFICER DETAILS	
	a) Taser Officer:	
	Name:	Rank:
	Role in incident:	
	b) Silver Commander:	
	Name:	Rank:
	Role in incident:	
	c) Investigating Officer:	
	Name:	Rank:
	Role in incident:	
	When completed please return this form to:	

# INDEPENDENT REVIEW AND ACCOUNTABILITY

# A. Introduction

1. As with the phase 3 report, it may be helpful to include in this document other statements relating to the use of the existing baton round, the L21A1.

# B. Revised ACPO guidelines on the use of the L21A1 round

2. On 8 December 2003 Home Office Minister Hazel Blears made the following written statement:

"On 1 August 1999, new operational guidelines on the use of baton rounds were issued by the Association of Chief Police Officers (ACPO) and replaced previous Home Office guidance. ACPO have now put forward revised guidelines to take account of developments in the weapon system, training and procedures for deployment which are designed to reduce the potential for serious injury and life threatening injuries.

The guidelines now include specific reference to the implications of the European Convention on Human Rights and also highlights that every effort should be made to ensure children are not placed at risk.

The revised guidance also takes account of the Defence Scientific Advisory Council statement on the use of the L21Al baton round at ranges from 1 to 19 metres, announced by the then Minister of State at the Home Office, my right hon. Friend the Member for Southampton, Itchen (Mr. Denham), 6 November 2002, Official Report, Column 312W.

A copy of this new guidance has been placed in the House Library."

3. The revised guidelines are as follows:

# REVISED GUIDELINES ON THE USE OF BATON ROUNDS IN SITUATIONS OF SERIOUS PUBLIC DISORDER

## 1. INTRODUCTION

- 1.1 The Heckler and Koch baton gun designated the L104A1 was introduced into service in 1994, as part of a common weapon system, to be used during serious public disorder, by police forces and the armed services within the United Kingdom.
- 1.2 A new baton round, designated the L21A1, designed to be fired from the L104A1, entered operational service in June 2001. The new round, when used with the new optical sight designated the L18A1 (as it always should be) is consistently more accurate than the older design of baton rounds and the probability of it causing serious or life threatening injuries has been reduced.

- 1.3 A collimator has also been provided to assist in checking the zero of the weapon, instructions on its use are contained at annex 1.
- 1.4 As with all applications of force, there is a potential for unintended serious and even fatal injury. The design and use of the baton round system is therefore subject to strict criteria. Baton rounds of the approved design may only be used as part of the common weapon system approved for use by members of the police service or HM forces in the United Kingdom.
- 1.5 The system has also been approved for use as a less lethal weapon augmenting the range of options available to police officers when responding to non-public order situations requiring the deployment of conventional firearms.
- 1.6 This document provides guidance on the deployment and use of baton rounds in situations of serious public disorder.
- 1.7 These revised guidelines take account of the most recent developments in the weapon system, baton round design, command protocols and training, all of which are designed to reduce the potential for serious and life threatening injuries. Nothing in these guidelines should be construed so as to constrain the police service in its fundamental responsibility to save life, protect property and maintain the peace (subject to the provisions of paragraph 1.14 below). Police officers shall at all times fulfil the duty imposed on them by law, by serving the community and by protecting all persons against illegal acts, consistent with the high degree of responsibility required by their profession. In discharging their duties, police officers will be cognisant of the provisions of the UN Code of Conduct for Law Enforcement Officers and of their obligations to uphold human rights.
- 1.8 Article 3C of the UN Code of Conduct for Law Enforcement Officers is specific in stating that:

  'The use of firearms is considered an extreme measure. Every effort should be made to exclude the use of firearms, especially against children. In general, firearms should not be used except when a suspected offender offers armed resistance or otherwise jeopardizes the lives of others and less extreme measures are not sufficient to restrain or apprehend the suspected offender.'
- 1.9 Baton rounds represent a less lethal alternative to conventional firearms. Every effort should be made to ensure that children are not placed at risk by the firing of baton rounds in public order situations and children should not be directly targeted unless their actions are presenting an immediate threat to life or serious injury, which cannot otherwise be countered.
- 1.10 Public disorder includes a wide spectrum of unlawful activity, which at the upper level may include serious rioting. In these situations conventional public order policing responses may have been tried and failed; and taking account of the level of violence and the risk to officers be considered no longer appropriate. Where on the basis of a risk assessment of existing intelligence it is believed that serious rioting would involve a risk of loss of life, serious injury or significant damage to property, an officer of Assistant Chief Constable/Commander rank may, with the prior agreement of the Chief Officer, deploy officers who are trained in the use of baton rounds and/or suitable CS munitions as a contingency in dealing with serious disorder. Such delegated authority may be for a specified time period, or within a specific geographical location or for a particular operation.
- 1.11 In addition where there is reason to believe that lethal weapons may be used it will be appropriate to consider the deployment of specially trained officers armed with conventional firearms. (These instructions should be read in conjunction with the Police Health and Safety Manual, Volume 3, Appendix A).

- 1.12 In certain circumstances it may be appropriate to deploy specialist firearms officers in public order situations. The deployment of specialist firearms teams in situations of public disorder must be closely co-ordinated and gives rise to specific command issues. For this reason specialist firearms resources should not, in these circumstances, be deployed without the express authority of an officer of at least Assistant Chief Constable/Commander rank.
- 1.13 Baton rounds are designed to provide a less lethal option in dealing with threats of serious violence and provide an effective means by which individuals armed with petrol bombs or other weapons can be kept at a distance, contained or dispersed. Experience has shown that rioters can throw such missiles, with force, for a considerable distance ranging out to approximately 60 metres, depending on the type of object being thrown or fired. In certain circumstances it will therefore be appropriate to maintain a tactical stand off distance, where circumstances permit, this should in public order situations be in excess of 20 metres. However baton rounds may be used at closer ranges when absolutely necessary to reduce a serious risk of loss of life or serious injury in accordance with paragraph 1.14 and 3.6 below. Baton rounds also provide a means of keeping at a safe distance those posing a serious threat to life, which would otherwise require the interventions of officers at close quarters potentially placing them at greater risk.
- 1.14 Baton rounds should only be used in a public order situation:
  - (a) where other methods of policing to restore or sustain public order have been tried and failed, or must from the nature of the circumstances be unlikely to succeed if tried; and
  - (b) where their use is judged to be necessary to reduce a serious risk of:
    - (i) loss of life or serious injury or;
    - (ii) substantial and serious damage to property where there is, or is judged to be, a sufficiently serious risk of loss of life or serious injury to justify their use.
- 1.15 In assessing the risk of loss of life or serious injury occurring, account should be taken of the risks to police officers and members of the emergency services as well as to members of the public and others.

# 2. USE OF FORCE: LEGAL PROVISIONS

2.1 Nothing in these guidelines affects the legal principles pertaining to the use of reasonable force as provided for under:

The common law duty to preserve the peace, the common law rules of self-defence, The Police and Criminal Evidence Act 1984 sec 117, Article 88 Police and Criminal Evidence Order (Northern Ireland) 1989 and Section 3 of the Criminal Law Act 1967, Section 3 Criminal Law Act (Northern Ireland) 1967 which states:

"A person may use such force as is reasonable in the circumstances in the prevention of crime, or in effecting or assisting in the lawful arrest of offenders or suspected offenders or of persons unlawfully at large."

2.2 The reasonableness of individual action will be subject to the combined tests of necessity and proportionality; in that, the objective cannot be achieved by a lesser degree of force and that the anticipated injury or harm to be prevented is greater than the harm which is likely to be caused by the firing of a baton round.

# **European Convention on Human Rights (ECHR)**

- 2.3 When making a determination as to whether the level of force used was lawful in any particular instance the courts will take cognizance of the Articles under the ECHR.
- 2.4 It is recognized that the use of a baton round has, in certain circumstances the potential for lethal consequences and, as such, Article 2 of the ECHR is of particular relevance when they are used by the Police Service.
- 2.5 The test of absolute necessity found in Article 2 provides a stricter test of proportionality than is required in other areas of the Convention. It is also a stricter test than is provided by the concept of reasonable force within s.3 Criminal Law Act 1967, s.117 of Police and Criminal Evidence Act 1984, the equivalent Northern Ireland legislation and the Common Law. Even where the use of force may be seen as being reasonable it may not be absolutely necessary. In addition the use of force must be based on an honestly held belief that it is necessary, which is perceived for good reasons to be valid at the time.

### 3. CONDITIONS OF USE

- 3.1 Only baton rounds and baton guns of a type authorised by the Home Office may be used. Details of the approved equipment are included in the ACPO police user manual.
- 3.2 Baton guns are not to be loaded unless their use is imminent.
- 3.3 Baton gun commanders, in charge of tactical formations which contain baton gunners, will be responsible for giving directions to baton gunners including instructions to load and unload, authority to fire and directions to cease firing.

# Warnings

- 3.4 Unless circumstances do not permit, baton rounds are to be fired only after an oral warning, for example by means of a loud hailer or PA system, has been given to the crowd to disperse. The warning should make clear that, unless the rioting stops or the crowd disperses, baton rounds will be used without further warning. A record is to be kept of the words used in giving the warning. The following words should be used whenever possible:
  - "Attention, attention, this is a police message. Unless you stop rioting immediately, baton rounds will (again) be fired. No further warnings will be given."
- 3.5 Baton rounds should be fired at selected individuals and not indiscriminately at the crowd. Baton rounds should be aimed to strike directly (i.e. without bouncing) the lower part of the subject's body i.e. below the rib cage. Baton Gunners are trained to use the belt-buckle area as the point of aim, at all ranges thus militating against upper body hits.

- 3.6 Unless there is a serious and immediate risk to life, which cannot otherwise be countered, use at under one metre or aiming the weapon to strike a higher part of the body is prohibited. In these circumstances the risk of serious and even fatal injuries is increased and the firer must be able to justify the increased use of force.
- 3.7 Steps are to be taken to ensure that medical attention is provided at the earliest opportunity for any casualties.
- 3.8 When possible, baton rounds should be recovered.
- 3.9 Baton gunners may be deployed on foot or in specially adapted protected vehicles from which baton rounds may be fired. Baton rounds should not be fired from moving vehicles. Tactical formations will differ dependent on the local circumstances and resources of a particular force.

# 4. REPORTS

- 4.1 Baton gunners must complete reports pertaining to the reason for firing baton rounds and information about the outcome and number of rounds fired. The record should also list any known injuries that may have occurred as a result of using baton rounds.
- 4.2 In England and Wales the chief officer should supply to the Home Secretary a written report on the circumstances surrounding the firing of baton rounds as soon as possible after the incident. In Northern Ireland there is a requirement to inform the Northern Ireland Policing Board of any operational discharge of a Baton Round. The Police Ombudsman is also informed.

### 5. PRE-PLANNED OPERATIONS

5.1 In situations where serious public disorder is anticipated an officer of Assistant Chief Constable/Commander rank may, with the prior agreement of the chief officers of police, give authority for the deployment of officers trained and equipped with baton guns.

# Command

5.2 Policy and command decisions in respect of the issue, deployment and use of baton rounds should be subject to continuous critical review during the lifetime of any incident. The officer in overall command of the incident (the Gold Commander) should ensure formal review and documentation of the requirement for baton guns as the disorder enters each new phase.

# **Authority for Use**

5.3 Before a decision to use baton rounds is put into effect, a designated senior officer, will by virtue of an on the ground assessment, confirm that the situation is sufficiently serious to justify the use of baton rounds, and that the criteria for use continues to be met. Except where urgent action is necessary, in circumstances where there is an immediate risk to life, baton rounds will only be used following authorisation by the Silver Commander.

- 5.4 Designated Senior Officers (DSOs) should be accredited public order commanders drawn from the Superintending and Inspecting ranks and will be fully trained for the role by virtue of a course approved nationally by the Association of Chief Police Officers. DSO's will have a detailed understanding of public order tactics, the characteristic of the baton round system and guidelines governing their use. They will also be aware and familiar with the principles and tactics associated with command of a situation where officers armed with conventional firearms require to be deployed. The designated senior officer will ensure that effective processes are in place for direction and control of baton gun commanders and baton gunners who have been specifically trained in the use of the equipment and know its characteristics.
- 5.5 Strict criteria applicable to the selection and training of baton gun commanders and baton gunners will ensure proficiency with the weaponry, thorough understanding of the conditions relating to its use, the injury potential and characteristics of baton rounds. Baton gunners deployed within a public order situation should be fully trained in public order policing and regularly complete baton gun training within that context.

#### **Records**

5.6 All command decisions in respect of the issue, deployment and authority to use baton rounds should be fully recorded and documented. The DSO will be responsible for documenting the assessment of the situation and rationale pertaining to the decision to recommend the use of baton rounds. In addition baton gun commanders will ensure that a record is maintained of the firing of baton guns and that baton gunners complete reports pertaining to the firing of baton rounds.

#### 6. SPONTANEOUS DISORDER

- 6.1 Chief Constables must have contingency plans for the availability and deployment of baton rounds in emergency situations. These should provide for the availability and deployment of baton gun resources and establishment of appropriate command structures to enable an effective response to serious spontaneous disorder. As in pre-planned operations an officer of Assistant Chief Constable/Commander rank may, with the prior agreement of the chief officer of police, give authority for the deployment of officers trained and equipped with baton guns. The officers authorising deployment will ensure formal review and documentation of the requirement for baton guns as the disorder enters each new phase.
- 6.2 The contingency plans should provide for the introduction of formalised command structures with the minimum of delay however; nothing in these guidelines should be construed so as to prevent an immediate and effective police response or the firing of baton rounds where their use is necessary. Baton rounds may only be used if the strict criteria set out at paragraph 1.12 is met.
- 6.3 The requirement to deploy officers with baton rounds should be formally reviewed by an officer of at least Assistant Chief Constable rank on a regular basis.

ASSOCIATION OF CHIEF POLICE OFFICERS 2003

# C. Statement by the Defence Scientific Advisory Council on the ricochet potential of the L21A1 Baton Rounds on 8 January 2004.

- 4. This work followed as a response to a recommendation in the original DSAC statement placed by the Home Secretary in the House of Commons Library in April 2001 that research should be undertaken into post-ricochet trajectories and energy of baton rounds, and steps that could be taken to reduce the risk to non-targeted personnel from ricochets.
- 5. The following is the written statement made by the Home Office Minister Hazel Blears on 8 January 2004:

# STATEMENT BY THE DEFENCE SCIENTIFIC ADVISORY COUNCIL (DSAC) ON THE RICOCHET POTENTIAL OF THE L21A1 BATON ROUND.

I have placed in the Library of the House a statement by the Defence Scientific Advisory Council (DSAC) on the Ricochet potential of the L21A1 Baton Round. This Baton Round is used as a less lethal option by the Police and the Army.

MOD have carried out research on the post-ricochet trajectories and kinetic energy of Baton Rounds. The Sub Committee, Defence Scientific Advisory Council have assessed the medical implications of the ricochets and have made a statement.

The DSAC statement concluded that the experimental studies and analysis undertaken were an acceptable technical approach to the prediction of the risks.

DSAC have recommended:

- Users should be made aware that L21A1 Baton Rounds can ricochet in some circumstances with high energy, and that the presence of obstacles and of personnel other than the intended target should form part of their risk assessment in the decision to fire the weapon
- A desire for a reduction of the ricochet potential should be stated in the research and operational requirements of future kinetic energy weapon systems, and be evaluated experimentally.

The Association of Chief Police Officers tell me that police firearms training addresses the ricochet potential of ammunition used by the police service. However, in order to ensure that this issue is specifically addressed, the results of these studies will be brought to the attention of persons responsible for firearms training in all forces throughout the United Kingdom. Current Army training on the use of baton rounds already addresses the issue of the ricochet potential.

6. The following is the DSAC statement placed in the House of Commons Library on 8 January 2004:

# Statement on the assessment by MOD of the risk to personnel from the ricochet of L21A1 Baton Rounds.

The statement of the Sub-committee (SC) of the Defence Scientific Advisory Council (DSAC) on the
medical implications of the use of the new L21A1 Baton Round was placed in the Library of the House of
Commons in April 2001. The statement compared the injury potential of the L21A1 system in public order
role with that of the then current Baton Round, the L5A7.

- 2. On the subject of ricochet, the SC, DSAC concluded that although the L21A1 Baton Round system was more accurate than the L5A7 and was less likely to strike directly the vulnerable parts of the body (head and upper torso), the probability of ricochet within the normal operational range of batons would be higher with the L21A1. This increased risk arose from the lower trajectory of the projectile, a feature of the system designed to reduce the risk of serious and life-threatening injury from direct impact.
- 3. The SC, DSAC requested that MOD undertake research on the post-ricochet trajectories and kinetic energy of Baton Rounds, and steps that could be taken to reduce the risk to non-targeted personnel from ricochets
- 4. The experimental work and theoretical modelling subsequently undertaken by MOD to address the recommendation have been reviewed by SC, DSAC. The L21A1 Baton Round was fired in a representative urban environment containing targets that would induce ricochet, such as kerbs, rubble, vehicles and lamp-posts. The Baton Rounds were fired directly at the various targets, and the post-ricochet trajectory and velocity of individual rounds determined by analysis of video images. A comparison of the propensity of L21A1 and L5A7 projectiles to ricochet was not undertaken.
- 5. The L21A1 projectiles remained intact after ricochet. They frequently tumbled, thereby effectively increasing their effective contact area for any subsequent impacts; this is likely to lead to a reduction of localised forces. The velocity and trajectory data were employed in a model of the public order disturbance environment to predict the risk of post-ricochet impact to non-targeted personnel. Within the model, the relative frequency of ricochet-inducing targets was intentionally varied, and assumptions made on both the operational accuracy of the weapon system and crowd density.
- 6. The trials and modelling predicted that an upper estimate of approximately 2% of L21A1 Baton Rounds fired operationally may ricochet with a significant proportion (greater than about one third) of their prericochet energy retained. In ricochet events when the pre- and post-ricochet trajectories were similar, the projectile could retain a large proportion of its kinetic energy. The projectiles have the potential to cause serious injury if they strike vulnerable areas. Further analysis using the model predicted that the risk of impact post-ricochet on the vulnerable parts of the body by the projectiles with high retained energy was low an approximate upper estimate of 0.3% of Baton Rounds fired. Impacts to the lower torso and limbs will also occur, but these impacts are unlikely to cause serious or life-threatening injury.
- 7. The SC, DSAC believes that the experimental studies and analysis undertaken were an acceptable technical approach to the prediction of the risks. They should form the basis of a procedure to compare the risk of serious and life-threatening injury from the ricochet of projectiles from weapon systems developed in the future, for use in public order incidents.
- 8. With regard to the steps that could be undertaken to reduce the risk to non-targeted personnel, SC DSAC recommends that:
  - a. Users should be made aware that L21A1 Baton Rounds can ricochet with high energy, and that the presence of obstacles and of personnel other than the intended target should form part of their risk assessment in the decision to fire the weapon;
  - b. A reduction of the ricochet potential should be stated in the research and operational requirements of future kinetic energy weapon systems, and be evaluated experimentally.

It is appropriate to reiterate that improvements to the accuracy of the L21A1 (and future) weapon systems in operational use will reduce the frequency of projectiles missing intended targets and being available to ricochet.

Projectile and the Discriminating Irritant Projectile being considered as part of the programme to establish a less potentially lethal alternative to Baton Rounds<sup>23</sup>, state that it is desirable that the potential for injury behind an intended target is minimised.

[signed]

Chairman, CBRN Defence HS Board, DSAC.

# D. Reports by the Police Ombudsman for Northern Ireland on the use of L21A1 baton rounds

- 7. In 2003, the Police Ombudsman issued two releases relating to the use of the L21A1 round in the summer of 2002. Both releases are set out in full below.
- a) Press release issued on 25 June 2003 by Police Ombudsman on events at Drumcree 7 July 2002.

#### 'DRUMCREE BATON ROUNDS JUSTIFIED': POLICE OMBUDSMAN

An investigation by the Police Ombudsman's Office into the firing of three baton rounds by police officers during disturbances following last year's parade at Drumcree has found that officers had been right to use the weapons as they faced 'a serious and immediate risk to life.'

The PSNI Chief Constable Hugh Orde asked the Police Ombudsman's Office to investigate the firing of three baton rounds during disturbances at Drumcree Bridge on Sunday afternoon, July 7, 2002. A full report on the matter has now been sent to the Chief Constable, the Secretary of State and the Policing Board.

The Police Ombudsman, Mrs. Nuala O'Loan, said the use of baton rounds in all three cases had been necessary because of the threat of serious injury or loss of life to police officers:

- "I pay tribute to the courage and restraint clearly displayed by many officers. The evidence clearly demonstrates the life threatening and ferocious attack to which they were subjected, resulting in many serious injuries, including broken bones, ligament damage and facial injuries.
- "The public of Northern Ireland should be grateful for these sacrifices made to maintain order. The violence of the event also demonstrates the absolute need for the baton gun or a viable alternative to it," she said.

During their investigation, Police Ombudsman staff examined PSNI documentation, including officers' notes and statements, police radio transmissions and police video footage. They also viewed broadcast footage: two of the three discharges were captured on video. The investigators also spoke to civilian witnesses and attempted to contact others.

The violence flared as protestors tried to breach a police cordon, with officers subject to a sustained barrage of missiles and close quarter attacks using sticks, umbrellas and other weapons.

At 2pm, police on the ground requested permission from their senior officers to use baton rounds. This was initially granted but withdrawn seconds later while senior police command asked for the reasons for deployment.

At 2.04pm, having established that officers on the ground were coming under severe attack, and that there was a likelihood of serious injury, the senior police commander granted permission.

Video evidence shows that as police tried to maintain the cordon many officers were hit by large stones and boulders, several falling to the ground after being struck.

At 2.06pm permission to use baton guns was again requested and this time was granted within seconds. After informing his baton gunners that permission had been granted, a police inspector was hit on the head with a stone and fell to the ground dazed. He was escorted by other officers to the rear of a barrier which had been erected on Drumcree bridge by the security forces. By this stage the crowd had surged forward towards police lines and the violence had intensified.

A man in a beige T-shirt was then seen advancing towards police, first of all mimicking the action of firing a gun at the officers, before picking up a large boulder and making a movement as if to throw it towards the police line. As he did so a baton gunner discharged a baton round striking the man on the arm. He was seen to drop the boulder and fall back clutching his arm.

Immediately after this another man, who can be seen on earlier footage throwing at least four missiles towards police, was seen picking up and throwing two large stones in quick succession towards police lines. The man is then seen moving towards police lines with his arm raised as if to throw another missile. The camera pans away from him momentarily and he is next seen limping back into the crowd, having apparently been struck by a plastic baton round.

Video footage also shows police officers being struck with stones, large boulders and at one stage what appears to be a tree trunk. Two officers are seen falling to the ground having been struck on the head, after which colleagues attempt to drag them back towards the barrier.

The third discharge was not captured on police or broadcast video but the police officer who fired the weapon recalled seeing another officer lying on the ground receiving treatment from a police medic as the crowd continued to throw missiles at the withdrawing police. Some of these appeared to be reaching the injured officer.

In his statement the baton gunner said he moved forward and discharged a baton round at a man who appeared to be preparing to throw a boulder. The man was struck on the upper left leg before being dragged back by other members of the crowd.

Although the discharge was not captured on video, several men matching the description given by the baton gunner are shown on video advancing towards police lines as they withdrew behind the barrier.

After firing his baton gun the officer was struck twice on the head with missiles in quick succession and fell to the ground unconscious, whereupon another officer dragged him through the large barrier to safety.

The Police Ombudsman, Mrs Nuala O'Loan, concluded that the discharge of the guns was consistent with police guidance, criminal law and human rights legislation.

"Given the intensity of the violence and the range of options considered and implemented by police prior to the discharge of baton rounds, officers exercised considerable restraint in a situation where their lives were often at risk," she said.

b) Press statement issued on 2 September 2003 by the Police Ombudsman on events in East Belfast on 3rd and 4th June 2002.

# BATON ROUND DISCHARGES "FULLY JUSTIFIED" POLICE OMBUDSMAN.

A major investigation by the Police Ombudsman's office has concluded that police were fully justified in discharging 60 plastic baton rounds and 10 live rounds during serious disorder in east Belfast in June last year

The baton rounds and shots were discharged during a three and a half hour period of intense rioting by Loyalists in the Lower Newtownards Road area between 11pm on June 3 and 2.30am on June 4, 2002. Shots were fired at police on five separate occasions and officers were also targeted with blast bombs, fireworks, petrol bombs, catapults and other missiles.

A total of 19 police officers were injured - one was shot in the leg by a Loyalist gunman. Of the 60 plastic baton rounds fired, 45 were reported to have hit their intended targets. The ten gunshots discharged by a police officer were aimed at a gunman who had fired two bursts of automatic gunfire at police lines.

The Police Ombudsman, Mrs Nuala O'Loan, said there was no doubt that the use of baton rounds was essential given the intensity of the unrest, which had posed a "serious and immediate risk to life". Indeed, she noted that officers had shown considerable restraint. "Taking into account the level and extent of violence directed at the police, and the large scale of the disorder, there were many occasions where police would have been justified in discharging baton rounds, yet did not do so", she said "There were also several occasions where police sighted gunmen and did not open fire, and may have been justified in doing so.

Mrs O'Loan pointed out that it is now almost a year since police last discharged a baton round in Northern Ireland – the last was fired on 11 September last year. "It is encouraging that we have not had a recurrence of violence on this scale and, as a result, that police have not required to use baton rounds," she said "I am also pleased to see that when the use of baton rounds is necessary, the PSNI now have much tighter controls and reporting mechanisms.

The rioting by Loyalists on the evening of June 3 and 4 followed major disorder earlier in the day when rival Loyalist and Nationalist crowds, numbering almost 1,000 people in total, clashed on the Mountpottinger Road. 120 police officers and 300 soldiers were deployed to help maintain order

A number of police units reported that shots were fired from the Nationalist side during this rioting, but there were no reported injuries.

During their investigation of the night's events, Police Ombudsman investigators interviewed police commanders, senior officers and officers involved in the disturbances, and also reviewed police radio transmission tapes, police and army video footage and forensic evidence, including bullet strike marks on buildings in the area.

While praising police for their handling of what had been a very dangerous public order situation, the Police Ombudsman expressed concern about the procedures adopted by two officers when accounting for the issuing of baton guns and rounds. Recommendations have been made to the Chief Constable regarding this matter, and have been accepted.

Mrs O'Loan also reiterated that while circumstances will not always allow police to issue a public warning before using plastic bullet guns, the reasons for failing to do so should always be accurately recorded.

# E. Second Report to the Defence Scientific Advisory Council Sub-Committee

8. A review of information from the first two years of L21A1 firings has been collated and presented to the independent medical advisers in the DSAC sub-committee. As with the review after the first year of use, once the sub-committee has produced their conclusions, their conclusions will be placed in the public domain and any necessary actions undertaken. In the interests of ensuring balance the sub-committee have also been provided with external reports such as the report published by the Northern Ireland Human Rights Commission in April 2003 on the use of the L21A1 in Northern Ireland.

# CATEGORY B TECHNOLOGIES - CALMATIVES AND MALODORANTS

# **Summary and introduction**

- After PSDB's initial evaluation of less lethal technologies the identified technology areas were divided into three categories defined by priority. Category A technologies, requiring immediate research, included tasers and impact rounds. Category B technologies, requiring research over a longer time frame, included calmatives and malodorant devices. Category C devices included technologies that were not considered of immediate interest or importance.
- 2. This chapter presents the findings of PSDB's desk-based research into the areas of calmatives and malodorants. No commercial or off-the-shelf system exists in either of these areas, therefore research has focused on the background to the technology, the perceived benefits and disadvantages of the technology and how each of these areas might meet the ACPO Operational Requirement for less lethal technologies.
- 3. Neither of these technologies meets all areas of the ACPO Operational Requirement. A number of serious failings were observed, particularly regarding safety of the subject and the duration and level of incapacitation to be expected.
- 4. PSDB recommends that further research into this area is not justified at the present time although they will continue to monitor US research in this area and notify the Steering Group of significant developments.
- 5. The Steering Group concluded that calmatives and malodorants should accordingly be transferred to Category C.
- 6. CS (orthochlorobenzylidene malononitrile) has been used by police forces for a number of years as an irritant agent to cause temporary incapacitation.
- 7. Calmatives and malodorants were identified as potential alternatives for use in this area. PSDB carried out some preliminary research on both areas and this work was presented in the Phase 3 report. In that report it was noted that the development of both calmative and malodorant technology was not advanced enough to merit further substantive investment at the present time. It was recommended, however, that research in other countries should continue to be monitored.
- 8. This chapter presents a summary of information gathered on the topics of calmatives and malodorants since the publication of the phase 3 report and examines each area in reference to the ACPO Operational Requirement for less lethal technologies. No commercial or off-the-shelf system exists for either of these areas, therefore research was focussed on the background to the technology, the perceived benefits and disadvantages of the technology and how each of these areas might meet the ACPO operational requirement for less lethal technologies.

## **CALMATIVES**

- 9. No commercially manufactured or 'off the shelf' system is currently available that could be used to incapacitate a human with a calmative agent in a policing scenario. Unlike other areas investigated by PSDB under the less lethal programme, research into calmative agents has had to focus on the wider issues surrounding their use rather than concentrating on any specific agent, delivery method or commercial product.
- 10. In October 2000, Pennsylvania State University produced a report on the advantages and limitations of calmatives in less-lethal operations<sup>24</sup>. The range of applications discussed in that report covers a wide range of operational scenarios, only some of which are relevant to potential UK use.
- 11. The report states:
  - "The ideal non-lethal calmative to use in these situations should be easy to dispense and compliant for administration via a wide range of routes. The compound's onset of action should be fast and have a short or limited duration; the dose should produce nearly the same extent of calm in individuals of similar body mass index and age range.

The effects of producing a calm state with this agent should be reversible. The compound should be capable to be safely administered by the individual who is making use of the non-lethal technique and free of any prolonged toxicity to the individual receiving the agent."

- 12. Calmatives are synthetic drugs designed to reduce anxiety and/or aid sleep. Many of the agents produce both effects, with a calmative effect at low doses and a hypnotic/sleep producing effect at higher doses. The drugs are usually targeted to specific proteins in the central nervous system, particularly the brain.
- 13. Calmatives inhibit mental activity and alertness and impair skills requiring concentration, such as driving. The precise effects of these agents are difficult to predict. Calmatives may, in some cases, reduce the inhibitions of the subject, which may result in violent or irrational behaviour. Such behaviour could result in an increased risk of injury to the subject or those around him.
- 14. The agents under consideration in this report are not generally intended to produce deep sedation or unconsciousness. To produce such an effect would require an anaesthetic compound. The effects and risks of drugs from this group are also briefly discussed in this report.

# **Agents and Effects**

15. A number of classes of drugs that could be used to produce a calmative or sedative effect are discussed below. This list is not exhaustive and is intended only to provide an overview of the range of agents available. A more comprehensive examination of available agents can be found in the Pennsylvania State University report.

#### **Analgesics**

16. The term analgesic covers a range of drugs used to provide pain relief. Effects produced may include pain relief, euphoria and sedation. Physical dependence may result after long-term use of these compounds. Drugs in this group include fentanyl.

### **Dopamine Antagonists or Neuroleptics**

17. Drugs in this class depress functioning of the central nervous system. They are commonly used in the treatment of mental illness, particularly schizophrenia. Effects of these drugs include sedation and reduced motivation. At higher doses tremors and muscle spasms may occur. A number of chemical groups fall into this category including phenothiazines and butyrophenones.

#### Benzodiazepines

18. This class of drugs is used in the treatment of anxiety, insomnia and epilepsy. They are also used as sedatives in pre-surgical medications. The effects produced by these drugs include relaxation of muscles and sedation. They also act as anti-convulsants. Drugs in this group include diazepam (Valium).

## **Anaesthetics**

- 19. The word "anaesthesia" means "loss of sensation". Various levels of sedation can be achieved depending on the choice of drug, dosage and delivery method.
- 20. Use of any agent intended to produce unconsciousness would require the presence of immediate medical assistance at the scene. The Pennsylvania State University report listed a number of precautions and risk scenarios associated with such action
  - It is important to ensure that subjects do not collapse in a position that may obstruct the airway or otherwise inhibit breathing;
  - It is possible that breathing could stop as a direct result of administration of certain agents. This effect is less likely to occur in fit, young individuals but is more likely to occur in unhealthy, elderly or very young subjects;
  - Administration of tranquillising agents could lead to secondary injuries e.g. through falling due to loss of muscular co-ordination;
  - Continued monitoring may be required dependant on the dosage of drug used and duration of action:
  - Medical assistance may be required to deliver an antidote to the agent if one is available.

# **Side Effects**

- 21. Use of any drug may lead to unwanted side effects. Some specific effects were mentioned in the drug descriptions in the sections above. Other more general effects can also occur.
- 22. Many of the agents described could have an effect on the subject's breathing, heart rate or blood pressure. Such effects may be compounded if the subject is under the influence of another drug such as any prescribed medication or recreational drug, including alcohol. The effect of interactions with other agents is strongly dependent on the drug being delivered and will also vary between subjects.
- 23. Pre-existing medical conditions may also alter the effects of a particular agent. For this reason many drugs are not recommended for use on specific subject groups e.g. children, the elderly or pregnant women. Other agents should be delivered at a different dosage level depending on the subject involved.

### **Delivery Methods**

24. Several methods may be used to deliver calmative or anaesthetic agents. These include:

### Oral delivery

25. Many calmatives are suitable for oral delivery, usually in tablet form. It would be difficult to administer any agent in this form to an uncooperative subject without close physical contact or deception e.g. by placing the drug in food or drink.

#### Injection

26. Intravenous injection can only be achieved at short range and would require close physical contact with the subject. Intramuscular injection could be possible through use of a dart at longer range. Not all agents are suitable for intramuscular delivery.

#### Inhalation

27. It would be difficult to control the dosage received by the subject through this delivery method as it would depend on a number of factors including the subject's proximity to the source of the drug and the subject's breathing rate.

# **Operational Requirement**

28. A number of key areas of the ACPO Operational Requirement for Less Lethal Options are not met by calmatives. These are outlined below.

# The option should be suitable for use against the maximum proportion of the population, taking account of both permanent and transitory effects.

- Many of the agents identified carry risks when used against specific groups. Most should not be
  used against pregnant women for example; others carry risks when used on elderly subjects or
  people with pre-existing diseases;
- There is a substantial risk in the interaction between the agents and other drugs including alcohol, prescribed medication and recreational drugs. The majority of calmative agents are not recommended for use on subjects who have consumed alcohol;
- Judgement issues arise for the operator or supervising officer in determining appropriate dosages based on weight, medical history, level of sedation required and whether the subject has consumed alcohol or is under the influence of any other agent;
- The effects of all these agents are strongly dependent on the medical history of the subject. Before a drug could be considered safe, an officer would require detailed knowledge of the subject's medical history particularly the use of other prescribed or non-prescribed medication.

# The option should temporarily neutralise the threat and the onset of action should be fast with a limited duration.

Many of the drugs identified vary in their time to effect. In some cases this may be as much as half
an hour after application of the agent. The time will vary from individual to individual and cannot be
accurately predicted. Similarly the duration of the effect of the drug cannot be predicted.

# Any option should be capable of being operated by one officer - with appropriate training.

The judgement issues required regarding the use of calmatives would suggest a medical
practitioner should be present or available to offer guidance on these matters. After the
deployment of any of the agents discussed in this report, the subject would require immediate

medical assistance to assess the level of tranquillisation, check for adverse side effects and to administer any antidote, where one exists.

29. In addition to the factors detailed above, issues of police, government and public acceptability would need to be considered before use or deployment of tranquillising agents. Legal and ethical issues would also have to be considered.

### Conclusions

- 30. From the limited information given above it is apparent that use of calmatives in policing situations would not be a straightforward process. The decision to use any drug whether intended to induce a state of calm or complete unconsciousness requires knowledge of a subject's medical history, particularly the use of any prescribed or non-prescribed medication and any relevant medical conditions. There would also be considerable responsibility in terms of immediate and post-incident aftercare.
- 31. On the basis of the arguments and observations presented, the Steering Group has decided to move the work on calmatives from Category B to Category C, indicating that further research is not required at present. However, PSDB will continue to monitor this area, focusing on international research programmes and future developments in delivery methods and potential tranquillising agents.

#### **MALODORANTS**

- 32. PSDB were asked to undertake a review of existing and near market products as well as a review of current research into malodorant technology. The data collected is summarised in this report.
- 33. A number of chemicals and compounds have been identified as having an unpleasant or distinctive odour. Each of these chemicals and their chemical properties are described in the following sections. This report summarises the chemical and physical attributes of each chemical compound; it does not recommend the use of any specific chemical.
- 34. A number of encapsulated systems suitable for malodorant deliveries have been identified which have been discussed in earlier PSDB reports<sup>25</sup>. These systems are still currently under development. No information has been found regarding any specific malodorant compound that has been, or could potentially be used in these devices. No current operational information has been found relating to malodorant devices.

### **Human Response to Odour**

- 35. The human response to odour is a complex subject. Responses may vary according to culture or personal experience. It was recognised by the US National Research Council that odorous substances that were not acknowledged as toxic to human beings still produced more than passing annoyance by the continued or frequent presence of the odour.
- 36. It is clear that people readily classify the healthfulness or harmfulness of environments by the presence and quality of perceived odours. It has also been proved that people from different cultures, countries, races, religions and class have different perspectives when it comes to malodours. For example, in the tests noted here<sup>26</sup> results showed that South Africans perceived a vomit odour to be fairly neutral in intensity, irritancy and only mildly unpleasant. However, subjects of Asian origin, perceived it as strongly irritating and very unpleasant.
- 25 PSDB Report 12/01 Less Lethal Technologies-Initial Prioritisation and Evaluation. http://www.homeofffice.gov.uk/docs/lesslethal.pdf
- 26 Establishment of Odor Response Profiles: Ethnic Racial and Cultural Influences. P. Dalton and G.K. Beauchamp, Monell Chemical Senses Center, 1999.

- 37. No studies have been identified which assessed the ability of a malodour to promote avoidance or crowd dispersal.
- 38. The Monell study suggested that concerns stemming from exposure to a malodour in a real-world setting could be exacerbated for several reasons. These could include: the unknown nature of the odour; the consequences of exposure; and also the source of the odorant deployment, which would heighten the possibility of injurious consequences for example, panic could occur as a result of deployment. It is likely that these psychological factors could enhance the adverse sensory impact of a malodour deterrent and could prove to be a powerful combination in achieving the desired outcome.

#### Malodorant Chemicals and Odour Thresholds

- 39. Odours are difficult to quantify. An odour may comprise of many chemicals related to different smells with different odour thresholds. The standard method<sup>27</sup> for measuring odours is the olfactory method, where a panel of subjects assess the odour of a sample of air containing a specific amount of malodorant chemical.
- 40. A concentration exists below which the odour of a substance will not be detectable under any practical circumstances, and above which individuals with a normal sense of smell would readily detect the presence of the substance.
- 41. The threshold may be characterised as being either (a) only detection (awareness) that a very small amount of added substance is present but not necessarily recognisable (the odour threshold), or (b) recognition of the nature of the added substance (the recognition threshold).
- 42. Thresholds are determined in order to note the effect of various added substances on the odour of a medium. The threshold could also be determined in order to characterise and compare the odour sensitivity of individuals or groups. The ability to detect a substance by odour is influenced by physiological factors and criteria used in producing a response by the panellist. The flowrate of a gaseous, odorous sample has an influence on the detectability of an odour.

#### **US Research**

- 43. The US National Defense Research Committee developed a faecal smelling odour for use against enemy troops during World War II. The odour was tested against German soldiers by French resistance forces and also against Japanese troops. The report notes that the volatility of the chemicals and an inadequate delivery system resulted in widespread contamination of the immediate area with the malodour.
- 44. More recently the Monell Chemical Senses Center in the US has conducted research on malodorants for the US military. The criteria for malodorant selection were defined as:
  - Perceived to be highly unpleasant by a target group;
  - Quickly detected and dispersed;
  - Not easily habituated or adapted (i.e. people do not get used to the odours);
  - Not incapacitating or a sensory irritant.

#### **Determination of Effective Dose**

- 45. Two malodours were selected for use in trials to assess the most effective dose to create an avoidance response. Responses were assessed through observations of behaviour, self-reporting and physiological measurement.
- 27 ASTM Standard E679-91 (1997) Standard Practice for Determination of Odor and Taste Thresholds By a Forced-Choice Ascending Concentration Series Method of Limits.

- 46. The two malodours selected were developed by the military "Bathroom Malodor" and "Who Me?" A neutral control odour was also used in the tests, in this case isobornyl acetate. Bathroom malodour contains a number of sulphide chemicals including skatole and mercaptoacetic acid. "Who Me?" also contains sulphide chemicals including t-butyl mercaptan and thiophenol.
- 47. Each odour was diluted in dipropylene glycol then moved into individual gas-sampling tubes and sealed. Each of the tubes was then connected to a supply of medical air and fixed to the top of the subject's hood, which covered the whole head and face.
- 48. Several measurements of subject response were made including: electrical conductivity of the skin, heart rate, respiration rate, the volume of air inhaled and exhaled in each breath and electrogastogram activity (an early physiological indicator of nausea). Before and after exposure the subjects completed a profile of mood states and a modified version of the National Institute for Occupational Safety and Health (NIOSH), health symptom survey. The mood state profile is an eleven item scale of mood attributes, rated on a 1-7 scale. The NIOSH survey consists of a 20 item survey including symptoms that were consistent with exposure to the chemical and false symptoms (e.g. leg cramps) that were not. The subjects read each symptom description and indicated the degree to which they were currently experiencing that symptom on a 1-5 scale (1- not at all to 5- very much).
- 49. At low concentrations no noteworthy differences between ratings were given at any point for the three odours. At higher concentrations the subjects adapted more easily to "Who Me?" and the control odour. At all concentrations "Bathroom Malodor" was seen as significantly more annoying and irritating than the other odours.
- 50. There was an average of 30% reduction in the volume of air inhaled and exhaled for "Bathroom Malodor" and 27% for "Who Me?"

### **Response to Specific Malodours**

- 51. The effective doses determined in Study 1 were used to conduct a full body study<sup>28</sup>. Participants were offered varying levels of incentive to complete a series of computer-based tasks while in the presence of a malodour. The purpose of this test was to observe the effect of the motivational level of the subject. Motivation was manipulated by the promise of financial compensation for task endurance in the presence of a malodour.
- 52. The subjects were informed that they could end the task when they wanted and would still be paid for the experiment. The amount offered varied across the three groups: \$15, \$50 or \$100. All subjects were subsequently paid the highest amount (\$100) following completion of the test and debriefing.
- 53. The malodorant solutions were made up with a tracer chemical added to ensure the consistency of the concentration of the malodour. The subjects were tested in an environmental chamber complete with a testing station. The same physical recordings were made as in the first study.
- 54. It was found that there was an interaction between motivation and vigilance performance. Subjects who were offered no additional bonus for motivation scored the lowest.
- 55. The level of perceived control over the odour intensity also appeared to influence performance on the vigilance task. In one session each subject was given the apparent power to manipulate odour intensity. Performance on the vigilance task was significantly higher among those subjects, and subjects rated the odour and annoyance intensity as much lower, even though the odour concentration was maintained at the same level, irrespective of their attempts to reduce odourant flow.

- 56. The results of this second study showed that the subjects rated the two malodours as notably more intense and annoying than the control odour, however no considerable difference was noted between the two malodours. There was a strong effect of gender on the ratings, with the male subjects rating odour, irritation and annoyance for both malodours as significantly higher than the female subjects.
- 57. Measurements showed an average of 25% reduction in the volume of air inhaled and exhaled for "Bathroom Malodor" and 23% for "Who Me?"
- 58. The two malodours led to an overall lower level of accuracy in the test by all groups. The lower performance in the low motivation group was partly due to the fact that five subjects left the experimental exposure early and scored less than 50% correct on the test.
- 59. The results from the US studies showed that the subjects regarded the malodours used as unpleasant. The studies did not indicate whether this would translate into incapacitation of a subject if deployed as a policing option or what effects a malodorant might have if deployed in a crowd situation. More research would be required to determine the effectiveness of any malodorant under these circumstances.

## **Operational Requirement**

60. The possible deployment of malodorants was examined against the ACPO operational requirement for less lethal technologies. The following aspects of the requirement are particularly relevant to the area of malodorants:

The option should be discriminating over a range between 1 and 25 metres. Considerable further benefit will arise if an option is discriminating over a greater distance.

• Malodorant devices are likely to have an area effect; although a device could be aimed at an individual it would also have an effect on others in the surrounding area.

#### The option should be rapidly effective - ideally immediate.

• It is not known how long it would take for a malodorant compound to have an effect on an individual and whether this will vary for different subjects or subject groups.

#### The option should be effective against the maximum proportion of the population.

- Information on effectiveness of available malodorants is limited. It is not known how different subject groups would react to particular odours or whether some groups would be more susceptible than others.
- Potential counter measures should be considered, e.g. nose clips or face masks.

# The option should minimise the risk to any person of serious injury and/or lethality at all ranges.

• Before any malodorant system could be deployed operationally it would require rigorous medical testing similar to that carried out on other chemical agents i.e. CS.

The option should at least temporarily neutralise the threat, rendering a subject incapable of carrying out an immediate threat of violence. The duration of such incapacitation must be sufficient to permit officers to safely approach a subject and restrain them, which may include the need to overcome an obstruction.

 Again, no information is currently available as to the type of effect any malodorant would have or the duration or level of any effect. Results from US studies discussed earlier suggest that some subjects would be able to fight through the effects of a malodorant, as with current chemical incapacitants.

#### The option should be effective in all operating conditions and in confined spaces.

 Any system employing an airborne substance is likely to be affected by weather conditions, especially wind and rain. In a confined space an odour is clearly more likely to persist than if used outdoors where there would be a more rapid dispersal.

#### Conclusions

61. Chemical and toxicological information has been obtained for a variety of chemical compounds, however the effectiveness of any of these chemicals as a malodorant for police use has not been determined. At present insufficient information is available to allow the recommendation of a specific chemical for further study. Before any malodorant agent could be deployed or used operationally it would have to undergo rigorous medical testing as with any other chemical irritant agent.

## **GENERAL CONCLUSIONS**

- 62. Neither calmatives nor malodorants currently meet police requirements. For this reason both calmatives and malodorants have been moved to category C for the purposes of evaluation. No further research will be carried out on either of these areas unless there are significant advances in the available technology.
- 63. Calmatives and malodorants both fail to meet key aspects of the ACPO Operational Requirement.

  Calmatives carry additional health risks compared to alternative options and malodorants do not appear to offer any tactical advantage over existing incapacitants already available to the police.

# **Glossary of Terms**

#### **ACRONYMS and ABBREVIATIONS**

ABE Attribute Based Evaluation

AC Alternating Current

ACPO Association of Chief Police Officers

ACPOS Association of Chief Police Officers Scotland

AEP Attenuating Energy Projectile

CN Chloroacetophenone

CR Dibenz (b.f.)-1:4-oxazepine

CS O-Chlorobenzylidene Malononitrile

DIP Discriminating Irritant Projectile

Dstl Defence Science and Technology Laboratory

LASD Los Angeles Sheriff's Department

Laser Light Amplification by the Stimulated Emission of Radiation

LED Light Emitting Diode

MOD Ministry of Defence

MPE Maximum Permissible Exposure

NIJ National Institute of Justice

NIO Northern Ireland Office

OC Oleoresin Capsicum

PAVA Pelargonic Acid Vanillylamide

PBR Plastic Baton Round (now generally referred to as baton round)

PSDB Police Scientific Development Branch

PSNI Police Service of Northern Ireland

PTSD Police Technical Services Division

rms Root mean square

SRDB Scientific Research and Development Branch

Taser Thomas A Swift's Electrical Rifle (from the Tom Swift fantasy stories)

