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Applied Research Laboratory

INSTITUTE FOR NON-LETHAL DEFENSE TECHNOLOGIES

Less-Lethal Operational Scenarios for Law Enforcement

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Introduction

Purpose

The development of a finite set of operational scenarios or “case studies” is an integral part of a formalized thought process that allows law enforcement to communicate needs to researchers, developers, and manufacturers in the form of operational requirements.

Background

The conference of National Armaments Directors, which advises the North Atlantic Treaty Organization (NATO) leadership on equipment development and procurement, tasked the NATO research organization to examine the feasibility and utility of NLW in peacekeeping and peace support operations. As a result, the North Atlantic Council approved a policy on NLW in September 1999, which set the parameters for the SAS-035 study.

The NATO Defense Capabilities Initiative, adopted at the Washington Summit in April 1999, called for the development of NLW and provided the objectives for the NATO SAS-035 study. Additionally, NATO’s studies on the Balkans further reinforced the need for NLW. Finally, in November 1999, NATO’s SAS Panel, under the Research and Technology Board, established an exploratory team on NLW designated SAS-E15. This team developed a roadmap which included three studies – the first of which was the SAS-035 Study.

The study began in March 2001 with delegations from the United States, Canada, Denmark, France, Germany, Italy, the Netherlands, Norway, the United Kingdom, and Supreme Headquarters Allied Powers Europe (SHAPE). The study sought to develop a mechanism that could determine the Measures of Effectiveness (MoE) of NLW in a robust and repeatable way. Specifically, they were to develop a MoE Framework and an effects database structure.

In March 2003, the North Atlantic Treaty Organization (NATO) published its study entitled, *Non-Lethal Weapons Effectiveness Assessment: The Final Report of NATO SAS-035*.

[This report described] a methodology, and the supporting mathematics, for assessing NLW effectiveness. This methodology differs from the familiar approach for lethal weapons - calculating the probability of hit and probability of a kill given a hit - because NLWs are “explicitly designed and developed to incapacitate or repel personnel, with a low probability of fatality or permanent injury, or to disable equipment, with minimal undesired damage or impact on the environment.” However, SAS-035’s methodology is relevant not only for NLWs but also for lethal weapons...[and allows] comparisons of NLW versus NLW as well as

The [NATO SAS-035] study sought to develop a mechanism that could determine the Measures of Effectiveness (MoE) of NLW in a robust and repeatable way.

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NLW versus traditional systems. The methodology calculates measures of effectiveness (MoEs) that address how well a given system accomplishes task objectives and satisfies target and collateral constraints within an operational environment.¹

The HEAP Assessment of SAS-035

In October of 2003, the Human Effects Advisory Panel (HEAP) at Penn State's Institute for Non-Lethal Defense Technologies assessed the NATO SAS-035 Final Study Report at the direction of the Joint Non-Lethal Weapons Directorate (JNLWD).² Conceptually, the panel found the Framework to be "sound, logical, and comprehensive in its approach."³

As intended, [the framework] helps provide a construct to consider the use of non-lethal weapons use and effects. However, as its name indicates, it is a framework.⁴

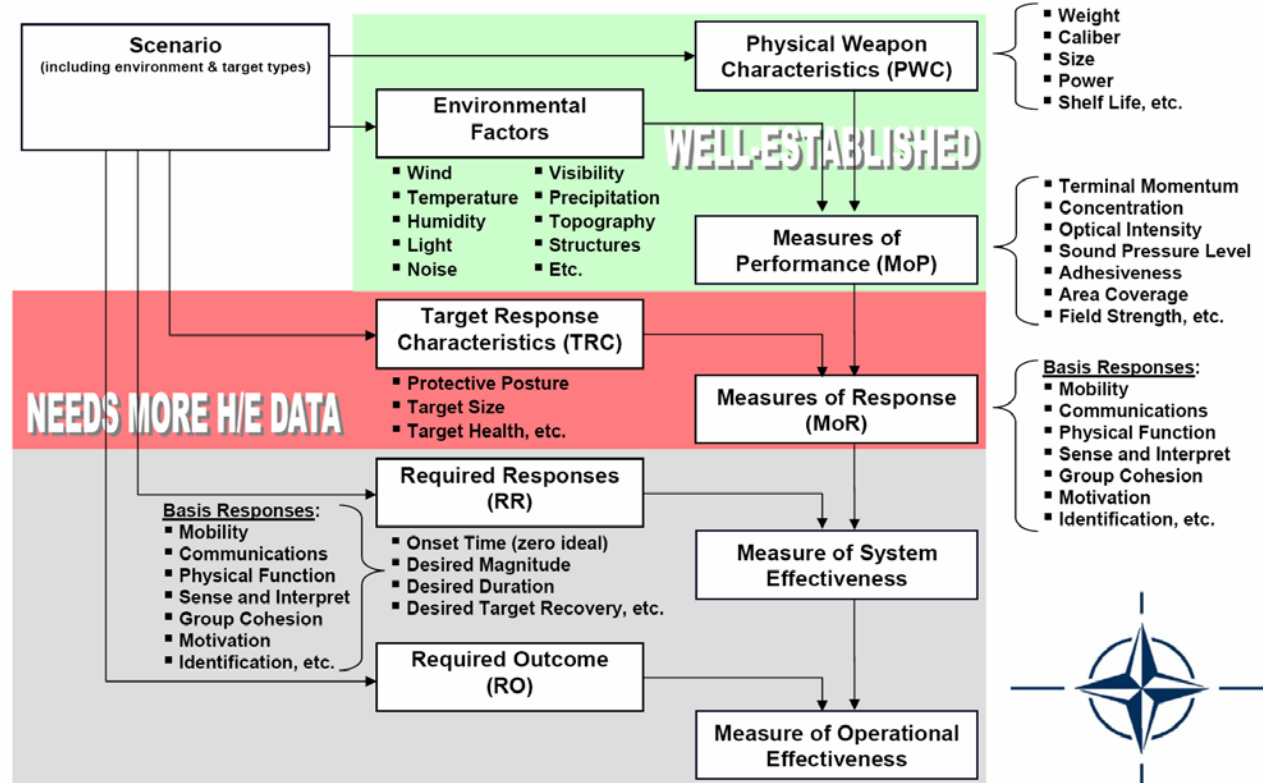


Figure 1 – Assessment of the NATO SAS-035 Measures of Effectiveness Framework

¹ Report Abstract from Official NATO Website, <http://www.rta.nato.int/Abstracts.asp#>, Downloaded, 12 April 2005.

² Kenny, John M., et.al., Assessment of the SAS-035 Non-Lethal Weapons' Effectiveness Framework, 20 February 2004.

³ Ibid., p 16.

⁴ Ibid., p 16

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To make the Framework achievable and usable the Panel made 14 recommendations including:⁵

- Seek operator input for the framework
- Provide greater definition for scenarios, drawing on operational experiences
- Make the Framework's outputs more user friendly for operators

Notably, the HEAP report stated that “the Framework depends heavily on scenario analysis. However, the scenarios in the study were vague and lacked detail. To better exercise the Framework, scenarios should be more thoroughly developed. Such development should draw on operator expertise. They could provide insights regarding operational conditions [environmental factors] and mission requirements [outcomes/responses].”

“...the Framework depends heavily on scenario analysis...”

The International Law Enforcement Forum

In April 2001, The Pennsylvania State University formed and sponsored the First International Law Enforcement Forum (ILEF) on Minimal Force Options. This forum served to define principles for use of minimal force options and begin the process of capturing operational needs.

In October 2002, ARL Penn State sponsored the second ILEF. The more urgent of the resulting recommendations from the forum included the development of a less-lethal weapon/technology database, the development of an injury database, the characterization of operational needs, and the development of standards for development, testing, and training. The event spawned the Electronic Operational Requirements Group (EORG), headed by the INLDT, which has since addressed the issues of developing international standards for development, testing, and training.⁶

In 2004, the third ILEF was hosted by the Police Scientific Development Branch (PSDB) of the United Kingdom (UK) Home Office. The meeting brought together representatives from the United Kingdom (UK), the United States (US), Canada, the Republic of Ireland, New Zealand, Finland, Sweden, and Norway. The forum further explored less-lethal weapons database development and resource sharing; effectiveness and injury potential; tactics and use; and common standards for development, testing, training, and operational use. Of the 14 recommendations from this forum, four were directly related to the work contained in the NATO SAS-035 Study. Specifically, recommendations, 1, 2, 5, and 6.⁷

⁵ Ibid., p 9.

⁶ Hughes, Edward L., Ed., Minimal Force Options: Report on the Second International Law Enforcement Forum, Applied Research Laboratory, The Pennsylvania State University, January 2003.

⁷ Hughes, Edward L., Ed., Report on the Third International Law Enforcement Forum on Minimal Force Options, Applied Research Laboratory, The Pennsylvania State University, April 2004.

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1. *Development of Agreed Operational Requirements.* The work on developing Operational Requirements for less-lethal weapons, and consensus across the international Law enforcement community, is considered a high priority. The work initiated by the Electronic Operational Requirements Group (EORG) following last years ILEF should continue. The group should also address issues associated with measurements of effectiveness.

2. *Articulate Operational Requirements to Manufacturers.* There is a need to create a mechanism to communicate the agreed international Operational Requirements being developed by EORG to bodies such as the International Chiefs of Police organizations and with manufacturers. One option was for ILEF to harness the support of the International Association of Chiefs of Police. It would then be able to articulate and communicate the 'model' international law enforcement operational requirements to manufacturers and suppliers and for law enforcement to begin to drive technology development in this field. There are hazards in developing rigid definitions of effect.

5. *Identify Desired Effects and Outcomes.* There is a need to formulate an operational statement of desired effects/outcomes of less-lethal weapons. There should be as much clarity as possible as to what a particular device does, or does not do. There is a need to appreciate that there are different interpretations influenced often by departmental doctrine and historical issues. This is work that could be developed by EORG.

6. *Describe and Provide Measures of Effectiveness.* There is a need to link descriptions of effectiveness with measures of effectiveness. The group was made aware of work commenced in the UK under the auspices of the Patten/ACPO Steering Group to identify effectiveness criteria for less-lethal devices. A summary of the emerging approach is provided in the Steering Groups Phase 4 Report.⁸ The integration of these descriptions with the type of measures described by Syndicate 2 (Determining Effectiveness and Injury Potential) could enable effectiveness criteria to better articulated and measured.

Since the 2004 Forum, ILEF's Electronic Operational Requirements Group (EORG) completed and published its report, "Less-Lethal Weapons: Definitions and Operational Criteria." The document seeks to establish a common vernacular in its guiding principles, definitions, and operational criteria.

*There is a need to
formulate an opera-
tional statement of
desired effects/
outcomes of less-
lethal weapons.*

⁸ Northern Ireland Office, Patten Report: Recommendations 69 and 70 Relating to Public Order Equipment, Fourth Report, January 2004, page 18.

Military and Law Enforcement Operational Needs

This work by the EORG for the international law enforcement community is complementary to NATO's work on its Measures of Effectiveness Framework for military use of non-lethal weapons. As one might hope, there is overlap in specific variables and characteristics addressed. For example, all of the ILEF operational requirements for employment equate closely with the SAS-035 Measures of Performance (MoP). The ILEF "Operational Effect" corresponds closely to NATO's Measure of Response (MoR). Also, the ILEF operational "Specifications of Weapons" equates closely with the NATO's Physical Weapon Characteristics (PWC).

Although the ILEF operational requirements effort did not attempt to re-create the complexity of the NATO framework, it did define areas not readily apparent in the NATO study, perhaps due to the difference in the contexts of the applications (military vice law enforcement). Some of these areas include acceptability, ease of operation, public policy considerations, portability, interaction with other systems, and mobility.

There has been acceptance of the SAS-035 Framework on Measures of Effectiveness within NATO. The considerable operational requirements efforts of the International Law Enforcement Forum (not yet fully developed) and others on behalf of law enforcement have also moved the community forward. Missing has been an effort to blend the military MoE Framework to the needs of law enforcement.

This report is the result of an effort to put the MoE Framework in a context acceptable to the law enforcement community. Specifically, the report focuses on the development of a finite set of operational scenarios or "case studies" as an integral part of a formalized thought process that allows law enforcement to, perhaps more effectively, communicate needs to researchers, developers, and manufacturers in the form of operational requirements.

Operational Scenario Development

General

This effort brought together a select group of law enforcement expert practitioners to discuss and develop operational scenarios for less-lethal devices. The intent was to develop these scenarios in a form consistent with the previously discussed NATO SAS-035 Study, but focused on US law enforcement operational needs.

The INLDT also encouraged their UK counterparts to continue their similar efforts for primarily UK/European law enforcement. Our view is that the development of a finite set of operational scenarios is the start point of a formalized thought process that allows law enforcement to communicate needs to researchers, developers, and manufacturers.

The Panelists

The ILEF Operational Scenario Development meeting was conducted on 30 March 2005 at the Applied Research Laboratory's office adjacent to the Office of Naval Research (ONR) in Arlington, Virginia. Panel members attending the session were:

- Commander Charles "Sid" Heal
Los Angeles County Sheriff's Department (LASD)
- Inspector Thomas Graham
Disorder Control Unit, New York Police Department (NYPD)
- Mr. Josh Ederheimer
Police Executive Research Forum
- Captain Mark Warren
Baltimore County Police Department
- Colonel Andy Mazzara (USMC-Ret)
Penn State's Institute for Non-Lethal Defense Technologies
- Commander John Kenny (USN-Ret), Ph.D.
Penn State's Institute for Non-Lethal Defense Technologies
- Dr. John Leathers
Penn State's Institute for Non-Lethal Defense Technologies
- Lieutenant Colonel Ed Hughes (USA-Ret)
Penn State's Institute for Non-Lethal Defense Technologies

Panelists that participated electronically and contributed throughout the iterative review and editing process also included:

- Major Steve Ijames, Springfield Missouri Police Department
- Mr. Kirk Hessler, Penn State's Center for Community and Public Safety
- Deputy John Stanley, Los Angeles County Sheriff's Department (LASD)

Methodology

Panel members were selected based on their knowledge of law enforcement needs, level of operational experience, and familiarity with less-lethal devices. Scenarios were drafted and worksheets developed prior to the meeting to facilitate the group discussion. The panel would assemble with the purpose of piecing together representative operational scenarios that describe “95%” of US law enforcement less-lethal needs.

Each of the operational scenarios was formatted in a worksheet that contained the following elements (see Appendix 2):

- **Situation** – The title of the scenario (e.g., “Barricaded Suspect);
- **Description** – A short paragraph presenting some context for the situation.
- **Required Outcome** – A list of necessary mission “end-states;”
- **Environmental Factors** – Variables that contextually might impact on the technology, tactic, procedure, or technique considered; and
- **Applicable Responses** – Responses of subject(s) that would facilitate achieving the required outcome(s).

At the meeting, the panel was to consider, discuss, and come to general agreement on, the basic draft scenario “situations.” The panel would then work through each of the draft scenarios for both the appropriateness of the format (the way we captured the scenarios) and the scenarios themselves.

Discussion

The draft scenario “situations” included: single aggressor; barricaded suspect; non-compliant groups; serious public disorder; hostage rescue–clearing facilities; vehicle pursuit–safely stopping a fleeing vehicle, and corrections–individual and group prisoner disorder. These “situations” were selected and developed in that they encompassed the vast majority of the scenarios within which less-lethal technologies would be appropriate in a law enforcement context. See Appendix 2 (Operational Scenario Worksheets) for the tabulated results.

For each of these operational scenarios, the panel discussed the “description” and came to agreement on the precise wording. It was also agreed that these “descriptions” should be brief and only specific enough to portray context. Too much detail might limit the possible approaches. Additionally, the group determined that “environmental factors” should account for the variability in the situation and drive the technical, tactical, and/or procedural approach(es). It was also agreed that these operational scenario “descriptions” needed to be somewhat isolated. No branches or sequels were addressed. In other words, the panel consciously limited the scope of each individual scenario recognizing that during an encounter, an officer may find himself moving from one scenario to another. For example, after successfully and safely stooping a fleeing vehicle (Scenario 6), and officer may be confronted by a single aggressor (Scenario 1).

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After reaching consensus on the scenario “description,” the panel determined the corresponding necessary or “required outcomes.” These were the desired “end-states” for the scenario or the tasks that would need to be accomplished in order for the situation to be considered resolved successfully. During the discussion regarding outcomes, the point was made that some of the terminology we were using was military in nature and should be carefully reviewed and revised in order to communicate more effectively to the law enforcement community. In particular, the term “target” should be replaced by “subject” when discussing a human being. When referring to an inanimate object, the term “subject” should be followed by the name of the object (e.g., subject vehicle).

After determining the “required outcomes” for the scenario, the panel proceeded to discuss and select applicable responses for the situation (those that would facilitate arriving at the required outcomes) from the seven “basis responses.” For each of these “basis responses,” the panel then arrived at a specific onset time, magnitude, target recovery state, and duration of effects.

Finally, for each of the scenarios, the panel considered environmental factors that would alter the context of the situation and possibly the technology, tactic, or procedure that might be used to achieve the required outcome. These environmental factors ranged from topography and weather to the existence of bystanders and noise.

Following the meeting, a draft report was developed and staffed with the panelists and other law enforcement professionals. As a result, the corrections scenario was divided into two scenarios, drafted and staffed with the panelists for inclusion in the document. It was also noted during the review that many of these scenarios rise to the level of lethal force if only one officer is present at the scene, which is often the case in smaller jurisdictions. This may be viewed as either negating the scenario under that condition or demonstrating a need for technologies, tactics, or procedures that allow officers to in a less-lethal fashion without further endangering his life. The purpose of the scenarios is to describe the vast majority of operational needs and facilitate a thought process. The “single officer on scene” should be considered a possible variable to be addressed within the context of the scenarios.

After presenting the findings to the International Law Enforcement Forum at its 2005 workshop in Ottawa, modifications to the draft were made. These included the addition of a graphical representation of the NATO SAS-035 Study assessment (see page 3) and a “relative frequency of occurrence” for each of the subject scenarios. The latter was accomplished with a survey of the panelists and they do not represent statistical data drawn from incident databases.

Conclusion

Notwithstanding the diverse experiences of the panelists and some debate, the focused efforts of this select group of law enforcement practitioners resulted in a concise product. The seven scenario worksheets capture useful operational input in a form consistent with the accepted NATO framework, but with a focus on US law enforcement operational needs.

The scenarios not only contribute to moving this framework forward, but may also be useful as a tool for law enforcement at the national, state/ provincial, or local level in conducting “what if” drills to identify potential gaps between existing tactical protocols, established policies and procedures, current individual techniques, or available technologies and those required/desired to address specific operational needs.

Recommendations

1. That these operational scenarios form the basis for evaluating and assessing less-lethal weapons for law enforcement.
2. That these scenarios be associated and integrated with the evolving ILEF operational test criteria matrix.
3. That ILEF seek to continue to advance the NATO SAS-035 Framework in the context of law enforcement.

Appendix 1 - Definitions⁹

Applicable Response. Response determined appropriate for the given operational scenario.

Basis Response. Generic responses that describe how targets behave as the result of the application of a weapon or technology [or tactic, or procedure] employed against them. The seven Basis Responses identified are Mobility, Communications, Physical Function, and Sense and Interpret, Group Cohesion, Motivation, and Identification.

Communications. The ability to disrupt or control by either restricting or enhancing verbal communication via voice or gestures between target(s).

Description. Brief summary of the context of the operational scenario.

Duration of the Target Effect. The period after the onset time that the target should exhibit a particular response greater than some particular threshold.

Environmental Factors. Environmental factors – such as wind speed, temperature, humidity, etc. – drawn from a scenario or personal context, directly affect the performance of a given weapon system [or tactic, or procedure] and consequently the system's calculated Measures of Performance.

Group Cohesion. The ability to disrupt or control a group of individuals or cooperatively operating vehicles, vessels or aircraft by either restricting or enhancing their organization, cooperation, and density.

Identification. The ability to differentiate between various individuals, groups of individuals, vehicles, vessels, or aircraft through an identifiable designation.

Magnitude of the Target Effect. The qualitative or quantitative response that the target should display once the weapon system [or tactic, technique, or procedure] has taken full effect.

Measures of Effectiveness. Measures indicating the degree to which a target response satisfies a requirement within an operational context.

Measures of Performance. Measures showing how environmental factors influence weapon effects at the target.

⁹ Some of these definitions are drawn from the NATO SAS-035 Study. The panel believes that they are consistent with the needs of law enforcement with the edits contained in brackets ([text]).

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Measures of Response. Measures indicating how a target reacts to a system's effects.

Mobility. The ability to disrupt or control the speed and/or direction of movement of target.

Motivation. The ability to disrupt or control the target(s) by either restricting or enhancing their will to act in certain ways in order to achieve a goal.

Onset Time (ideally equal to zero). The period between the deployment of the weapon system [or tactic, technique, or procedure] and the point when the magnitude of the desired effect attains some particular threshold.

Physical Function. The ability to disrupt or control by either restricting or enhancing the capacity of target(s) to accomplish tasks or the physical state of equipment such that it is inoperable of functions at reduced efficiency.

Physical Weapon Characteristics. The intrinsic qualities of a weapon including dimensional design values associated with a weapon (weight, caliber, size, power requirement, shelf life, etc).

Required Outcome. The required outcome (RO) considers the entire operational context of a mission or scenario. It reflects the accomplishment of multiple tasks and the satisfaction of associated constraints over time.

Required Response. The response required of a chosen target for scenario success. It links a particular target engagement with a weapon or technology at a particular time in the scenario or mission. Specified in terms of values for each of the seven basis responses: desired onset time; desired magnitude of target effect; desired duration; and desired target recovery.

Relative Frequency. The frequency of occurrence of a scenario relative to all operational scenarios.

Sense and Interpret. The ability to disrupt or control by either restricting or enhancing the vision, smell, hearing and cognition of target(s) or the operation of artificial intelligence systems in autonomous vehicles, vessels, or aircraft.

Situation. Title or short description of operational scenario.

Target Recovery (ideally full recovery immediately at the end of the desired duration). The period when the target response falls below a particular threshold and a full recovery of unimpaired functionality is desired in an operationally meaningful context.

Appendix 2

Operational Scenario Worksheets

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OPERATIONAL SCENARIO 1				
SITUATION:	SINGLE AGGRESSOR – INCLUDING SUICIDE BY COP (RELATIVE FREQUENCY = 47%)			
DESCRIPTION:	<p>Patrol officers respond to a complaint of a disturbance in front of a residence. The man had been hitting his wife before police arrived and continues as several units arrive at the scene. He is holding a baseball bat in his hand.</p> <p><i>Continued...</i> The man lets his wife free but will not drop the bat. Officer Smith had his finger on the trigger of his service revolver. "Drop the bat! Drop it!" officers yelled. "We'll shoot you." The man moves toward one of the police officer without dropping the bat.</p>			
REQUIRED OUTCOME:	<ul style="list-style-type: none"> ▶ Victim uninjured ▶ Subject in Custody ▶ Subject Minimal Injury (temporary) ▶ No Officer Injured/Killed ▶ No bystanders injured/killed 			
ENVIRONMENTAL FACTORS/ VARIABLES:	<ul style="list-style-type: none"> ▶ Topography & Vegetation – barriers between subject and officers; ▶ Buildings & Structures (inside/outside) – barriers between subject and officers; ▶ Bystanders present (e.g., children) ▶ Lighting & Time of Day ▶ Noise ▶ Weather (temperature, wind, precipitation, humidity) ▶ Subject(s) & Bystander(s) ▶ Visibility ▶ Mentally ill suspect ▶ Drug and/or alcohol induced subject 			
APPLICABLE RESPONSES:	BASIS RESPONSE		REQUIRED RESPONSE:	
	<input checked="" type="checkbox"/> Mobility	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% immobile	▶ Duration: 1-2 min
	<input type="checkbox"/> Communications	> Onset Time:	NA	> Target Recovery: NA
		> Magnitude:	NA	> Duration: NA
	<input checked="" type="checkbox"/> Physical Function	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% immobile	▶ Duration: 1-2 min
	<input checked="" type="checkbox"/> Sense and Interpret	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% disruption	▶ Duration: 1-2 min
	<input type="checkbox"/> Group Cohesion	> Onset Time:	NA	> Target Recovery: NA
		> Magnitude:	NA	> Duration: NA
	<input checked="" type="checkbox"/> Motivation	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% compliant	▶ Duration: 1-2 min
	<input type="checkbox"/> Identification	> Onset Time:	NA	> Target Recovery: NA
		> Magnitude:	NA	> Duration: NA

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OPERATIONAL SCENARIO 2				
SITUATION:	BARRICADED SUSPECT (RELATIVE FREQUENCY = 11%)			
DESCRIPTION:	Patrol officers respond to a disturbance call at the Happy Hotel. The officers are told that a lone, wild-eyed, disheveled, male entered the small office of the motel/hotel. He stated he has a handgun but none was observed. Fearing for their safety the employees and patrons fled. The suspect remains alone in the office area and can be seen throwing objects and breaking furniture and windows.			
REQUIRED OUTCOME:	<ul style="list-style-type: none"> ▶ Subject in Custody ▶ Subject Minimal Injury (temporary) ▶ No Officer Injured/Killed ▶ No bystanders injured/killed ▶ Minimize property damage 			
ENVIRONMENTAL FACTORS/VARIABLES:	<ul style="list-style-type: none"> ▶ Topography & Vegetation - barriers between subject and officers; ▶ Buildings & Structures (inside/outside) – barriers between subject and officers; ▶ Bystanders present (e.g., children) ▶ Lighting & Time of Day ▶ Noise ▶ Weather (temperature, wind, precipitation, humidity) ▶ Subject(s) & Bystander(s) ▶ Visibility ▶ Mentally ill suspect ▶ Drug and/or alcohol induced subject 			
APPLICABLE RESPONSES:	BASIS RESPONSE		REQUIRED RESPONSE:	
	<input checked="" type="checkbox"/> Mobility	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% immobile	▶ Duration: 1-2 min
	<input type="checkbox"/> Communications	> Onset Time:	NA	> Target Recovery: NA
		> Magnitude:	NA	> Duration: NA
	<input checked="" type="checkbox"/> Physical Function	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% immobile	▶ Duration: 1-2 min
	<input checked="" type="checkbox"/> Sense and Interpret	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% disruption	▶ Duration: 1-2 min
	<input type="checkbox"/> Group Cohesion	> Onset Time:	NA	> Target Recovery: NA
		> Magnitude:	NA	> Duration: NA
	<input checked="" type="checkbox"/> Motivation	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% compliant	▶ Duration: 1-2 min
	<input type="checkbox"/> Identification	> Onset Time:	NA	> Target Recovery: NA
		> Magnitude:	NA	> Duration: NA

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OPERATIONAL SCENARIO 3				
SITUATION:		NON-COMPLIANT GROUPS (RELATIVE FREQUENCY = 4%)		
DESCRIPTION:		During a protest, about 250 protesters of about 1,500 demonstrators have severely restricted the entrance of a convention center during a convention. While the disorder control unit has been able to enforce adherence to all the issued permits to this point, a "sit-in" along this main thoroughfare exceeds the boundaries of the permit for public demonstration. It also causes serious concerns for the safety of the participants, including some foreign heads of state, and impedes the free access to local business and traffic thoroughfares. The protestors are refusing to leave. A number of city television stations have established reporting sites within the protest group and outside of the controlled area.		
REQUIRED OUTCOME:		<ul style="list-style-type: none"> ▶ Subject group compliance ▶ Subjects minimal injury (temporary) ▶ No Officer Injured/Killed ▶ Minimal disruption to the event ▶ Minimal impact on surrounding community and businesses 		
ENVIRONMENTAL FACTORS/VARIABLES:		<ul style="list-style-type: none"> ▶ Topography & Vegetation – barriers between subject and officers; ▶ Buildings & Structures (inside/outside) – barriers between subject and officers; ▶ Lighting & Time of Day ▶ Noise ▶ Weather (temperature, wind, precipitation, humidity) ▶ Subject(s) & Bystander(s) – Size, density and proximity ▶ Visibility ▶ Emotional state and degree of commitment to cause of the group ▶ Intelligence, including history of the group 		
APPLICABLE RESPONSES:	BASIS RESPONSE		REQUIRED RESPONSE:	
	☒ Mobility	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% controlled	▶ Duration: 30 minutes
	☒ Communications	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% disruption	▶ Duration: 30 minutes
	☒ Physical Function	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% controlled	▶ Duration: 30 minutes
	☒ Sense and Interpret	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery ¹⁰
		▶ Magnitude:	100% disruption	▶ Duration: 30 minutes
	☒ Group Cohesion	▶ Onset Time:	Immediate	▶ Target Recovery: NA
		▶ Magnitude:	100% disruption	▶ Duration: 30 minutes
	☒ Motivation	▶ Onset Time:	Immediate	▶ Target Recovery: NA
		▶ Magnitude:	100% compliant	▶ Duration Time: 30 minutes
	☒ Identification	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% accurate	▶ Duration Time: 30 days

¹⁰ Of individual members

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OPERATIONAL SCENARIO 4				
SITUATION:		SERIOUS PUBLIC DISORDER (RELATIVE FREQUENCY = 4%)		
DESCRIPTION:		Reports that citizens of the city have taken to the streets after violence broke out during a protest. Numerous acts of rioting, arson, and looting are taking place. The city fire department officials report that many large stores are burning, and that numerous cars have also been set afire and are blocking intersections.		
REQUIRED OUTCOME:		<ul style="list-style-type: none"> ▶ Mob dispersed, rioters in custody ▶ Area denial ▶ Rioters minimal injury (temporary) ▶ No Officer Injured/Killed 	<ul style="list-style-type: none"> ▶ Minimal impact on surrounding community and businesses (i.e., property damage, looting, arson, etc.) ▶ No uninvolved persons injured or arrested 	
ENVIRONMENTAL FACTORS/ VARIABLES:		<ul style="list-style-type: none"> ▶ Topography & Vegetation – barriers between subject and officers; ▶ Buildings & Structures (inside/outside) - barriers between subject and officers; ▶ Lighting & Time of Day ▶ Noise ▶ Visibility 	<ul style="list-style-type: none"> ▶ Weather (temperature, wind, precipitation, humidity) ▶ Subject(s) & Bystander(s) – Size, density and proximity ▶ Emotional state and degree of commitment to cause of the group ▶ Intelligence, including history of the group 	
APPLICABLE RESPONSES:	BASIS RESPONSE		REQUIRED RESPONSE:	
	☒ Mobility	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% controlled	▶ Duration: 30 minutes
	☒ Communications	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% disruption	▶ Duration: 30 minutes
	☒ Physical Function	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% controlled	▶ Duration: 30 minutes
	☒ Sense and Interpret	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery ¹¹
		▶ Magnitude:	100% disruption	▶ Duration: 30 minutes
	☒ Group Cohesion	▶ Onset Time:	Immediate	▶ Target Recovery: NA
		▶ Magnitude:	100% disruption	▶ Duration: 30 minutes
	☒ Motivation	▶ Onset Time:	Immediate	▶ Target Recovery: NA
		▶ Magnitude:	100% compliant	▶ Duration Time: 30 minutes
	☒ Identification	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% accurate	▶ Duration Time: 30 days

¹¹ Of individual members

*Less-Lethal Operational Scenarios
For US Law Enforcement*

OPERATIONAL SCENARIO 5				
SITUATION:		HOSTAGE RESCUE – CLEARING FACILITIES (RELATIVE FREQUENCY = 2%)		
DESCRIPTION:		<p>A group of around fifteen armed men and women have stormed Smith Middle School. Most of the attackers wore black ski masks and a few were seen carrying explosive belts. The attackers seized the school building and have taken more than 400 people hostage, nearly all of them students.</p> <p>A security perimeter has been established around the school, consisting of city police officers, county sheriff's department, the state police and SWAT teams.</p>		
REQUIRED OUTCOME:		<ul style="list-style-type: none"> ▶ Subject(s) in Custody ▶ Subject Minimal Injury (temporary) ▶ No hostages or bystanders killed or injured 	<ul style="list-style-type: none"> ▶ No Officer Injured/Killed ▶ Limited property damage 	
ENVIRONMENTAL FACTORS/VARIABLES:		<ul style="list-style-type: none"> ▶ Topography & Vegetation – barriers between subject and officers; ▶ Buildings & Structures (inside/outside) – barriers between subject and officers; ▶ Lighting, Time of Day, Visibility ▶ Noise ▶ IEDs, and other secondary threats 	<ul style="list-style-type: none"> ▶ Weather (temperature, wind, precipitation, humidity) ▶ Number of Subjects (hostage takers) ▶ Number of Hostages ▶ Bystander(s) ▶ Operational Intelligence 	
APPLICABLE RESPONSES:	BASIS RESPONSE		REQUIRED RESPONSE:	
	☒ Mobility	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% immobile	▶ Duration: >2 hours
	☒ Communications	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% disruption	▶ Duration: >2 hours
	☒ Physical Function	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% immobile	▶ Duration: >2 hours
	☒ Sense and Interpret	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% disruption	▶ Duration: >2 hours
	☒ Group Cohesion	▶ Onset Time:	Immediate	▶ Target Recovery: 0%
		▶ Magnitude:	100% disruption	▶ Duration: >2 hours
	☒ Motivation	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% compliant	▶ Duration Time: >2 hours
	☒ Identification	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% accurate	▶ Duration Time: 30 days

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OPERATIONAL SCENARIO 6				
SITUATION:		VEHICLE PURSUIT – SAFELY STOPPING FLEEING VEHICLE (RELATIVE FREQUENCY = 18%)		
DESCRIPTION:		After activating his red lights and siren to stop a car, the suspect driver speeds away. In accordance with department policy, the situation demands that the vehicle be stopped.		
REQUIRED OUTCOME:		<ul style="list-style-type: none"> ▶ Target vehicle stopped ▶ Vehicle occupants minimal injury (temporary) ▶ No officer injured/killed ▶ No property damage¹² ▶ No bystanders or motorists injured/killed 		
ENVIRONMENTAL FACTORS/VARIABLES:		<ul style="list-style-type: none"> ▶ Topography ▶ Buildings & Structures (residential, commercial, areas) ▶ Lighting & Time of Day ▶ Weather (temperature, wind, precipitation, humidity) ▶ Subject(s), motorists & bystander(s) ▶ Visibility, traffic and road conditions ▶ Type of vehicles and/or cargo 		
APPLICABLE RESPONSES:	BASIS RESPONSE		REQUIRED RESPONSE:	
	<input checked="" type="checkbox"/> Mobility	▶ Onset Time:	Immediate	> Target Recovery: NA
		▶ Magnitude:	100% controlled	> Duration: NA
	<input type="checkbox"/> Communications	> Onset Time:	NA	> Target Recovery: NA
		> Magnitude:	NA	> Duration: NA
	<input checked="" type="checkbox"/> Physical Function	▶ Onset Time:	Immediate	> Target Recovery: NA
		▶ Magnitude:	100% controlled	> Duration: NA
	<input type="checkbox"/> Sense and Interpret	> Onset Time:	NA	> Target Recovery: NA
		> Magnitude:	NA	> Duration: NA
	<input type="checkbox"/> Group Cohesion	> Onset Time:	NA	> Target Recovery: NA
		> Magnitude:	NA	> Duration: NA
	<input type="checkbox"/> Motivation	> Onset Time:	NA	> Target Recovery: NA
		> Magnitude:	NA	> Duration: NA
	<input checked="" type="checkbox"/> Identification	▶ Onset Time:	Immediate	> Target Recovery: NA
		▶ Magnitude:	100% accurate	▶ Duration Time: 30 days

¹² Excludes suspect vehicle

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OPERATIONAL SCENARIO 7				
SITUATION:		CORRECTIONS – PRISON RIOT (RELATIVE FREQUENCY = 5%)		
DESCRIPTION:		Approximately 100 inmates have divided along racial lines and are rioting. The inmates are throwing food and other debris at each other. Some are engaged in one on one or group fights as members of each race attempt to flee to the relative safety of their own lines. Some inmates are seen breaking out light fixtures to make weapons while still others are observed to be armed with shanks, but they are only using them to hold other inmates at bay. All staff is out of the area. Inmates are ignoring verbal commands to stop fighting.		
REQUIRED OUTCOME:		<ul style="list-style-type: none"> Inmates under control Inmates minimal injury (temporary) No officer Injured/Killed No escapes Minimal damage to facility 		
ENVIRONMENTAL FACTORS/VARIABLES:		<ul style="list-style-type: none"> Adjacent geographical Features & Vegetation Buildings & Structures (Floor plan, HVAC, etc.) Lighting & Time of Day Visibility and noise Weather (temperature, wind, precipitation, humidity) Subject(s) & bystander(s) (size, density, proximity, emotion, etc.) NLW countermeasures 		
APPLICABLE RESPONSES:	BASIS RESPONSE		REQUIRED RESPONSE:	
	☒ Mobility	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% controlled	▶ Duration: >30 minutes
	☒ Communications	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% disruption	▶ Duration: >30 minutes
	☒ Physical Function	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% controlled	▶ Duration: >30 minutes
	☒ Sense and Interpret	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery ¹³
		▶ Magnitude:	100% disruption	▶ Duration: >30 minutes
	☒ Group Cohesion	▶ Onset Time:	Immediate	> Target Recovery: NA
		▶ Magnitude:	100% disruption	▶ Duration: >8 hours
	☒ Motivation	▶ Onset Time:	Immediate	> Target Recovery: NA
		▶ Magnitude:	100% compliant	▶ Duration Time: >30 minutes
	☒ Identification	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% accurate	▶ Duration Time: >24 hours

¹³ Of individual members

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OPERATIONAL SCENARIO 8				
SITUATION:	CORRECTIONS – PRISONER DISORDER (RELATIVE FREQUENCY = 8%)			
DESCRIPTION:	Two inmates locked in a holding cell are fighting. They ignore all orders to cease. One inmate appears to be gaining the upper hand.			
REQUIRED OUTCOME:	<ul style="list-style-type: none"> ▶ Inmates under control ▶ Inmates minimal injury (temporary) ▶ No officer Injured/Killed 		<ul style="list-style-type: none"> ▶ No escapes ▶ Minimal damage to facility 	
ENVIRONMENTAL FACTORS/VARIABLES:	<ul style="list-style-type: none"> ▶ Buildings & Structures (Floor plan, HVAC, etc.) ▶ Lighting and visibility ▶ Noise 		<ul style="list-style-type: none"> ▶ Temperature and humidity ▶ Nature of subjects' conditions (size, emotional and physical state, etc.) ▶ NLW countermeasures 	
APPLICABLE RESPONSES:	BASIS RESPONSE		REQUIRED RESPONSE:	
	<input checked="" type="checkbox"/> Mobility	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% controlled	▶ Duration: >30 minutes
	<input type="checkbox"/> Communications	> Onset Time:	NA	> Target Recovery: NA
		> Magnitude:	NA	> Duration: NA
	<input checked="" type="checkbox"/> Physical Function	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery
		▶ Magnitude:	100% controlled	▶ Duration: >30 minutes
	<input checked="" type="checkbox"/> Sense and Interpret	▶ Onset Time:	Immediate	▶ Target Recovery: Full recovery ¹⁴
		▶ Magnitude:	100% disruption	▶ Duration: >30 minutes
	<input type="checkbox"/> Group Cohesion	> Onset Time:	NA	> Target Recovery: NA
		> Magnitude:	NA	> Duration: NA
	<input checked="" type="checkbox"/> Motivation	▶ Onset Time:	Immediate	> Target Recovery: NA
		▶ Magnitude:	100% compliant	▶ Duration Time: >30 minutes
	<input type="checkbox"/> Identification	> Onset Time:	NA	> Target Recovery: NA
		> Magnitude:	NA	> Duration Time: NA

¹⁴ Of individual members