

Annex E – STATEMENTS FROM PARTICIPANTS IN HFM-073

The following statements are the opinions of the individual participants and should not necessarily be viewed as the opinions of the organization or the nation that supported their participation in HFM-073.

E.1 CZECH REPUBLIC (PROVIDED BY JIRI CHALOUPKA)

The Czech Republic has been a member of NATO for 5 years. By admission to this organization one of the main strategic tasks of our foreign policy has been fulfilled. Building up qualitatively new contacts with NATO allies represents one of the main conditions for security enhancement and stability enlargement. At present the Czech policy towards NATO is characterized by active participation of the Czech Republic in implementation of NATO security policy. Czech Army integration and interoperability process is ensured by links of Czech Armed Forces structures and capabilities with NATO principles and standards. Within the Non-Lethal Technologies research program the Czech Armed Forces encourage cooperation and coordination between NATO and PfP country's research workers in the Research and Technology Organization and by this they contribute to interoperability of newly developed technologies.

The Czech Armed Forces are engaged in NATO and UN multinational peacekeeping operations. Because of the need of alternative weapons that may be widely used in cases of civil unrest, they have decided to participate in research cooperation in the field of Non-Lethal Technologies (NLTs) development. These alternative weapons can be probably used in future military operations other than war (MOOTW). The task of these technologies – to incapacitate personnel or materiel, while minimizing fatalities, permanent injury to personnel, and undesirable damage to property and the environment – is in accordance with our foreign policy in all areas of the world.

The research into NLTs in our country is primarily for security forces – police, military police or civil security agencies. The use of NLTs in military operations has been proposed in order to maintain crowd control and to break the resistance of the population as a way of minimizing enemies (e.g., during the defence of one's own troops against rioting of crowds, during peacekeeping or peacemaking operations). Special police forces or armed forces may plan to use them during antiterrorist operations and activities.

Research and developmental activities in the Czech Armed Forces are coordinated at the level of the Ministry of Defence Department of Research and Development Control. The technical part of this research and potential NLTs development is the responsibility of the Ground Forces Military Technical Institute. At present this Institute is carrying out a project concerning the development of explosives with rubber projectiles. This project will be finished in 2005.

Police and civil security agencies are interested in purchasing commercially available NLTs from foreign importers. We do not know anything about possible research and development efforts by the organizations.

Other research and developmental activities have also been carried out at the Purkyne Military Medical Academy in Hradec Králové. The aim of these activities has been to find new and efficient ways for the protection of soldiers against harmful factors, including mechanical, physical, chemical, biological, or environmental factors. In the field of NLTs, the experiments concerning the auricular and extra-auricular systemic effects of noise, low-frequency noise, and infrasonic noise have been conducted and means for providing soldiers with protection have been found. Animal research on the biological effects of physical factors that might be used in NLTs, using histochemical and protein analysis, is just beginning. The aim of

ANNEX E – STATEMENTS FROM PARTICIPANTS IN HFM-073

this research is to determine the protective characteristics of various materials and to prevent injuries of our own troops in case of the use of new military technologies.

The Ground Forces Military Training Base is used for training for many missions, including those possibly involving NLTs. Training effectiveness is achieved by applying the principles of protective equipment development, human organism adaptation, psychological and military training procedures, and the development of an extended individual training program.

Research on the development of drug combinations that can be used for anaesthesia, analgesia, and psychological status improvement, in order to control the panic reactions of individuals or a crowd, has been conducted during the last few years.

Another project of the Ground Forces Military Technical Institute is designed to find the effective and humane substitution for anti-personnel mines with the use of non-lethal technologies. This project consists of finding a technical solution for appropriate weapons and analyzing the latest non-lethal technologies. An MCG generator with an output current of approx. 22 kA, which is able to supply a vircator as a source of HPM, has been developed and tested as a first step.

E.2 FRANCE (NONE PROVIDED)

E.3 GERMANY (PROVIDED BY DIETER REIMANN)

E.3.1 Why Germany participated? Background

The primary reason why Germany participated in HFM-073 was to support the Occupational Medicine and Occupational Health Service of the German Armed Forces. Medical health protection at work is based on Article 2 of the Basic Law of the Federal Republic of Germany. Occupational safety and health legislation is designed to protect people from hazards and health damage at work. The bases for these laws go back to social legislation in 1871 by Reichskanzler Bismarck.

The legally established executive authority for administration and implementation of Article 2 is based on Article 21, paragraph 5, p. 4, Occupational Safety and Health Act (Arbeitsschutzgesetz) of 1996 (this is an adaptation of the legislation in the European Community) Article 114, paragraph 1, sub-paragraph 3, and Article 115, paragraph 5, p. 3, Code of Social Law (Sozialgesetzbuch – SGB VII). The objective of this legislation is occupational health and environmental medicine coverage of all Bundeswehr personnel, including, but not limited to, the investigation of the causes of occupational hazards within the scope of the preventive functions the government has to discharge in its capacity as the social injury carrier in accordance with Article 14, SGB VII.

The supreme federal authority, pursuant to Article 1, Industrial Safety Act of 1973 (Arbeitssicherheitsgesetz), and in conjunction with the guidelines of the Federal Ministry of the Interior, sees to it that occupational health officers performing tasks pursuant to Article 3, ASiG, are appointed in organizations.

The Surgeon General of the Armed Forces at the Federal Ministry of Defence (FüSan I 2) is the office of primary responsibility for coordinating all occupational and environmental medicine activities within the scope of public-law supervision and functional control. Occupational safety and health and environmental protection activities comprise all legal, administrative, occupational medicine, and environmental medicine measures designed to protect Bundeswehr personnel from operational hazards at home and abroad.

E.3.2 Why Germany participated? Inducement

In March 2000 the Chief of Staff Federal German Armed Forces decided to promote research on NLT and to hurry to provide German Forces in Kosovo with adequate Non-Lethal Weapons because of critical events in the liberation action of personnel of the German Embassy off Tirana, Albania, and in an aggressive crowd in Mitrovica, Kosovo.

The Surgeon General of the ARMY ordered a medical officer as consultant for the German Bundeswehr to the NATO RTO HFM 073 “NLW in Peace Support Operations. Medical Aspects and Human Effects of Non-Lethal Technologies”.

Of special interest are the efforts of the Armed Forces Medical Service for protection of the own Forces when employing NLT/NLW. In Germany for historical ethical reasons trials with humans or even animals are strictly limited. So it was expected to collect international knowledge and experience on human effects in the use of NLT from nations using NLT already.

By definition the main interest for the HFM panel is protecting the soldier. If we concentrate on the effect on the opponent it’s for predicting medical effects, crowd behaviour or preparation of medical support and therapy. By learning about the effects we can prove that the specific NLT will act less than lethal.

Task Group 12 worked on Taxonomy and Glossary of NLT related medical terms and thus produced distinctness in thinking. Visits of specialised laboratories and lectures of scientific co-workers increased knowledge and raised experience.

When the Task Group was initiated in 2000, level of authority was German ARMY Support Command, Surgeon General of the ARMY, Koblenz. Now – by change of structure – Medical Office, Muenchen is in charge.

E.3.3 German Focus Areas for NLT

There is activity on NLTs in the German MoD. Studies and papers on scenarios and in which NLWs might be used have been prepared. The 40 mm impact foam grenade is the only NLW currently in use by the German forces. New activity was initiated following the March 2004 riots in Kosovo. An update on NLT activities in German Forces is given below:

E.3.3.1 Acoustics

Loudspeaker-Vans have been in use for decades for information and irritation purposes.

Directional multi-effects acoustic systems using controlled phased arrays are undergoing trials. These systems acoustically target selected people within a crowd with low audible frequencies to cause unbearable acoustic stress, targeted information/disinformation, and loss of equilibrium.

Infrapulse-Generator technology is in research and development.

E.3.3.2 Animals

Special trained dogs (German Shepherd) for different purposes (watchdog, search and rescue, explosives and mine tracing, drug sniffing, etc.) have been stationed with the troops with their individual sentries for several years. They are integrated in the parachute forces too. Veterinary care is available at all times.

E.3.3.3 Barriers

A Multipurpose launcher, a Bazooka-like 90 mm tube (Panzerfaust) using compressed air, is under trial for delivering payloads up to 1.5 kg up to a range of 300 m. Payloads could include, for example, fog, flash bangs, markers, entanglers, nets (range limiting, 9 m in diameter), or HPM-jammers.

Micro wire obstacles consisting of steel wires compacted under tension, have been developed. When deployed the wires expand to assume pre-determined geometric shapes formed from a tangle of the wire itself. Expansion ratios of 1:6000 are achievable. Micro-wires could be used as impenetrable barriers to prevent access by vehicles and personnel to designated areas. They could also be deployed to prevent egress of hostile groups from designated areas. The technology could be extended to provide propeller entanglement to stop small boats and patrol craft, if the system could be deployed just below the surface. Micro-wires could ensnare the propellers of fixed wing aircrafts and rotors of helicopters on the ground.

Airbag Stopper technology and means of erecting Rapid Barriers are in research and development.

E.3.3.4 Chemical Agents

Chemical agents such as CN, CS, even Pepper Spray or other preparations of OC are not allowed in military operations because of the Chemical Weapons Convention (CWC) and, furthermore, there are detailed national German restrictions on the use of chemicals, which refer especially to Peace Enforcement and Peace Keeping military operations. Decision for implementing OC was taken in September 2004.

The goal of NLT is to incapacitate people or equipment while minimizing unintended fatalities and damage. However, Jean Pascal Zanders from Stockholm International Peace Research Institute has pointed out: “The Chemical Warfare Convention doesn’t ban chemicals, it bans purposes under which those chemicals are applied.” [1]

The situation has changed since the World Wars, Cold War, and even since 1993, when the CWC was agreed upon, to a new emphasis on Crowd Control, Law Enforcement, Embassy Protection, Rescue Missions, Peace Keeping Missions, and Counter-terrorism. However, we are still depending on old law. There is an urgent need for rethinking and rewriting the existing laws with respect to the implementation of NLTs using chemicals. International legal experts should reconsider the old laws in the light of new security imperatives and the development of new NLTs. Especially after the riots in Kosovo in March 2004, when it was reported that 28 people died and 800 were injured and 15 churches and about 110 houses were destroyed, we should consider relaxing restrictions on the use of “chemicals” in certain situations. Such exceptions could be limited to Operations Other Than War (OOTW) or for discrimination between rioters, combatants, and civilians in a hostage or human-shield situation. Multinational exercises should be conducted to identify situations when the use of specific NLTs would be fully justified; scenarios should include consideration of unexpected or even “unthinkable” situations.

The German MoD and Ministry of Foreign Affairs has been expanding its consideration of the use of certain NLTs by the military in peace keeping and peace enforcement operations. Decision for the use of “Reizstoffe” and pepper spray for escalation purposes instead of lethal force passed legislation in September 2004 [2]. Only products already in use in the police forces and declared to the CWC-Organisation in The Hague, NL, will be implemented.

E.3.3.5 Directed Energy

Radio Frequency and High Power Microwave systems are being considered to stop ground or aerial vehicles and missiles and to jam radio communications and information technology. The frequency spectrum that can be used varies from VHF to millimetre waves. The emitted energy can have various characteristics: continuous or pulsed, specific peak power, specific mean power, specific pulse duration and frequency (there may be only one pulse), sharply focused or wide spread. For protection against electromagnetic fields see STANAG 2345 [3].

E.3.3.6 Electro-Incapacitating Devices; Electro-shockers

The Air TASER M26 was tested at a German Army proving ground and was found to be not accurate enough in function. Malfunction and electric shortcuts by sparks to the trigger hand in high humidity weather may endanger your own personnel.

Some Police forces in Germany have tentatively begun using M26 TASERS. The effects are impressive, but there is still concern that the physiological and neurological effects of the TASER are still poorly understood.

A Plasma Electro incapacitating device is under going research and development.

E.3.3.7 Impulse Weapons

40 mm sponge grenades [4] and a 40 mm impulse grenade with marker substance and their launchers have been delivered to special troops since 2002. Reports about training experience or use in action have demonstrated that these weapons pose no occupational threats to our own forces. There is no information available yet about their effects on targets.

40 mm launchers have been adapted to a number of G36 guns for mutual use.

A Vortex-Generator is undergoing research and development.

Water cannons, both traditional and sophisticated, using High Pressure Pulsed Water, are under going trials.

E.3.3.8 Other Focus areas

Work is being conducted on a Broadcasting Station and on Newspapers for spreading information to both illiterate and literate inhabitants of a country.

Unmanned Aerial Vehicles (UAV) with non-lethal payloads is undergoing research and development.

Specialized Training Procedures have been developed for dogs and their individual sentries. Also, specialized Training Procedures have been developed for the use of the 40 mm impulse grenade, the 40 mm launcher, and the G 36 adapted version.

In 2001, 2003, and 2005, in Ettlingen, Germany, European Symposia on NLW were well attended by scientists and policy makers from all over Europe and North America. A broad spectrum of topics were presented and the proceedings were published in a book. These are considered among the best symposia on NLTs in the world.

E.3.4 Conclusions and Recommendations

Even though there is very high interest in peaceful operations and a good rapport with people in the countries in which the German military is deployed, the effective use of explosives by adversaries and terrorists is compromising the opinion of NLT. Unless it can be demonstrated that the intelligent use of NLT, at the right time in the right places, produces better outcomes than traditional means of warfare, there will be little push to deploy NLW.

E.3.4.1 NLT Awareness

Military decision makers should be kept aware of new information on the use and validation of existing NLWs as well as new findings on NLTs undergoing trials and advanced development. If such awareness is maintained, NLWs and NLTs may be considered for use in specific emergency situation. A high-level, table-top type of document, including various NLT, operational, and logistical requirements, with examples of specific scenarios and rules of engagement in which such options have been or might be employed, would serve the purpose.

E.3.4.2 Public Acceptance

In order to garner public acceptance for the use of NLWs, it is essential to provide information and to give opportunities for debate. In particular, NLT other than kinetic or pyrotechnic devices will have to be assessed carefully with regard to their effects on human health in order to inform the public that they do not produce new unknown effects, including long-term effects.

E.3.4.3 Legal and Political Issues

Inside NATO-Nations different law is applied on different situations in certain scenarios in police or military operations. For multinational and joint operations, the Law of Armed Conflict should be identical for each participating nation. Because of the multinational nature of NATO operations, common NATO standards for the use of NLWs and the training of personnel will need to be developed. Developing this common standard might also lead to changes in the domestic law of some NATO member states.

E.3.4.4 Medical Preparation

When a chemical incapacitant was used at the Moscow theatre hostage incident, tragic outcome, mostly due to poor preparation for rescue and therapy, showed how important tactical medical planning is in an overall operational use. Every non-lethal technology has to be evaluated for medical aspects during its conception, development, training, and application. Even if the technology is designed for anti-materiel applications, human or humanitarian aspects might become involved during application. Each NLT has to prove its non-lethality by definition and be tested for effects on human health and the environment. Methods for protection of own forces and therapeutic strategies for both our own forces and the adversary need to be developed. The goal could be establishing a process for NATO certification of each NLT before it is approved for operational use. Such a process could be documented in a NATO STANAG on NLWs, and we recommend that this effort be stated as soon as possible.

E.3.4.5 Training

As with training on traditional weapon systems, training for use of NLWs will be aided by computer simulations in virtual reality situations. As such simulations need to be based on experience, a process for completing, collecting, and analysing “after-action” or “lessons-learned” reports following actual NLW use.

E.3.4.6 Continued Activities of the HFM Panel on NLW

The aim of HFM-073 to create a medical NLW databank, including psychological and pharmacological aspects, to be implemented later on into a technical and operational databank should be followed in the future. Valuable medical data are of fundamental importance for the above mentioned certification process. MoD-funded Human Science Research in NLW is urgently needed to prove advantages and public acceptance.

E.4 THE NETHERLANDS (PROVIDED BY ANTHONY W.K. GAILLARD)

From 1999 until the end of 2003 a large research program (~2.4 million euros) on non-lethal weapons (NLW) was conducted by TNO Defence, Security, and Safety. The objective of the program was to investigate the suitability for the Royal Netherlands armed forces of a number of NLW concepts by the determination of their technical performance, weapon effectiveness, and operational value, within the context of a number of scenarios.

The research focused on the following NLWs: Microwaves, Calmatives, Flash-bang hand grenades, Infrasound, Barriers, Entanglements, Blunt impact devices, and Psychological Operations.

These NLWs were evaluated on the basis of the judgments of military experts, in perspective of a number of military scenarios. Aspects considered were: effectiveness, usability, acceptability, and maturity. The study showed that for almost each situation a useful NLW can be found. The challenge is to find an NLW-system that is appropriate for many tasks or situations, and fulfils the global military requirements.

Finally the following five NLW concepts were selected as being suitable for the Netherlands armed forces: High Power Micro Waves (HPM), Combined flash-bang hand grenades, Non-penetrating projectiles (NPP), Pepper spray, and Psychological Operations (PsyOps).

Since NLWs become more and more important in NATO as well as in the other European countries, a new NLW program is currently prepared. Currently the Ministry of Defence is preparing a new policy with regard to the use of NLWs in the Armed Forces. A new program on HPM threat and protection started in 2003 and will last until August 2007 (budget 1.4 ME), whereas the research on Crowd Riot Control and Psychological Operations continues in other research programs.

Besides HFM-073 the Netherlands participated in several international groups: NATO SAS-035, NATO SAS-040, and EWG-NLW, and presented several papers at the 1st, 2nd, and 3rd European Symposia on NLW (2001, 2003, 2005), at the ICEAA (2001), and at the NATO-ARW on Anti-terrorism (2004). The Netherlands will also participate in the new NATO Task group SAS-060 on “Non-Lethal Weapons Effectiveness Assessment, Development and Verification”, and in the exploratory group for “The Human Effects of Emerging Technologies for Non-Lethal Operations”.

E.5 NORWAY (PROVIDED BY PER KRISTIAN OPSTAD)

Until recently only Norwegian police forces has been equipped with non-lethal weapons in the form of CS sensory irritants for crowd and riot control, baton rounds and distraction grenades. The Norwegian Police Directorate, which is organized directly under the Ministry of Justice, do not have their own research establishment, but a computer and materiel service which is responsible for selection and testing of materials and weapons.

ANNEX E – STATEMENTS FROM PARTICIPANTS IN HFM-073

Although Norway has a long tradition for significant contributing to UN operations in different countries, non-lethal technologies have not been included during these operations.

Norwegian Armed Forces are increasingly deployed in areas and situations where the objective of their mission is incompatible with the use of lethal military force. They often have to take the role both as military forces and as police forces. In addition there is in the western countries an increasing intolerance not only to suffer own casualties but also casualties among bystanders, civilians and even enemies. The Norwegian forces in Afghanistan are the first to be equipped with non-lethal weapons such as paintballs, rubber bullets, and CS sensory irritants.

The Norwegian Defence Research Establishment has started for 3 – 4 years ago a research program on non-lethal weapons. The main purpose of this program is quality assurance, efficiency, procedures for employment, security for users and international law to avoid breaching BTWC or CWC or any other international legal obligations. Although this program should have been a joint program for the Ministry of Defence and the Ministry of Justice it is entirely financed by the Ministry of Defence. In the future we will be interested in taking more advantage of non lethal technologies in military operations to avoid unnecessary suffering and damage to personnel. We will be interested in information about the bio medical effects of such weapons and promote research in collaboration with our NATO partners.

E.6 SWEDEN (PROVIDED BY ULF SUNDBERG)

In 1994, the Swedish Defence Research Agency (FOI) began considering “Non-Lethal Technologies” (NLTs) for possible support of units in international missions. FOI first developed a catalogue of scenarios and then analyzed the applicability of various conventional and alternative techniques to address each scenario. These scenarios, built on Swedish experiences from early FN missions, have also been used in the work of NATO LG3 ToE NLW/MOUT and SAS-040, in which Sweden participated.

The FOI NLT project took a holistic approach, but it was obvious from the beginning that Human Effects are critical for a complete understanding of the mechanisms of action and the outcomes of the use of NLT.

Technology projects have included (a) the use of high power microwave (HPM) as an auto stopper, which was tested 1994, and (b) an experimental development for generating infrasound (“Vortex generator”), which was later presented at a German-Swedish Workshop on NLW 1995 (Euskirchen). Both projects are currently inactive.

The possible impact of HFM on human health and safety, is being studied by Mårten Risling, FOI Department of Weapons Traumatology.

Following a study in 2002, the Swedish Defence Forces International Centre (SWEDINT) recommended the acquisition of NLT for International use, based on a definition and Policy applicable for Swedish units. These recommendations were accepted by the Defence Forces Headquarters (16 November 2004). The Policy excludes Information Operations and Electronic Warfare.

In 2005, the FOI NLW Project became part of a larger project aimed at acquiring an Armed Forces capability to be able to respond to any targets with an adapted scalable effect.

E.7 SWITZERLAND (PROVIDED BY DAVID HUMAIR)

According to their missions and changes in the security environment, the Swiss Armed Forces will increasingly be involved in situations where the use of lethal force is inappropriate or even counter-productive. Under such conditions, the enlargement of the range of options at a soldier's disposal must be assured and monitored.

As a member of the PfP programme, Switzerland took up the opportunity offered by the RTA of NATO to participate in the HFM-073 group on NLW in June 2002. Participation in the group was assured by a member of the Armed Forces Planning Staff, who contributed to different discussions, particularly the section on training, and organised a meeting for the HFM-073 group in Bern in November 2004. This involvement in the NATO discussion on NLW provided Switzerland with a great opportunity to develop a network of experts in the field.

As part of standard guard duty training, every soldier in the Swiss Armed Forces is instructed in the rules of proportionality, and the concept of the continuum of force (namely from a physical presence to the involvement of fire arms) forms an integral part of this training. A discussion is conducted to introduce non-lethal responses/means to all troops involved in armed guard duty.

Different non-lethal means are already in use within specialised troops of the Swiss Armed Forces. These means include the use of batons and pepper spray. Tests were launched with a view to producing non-lethal rounds for the 40 mm grenade launcher, but these have recently been stopped.

Switzerland fully supports this report and is interested in participating in future working groups on the subject of NLW.

E.8 UNITED KINGDOM (PROVIDED BY ROBERT INNS)

UK Armed Forces are increasingly deployed in situations where achievement of their objectives is not compatible with the full use of lethal military force; for example in peacekeeping and peace implementation situations. In parallel with this situation, there is an increasing public intolerance, not only of casualties suffered by UK forces, but also of casualties among the opposition and bystanders in the civilian population.

The UK MoD is concerned to keep abreast of Non-Lethal Weapon (NLW) developments, which according to the NATO definition, are explicitly designed and employed so as to incapacitate personnel or equipment with a very low probability of death or serious injury and with minimal collateral damage or impact on the environment".

NLW currently in service are CS sensory irritant (used for law enforcement applications only due to CWC constraints), distraction grenades, and baton rounds. With regard to the latter, there is a continuing programme of research, by Dstl, in hand to look at ways to reduce the risk of injury. This research is undertaken for the Northern Ireland Office (NIO), Home Office/ACPO, and MoD to meet the requirements of the Patten report on policing in Northern Ireland (NI) (and implicitly military operations in NI), and ACPO's desires to have a broader range of options in conflict management – public order and alternatives to conventional firearms. DSTL are contributing to this programme, largely in terms of providing independent medical opinion on the risks from commercial devices such as TASERS (electrical incapacitation devices) and water cannon. DSTL has also been asked by NIO to develop concepts for baton rounds with even less risk of injury, and projectiles to deliver effective quantities of CS on individuals. Full and up to date details of the programme can be found at www.nio.gov.uk.

ANNEX E – STATEMENTS FROM PARTICIPANTS IN HFM-073

In addition to the above, on MoD's behalf, Dstl conducts and co-ordinates a small programme of research into some of the novel technologies. It is also responsible for the UK's International Research Collaboration in this area. Research has been conducted into non-lethal barrier technologies such as foams and nets, traction inhibiting adhesives, electrical shorting compounds employing metal fibres and dusts, and underwater acoustic devices.

More recent research includes computer studies of the Vortex Ring gun and the uses of optical dazzle and microwave devices. All research that is undertaken is consistent with the fact that the UK has no plans to develop or promote NLW that would breach the BTWC or CWC or any other international legal obligations. The 1995 Protocol IV to the 1980 Convention on Certain Conventional Weapons prohibited the development of laser weapons designed to permanently blind the unaided eye. However, optical systems (including lasers) that temporarily dazzle are considered as possible military options. An integral part of any research of this nature is the study of human physiological and psychological effects caused by optical dazzle devices.

As with any weapon system, normal legal reviews will be conducted before any such weapon enters service. The NLW application of High Powered Microwave (HPM) and Radio Frequency (RF) devices has been a research programme conducted by the UK since the mid 1980s. This programme has investigated the enabling technologies, target interaction processes, military utility and protection techniques appropriate to the development of, and threat from, RF-Directed Energy Weapons (DEW) and integrated hazards based on the RF, HPM and mmW wave parts of the EM spectrum. Potential generic applications include information operations, platform and installation protection, Command and Control Warfare (C2W), novel warheads, and "soft-kill" munitions, which achieve their effect by inducing disruptive electrical processes in the sub-components of target systems rather than gross blast effects from an explosive. The programme also monitors emerging NLW anti-personnel concepts such as the US VMADS system to provide awareness of such systems and to understand our vulnerability to them.

E.9 UNITED STATES OF AMERICA (PROVIDED BY MICHAEL R. MURPHY)

The U. S. Joint Non-Lethal Weapons Program (JNLWP) (<http://www.jnlwd.usmc.mil/>) was established 09 Jul 96, under DoD Directive 3000.3. The directive established joint service organizational responsibilities and provided guidelines for the development and employment of non-lethal weapons. The directive designated the Commandant of the US Marine Corps as Executive Agent (EA) for the JNLWP. Under DoD Directive 3000.3, NLWs are defined as "weapons that are explicitly designed and primarily employed so as to incapacitate personnel or materiel, while minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment."

The JNLWP seeks to find solutions to capabilities deficits and quickly deliver technically mature and militarily useful non-lethal weapons and capabilities for the warfighters. The strategic direction for the JNLWP is to support and fund the research, development, testing, and evaluation of non-lethal weapons, concepts, and capabilities that have clear applications and unique contributions in support of the force protection, dominant manoeuvre, and precision engagement joint operating concepts. These efforts work to improve existing non-lethal weapons, provide standoff capability to deliver non-lethal capabilities beyond small arms range, and find transformational non-lethal technologies and concepts that offer advantages and solutions at all levels in the spectrum of threats and crises.

A Joint Service representative body, the Joint NLW Integrated Product Team (JIPT), establishes and directs DoD NLW programs for joint doctrine, professional training, materiel requirements, research and

development and acquisition-related activities. The JIPT has functions and responsibilities to support the execution of EA responsibilities. The JIPT, chaired by the Deputy Chief of Staff, Plans, Policies and Operations, Headquarters Marine Corps (PP&O), is the final arbiter for the consolidated DoD NLW RDT&E program.

The Joint Coordination and Integrated Group (JCIG) acts in an oversight capacity, reviewing and recommending approval to the JIPT for new starts or the termination of unsuccessful efforts. The JCIG coordinates and integrate NLW programs supported by the JNLWP. The JCIG catalogs and tracks progress of independent and Joint NLW programs, looking for efficiencies and leveraging opportunities.

The Joint Non-Lethal Weapons Directorate (JNLWD) is responsible for the centralized coordination and integration of NLW technologies and systems that support the Services and Combatant Commanders. The Directorate was established to execute and manage the JNLWP in its day-to-day activities and provide support to the JIPT. The Director acts on behalf of the EA and the JIPT in accordance with actions approved by the JIPT Chair. The Director chairs the JCIG. The JNLWD ensures that funding efficiencies are in place and approaches among the divisions are coordinated and maintained. The Directorate represents the EA throughout a wide range of venues and audiences. The JNLWD combines military, civil service, and support personnel tasked to implement and maintain an aggressive, energetic, and forward-looking NLW program. The Directorate's responsibilities also include serving as the DoD NLW single point of contact for liaison with foreign entities on matters of mutual interest concerning NLWs.

The human effects of non-lethal weapons are managed directly by the JNLWD through a series of organizations. The Joint Non-Lethal Weapons Centre of Excellence, operated by the Air Force Research Laboratory at Brooks City-Base, Texas, was established in 2001 to provide scientific, fair evaluation of existing human effects information and develop strategies to collect the required information if it does not exist (<http://www.afrlhorizons.com/Briefs/Sept02/HE0209.html>).

The JNLWP also established the Human Effects Advisory Panel (HEAP), under contract with the Marine Corps Research University at Pennsylvania State University, which serves as an independent technical advisor on matters pertaining to the human effects on non-lethal weapons. The JNLWD also supports significant human effects analysis and research through the Non-Lethal Technology Innovation Centre (NTIC), located at the University of New Hampshire. NTIC organizes the annual non-lethal conference "Non-Lethal Technology and Academic Research (NTAR) Symposium" and manages research projects on behalf of the JNLWD (<http://www.unh.edu/ntic/index.html>).

