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RUSSIAN NONLETHAL WEAPONS

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FUTURE WAR WILL BE WARS OF SURPRISES, TO INCLUDE NEW TYPES OF WEAPONS, TECHNOLOGIES, AND EMPLOYMENT FORMS AND METHODS. THIS INCLUDES INFRASONIC STRIKES AGAINST AN OPPONENT'S FORCES.[1]

Introduction

For several years now Russian military authors have discussed the definition and potential use of nonlethal weapons (NLWs). NLWs are used as a crowd-control mechanism or a more humane way to conduct armed conflict. The latter type of NLWs include ways to capture or immobilize people hiding in buildings or behind barricades instead of killing them. Most definitions of the term center on these uses. What is difficult to ascertain is how advanced Russian efforts are in the production of NLWs since most such experiments are conducted in secret laboratories. Since Russia believes that the U.S. is developing NLW incapacitants (and they discuss U.S. regulations and purported capabilities in some detail in their writings), they are likely to use such accusations to verify their own developments. One NLW analysis demonstrated why Russian authority fears so-called color revolutions:

> *Analysis of today's conflict situations shows that political events in such countries as Iraq, Libya, Syria, and Ukraine develop according to similar scenarios. In some cases, it is worth noting the use of incapacitants to stir up panic, various kinds of provocation, and the inadequate behavior by some groups of the public aimed at discrediting the authorities or individual political leaders.*[2]

Discrediting authorities and political leaders is what concerns suspicious Kremlin leaders the most.

Russian military authors clearly indicate that NLWs are under development. One source noted that research is directed at developing "basic theoretical principles of NLWs, in particular, the legitimacy of their employment" and "identifying the extent and timing of their employment in combat," among other issues.[3] The planning process for new weaponry indicates that, once the NLW program is endorsed by the various ministries concerned with their development, the National Military Industrial Commission and Security Council then submit the program to the leadership, both political and military, for approval. Russian NLW development trends are to be projected out 20-25 years, with predictions of critical military technologies that effect NLW development projected 15-20 years out. One article noted that laser blinding devices, which cause temporary loss of vision without harmful consequences, can be fitted to drones and delivered up to three kilometers. Loudspeakers, sirens, video cameras, and other devices can be fitted to the drone.[4] The capabilities of the Filin blinding weapon, purportedly capable of temporarily blinding an opponent up to two kilometers away, are being increased along with its emitter power and angle of exposure.[5]

This article covers specific incapacitants and their most likely utility. First, the changes in the definition of NLWs in Russia are explored. Second, the method by which NLWs are planned and produced is discussed. Third, explanations of when and how

NLWs are used for internal and external situations are examined along with tactical innovations. Finally, Russia's cupboard of physical, chemical, biological, and radiological NLWs are examined. While not a game changer, NLWs are set to become an interesting addition to Russian capabilities on both the modern battlefield and, more likely, in domestic crowd control operations.

A Change in Definition?

Often described as a way to "humanize" armed violence, Russia's NLW concept has morphed in meaning over the years from a focus on personnel and equipment to a more focused approach on personnel. The ability of NLWs to disable equipment, however, is still mentioned, so the change appears to be only one of emphasis.

In 2011 the term was defined as the ability to incapacitate enemy personnel as well as disable enemy weapons, equipment, or infrastructure for a limited time. Weapons were defined by purpose and effect, with the latter including electronic shock; acoustic, kinetic, and biotechnological effects; or a combination of those. Viewed as a supplement to conventional weapons, they could be used in counterterrorist, peacekeeping, and special forces operations to halt hostile moves, limit conflict escalation, or use force where conventional weapons are unacceptable.[6]

In 2014 incapacitants were described as disabling personnel temporarily to reduce lethality and irreversible harm to humans, but other uses were also described. When applied only to humans, the goal was to achieve results only by more humane methods. NLWs were to be used in both low-intensity (contain movement, limit conflict escalation) and high-intensity (frustrate repairs, interfere with manpower mobilization) conflicts.[7] More important, they were to immobilize personnel for specific time periods in accordance with the developing situation and penetrate any type of cover.[8] Psychotropic agents include anesthetics, narcotic analgesics, and antidepressants, among others. Other chemical NLWs were to cause malfunctions in weapons and equipment. Thus, there was an equipment aspect to the 2014 NLW concept as well. NLWs included antifriction compounds, chemical substances that accelerate the corrosion of alloys, and substances that degrade the quality of petroleum, oils, and lubricants as well as impair optical instruments.[9] It was stated that deregulators and substances that cause irreversible injury are banned by the Chemical Weapons Convention of 1993, and that Russia would never use such substances under any circumstances.[10]

A Russian 2015 article opened with a definition of NLWs that again included both personnel and weapons and equipment, noting that an NLW is

> *A weapon designed to temporarily disable or immobilize personnel, weapons, military, and specialized machines and equipment, and infrastructure facilities and to reduce fatalities to a minimum without causing irreversible injuries to the health of human targets, or significant physical destruction of material assets and pollution of the environment.*[11]

In the same article, however, the authors later noted that the definition is too broad and inaccurate from the point of view of logic. It is hardly inhumane to use NLWs against equipment! Thus, the authors wrote that a better definition would be "weapons

designed to incapacitate adversary personnel temporarily and minimize irreversible injuries to their health or incur fatalities."[12] This discussion led to the eventual exclusion of equipment from most definitions of the term NLW. This change had appeared under consideration earlier, in 2013, when it was noted that NLWs incapacitate manpower for a specific time period without causing lasting harm to personnel.[13] It was stated that equipment should not be considered part of the target set.[14]

The 2015 article added that NLWs included acoustic, optical (laser and incoherent optical), and extremely high frequency (EHF) radiation weaponry. Incoherent optical radiation can be used only in dark hours and fair weather, and so it was determined to be less useful. So was laser radiation, since it cannot be used on a large scale due to constraints from Protocol IV of the 1995 Vienna Convention. This left only acoustic and EHF radiation for potential NLW use. They were described as all-weather with no limitations due to international law and able to fit on many vehicles due to small-sized radiation emitters. The radiation generator has an immobilization range of up to 60 meters for acoustic use and up to 250 meters for the EHF unit.[15]

In 2018 it was stated that an NLW is meant to impact only living beings, thus supporting the finding from three years earlier. The NLW term was defined as "weapons intended for the temporary disablement of adversary manpower with a minimum of lasting health disorders and fatalities."[16] The authors also defined two other terms. First, a "nonlethal injury" was defined as an NLW that impacts humans where "the result of the factual use of NLWs by the adversary implies loss of combativity or incapacitation of the impact target for the duration of time **equal to or exceeding** (emphasis added) the time needed to carry out the combat (special) task."[17] Second, the term "nonlethal suppression" was defined as "the result of the factual use of NLWs by the adversary implying loss of combativity (incapacitation) of the target for the time **less than that needed** to carry out the combat (special) task for which the said NLW was used."[18]

The Production Plan for NLWs

In 2002 new theories were advanced for waging armed conflict and for performing specific missions. Specific weapons, such as acoustic and optical ones, were deemed humane NLWs. The following order was recommended to determine the selection of NLW priorities at that time:

1. The role of these weapons in support of national security
2. The types of conflicts and situations in which it was proposed to use NLWs
3. The cost of the development, production, and use of each type of NLW
4. The volume of resources needed to create them
5. The theoretical and experimental ground for equipping troops within allowable timetables and cost
6. The infrastructure for their use
7. The ability to organize training in the NLW field.[19]

Two combination types of NLWs were deemed possible, information weaponry combinations and physical/chemical weaponry ones. Today, radiation and biological issues have been added to the NLW mix as the concept evolves over time.

A 2012 *Military Thought* article noted that NLWs should be designed to comply with the following military criteria:

- Simple design that has an acceptable weight and size
- Compliance with combat kit
- Preference to NLW carriers already in existence
- Performance characteristics matching the required task without the use of conventional weapons
- Adversary effects varying in intensity depending on the situation
- Compatibility characteristics with conventional weapon requirements[20]

The basic criteria involved in a military-economic assessment of NLWs included the following factors:

- Safety in use, including the ratio of the area on which an adversary is exposed to friendly firepower versus the area exposed to friendly NLWs
- Costs of the funds allocated over the lifetime of an NLW
- Combat efficiency of employing an NLW to fulfill its missions in a specified time
- Compatibility of an NLW with conventional weapons; that is, their integration
- NLWs proportion of a unit's total weapons complement to fulfill tasks
- The assurance that the use of NLWs does not go against existing law[21]

Problems facing the planning and development of NLWs evolved in 2018. They included a lack of precise definitions of terms and their classification; NLWs were defined differently for the Interior Ministry, the Armed Forces, and the Federal Security Service. This was a serious problem, since all of these agencies use NLWs for policing and counterterrorist operations, which they all handle. These are important points for the agencies to solve together. Another problem was determining whether NLWs are direct action (incapacitation) or special-purpose NLW agents. The latter NLW agents do not incapacitate an adversary physically but provide an opportunity, for example, for restricting an opponent's freedom of movement.[22]

It was noted that an NLW development program should include the following steps:

1. An analysis is made of indigenous and foreign trends, with a forecast offered of where NLWs seem headed.
2. A forecast is developed of potential constraints from existing international law, and humanitarian, ecological, socio-moral, and other issues that might restrict NLW use.
3. A discussion is conducted of scenarios and NLW employment opportunities.
4. The results of Steps 2 and 3 help validate priority areas of NLW development for the military and law enforcement ministries.
5. Research is required into aspects of the employment, maintenance, manufacturing, and other constraints on NLW development.
6. Five-year, ten-year, and 15-year guidelines are drawn up, especially those to be followed by all agencies.
7. A Targeted NLW Development Program is prepared, and its feasibility assessed in relation to existing financial, manufacturing, technological, workforce, and other constraints. Where unsatisfactory results are discovered, the process returns to Step 3.[23]

Once the "Targeted NLW Development Program" in Step 7 is endorsed by the various ministries concerned, then the National Military Industrial Commission and Security Council submit it to the leadership, both political and military, for approval.[24] NLW development trends need to be projected out 20-25 years, while critical military technologies with an effect on NLW development are projected out only 15-20 years.[25] Such a planning and development list suggests, due to its logic, that other Russian weapons planning and development scenarios might follow a similar seven-step process.

Three types of NLW developments were identified based on how they affected their targets. First were NLWs with a physical effect, including electromagnetic radiation, acoustics, mechanical constraints, kinetic energy, and electric discharge. Second were chemical NLWs, which cause irritant (mucous membranes) and odorant effects (such as psychophysical). Toxins, hallucinogens, simulants, and neuroinhibitory agents are other chemical effects. Third were biological NLWs, such as those causing irritation of the sense organs.[26] In addition to these three, targeted radiological NLWs were also mentioned.[27]

Using NLWs Internally and Externally

There are several internal and external circumstances under which NLWs could be used. Internal armed conflicts (IACs) are those (1) between various illegal armed formations or (2) between illegal formations and state law enforcement agencies. Settling these types of conflicts early can prevent a transition to war. IACs are classified according to the causes of their emergence, the degree of state power structure involvement (as one of the opposing sides), the size of the state territory involved (local, regional, etc.), and the organization type (planned or spontaneous) and intensity. Subversive and terrorist activities are inherent in internal struggles, and a state's failure to resolve such activities early can result in an atmosphere of fear that permeates society and creates a lack of confidence in state authorities. NLWs help reduce the combat efficiency of opponents in IACs and limit the number of fatalities.

NLWs employed in police operations generally fall in line with the use of acoustic and electromagnetic radiation weapons and are one option available to reduce fatalities. It is important to develop various NLW systems, including those using electric current and radiation, to help power entities solve such special problems. When protecting major facilities, electroshock mines can be laid, since they help block unauthorized access to important areas.[28] It was noted that:

> *At the same time, the distinctive features shared by all IACs suggest that NLWs must be used more extensively for their neutralization effect. Elimination of illegal armed forces with minimal civilian casualties, along with keeping life support, social, and transportation infrastructure facilities in a normal operational mode, will not only help restore the constitutional order in the conflict area, but will also ensure sustainable development of the country at large.*[29]

One Russian military opinion was that NLWs are an effective information warfare asset. In handling internal issues, NLWs can "defuse the bellicose

moods stoked by propaganda and isolate the most outrageous advocates of the indiscriminate use of military force."[30] Ironically, the "mood" of recent anti-Kremlin demonstrations in Moscow was provoked due to Kremlin decisions to keep certain people off election ballots there. This shows that in Russia, moods can be both "provoked" and then "defused" (with NLW) by the same government officials!

In regard to the external use of NLWs, they are being tested during exercises, with priority given to the Collective Security Treaty Organization (CSTO) due to the challenges these forces are facing in regard to terrorism, drugs, weapons, and ammunition trafficking along their borders.[31] In the three examples below, a special operations brigade of Kyrgyzstan's Armed Forces conducted the first bullet. Russian troop tactical exercises conducted the other two examples:

- To seize a population center captured by militants, smoke screens were deployed from 70 meters to obscure the vision of a sniper hiding in a building. This would be followed, when buildings were stormed, by thermobaric hand and under-barrel grenades. Sound-and-light cluster hand grenades were also used on fighters in rooms. The Osa complex, with target acquisition and terrain illumination capabilities (signal and flare cartridges), was possibly utilized in this exercise.
- To fight off adversary ambushes, incapacitating agents were used, such as thermobaric hand grenades, which are 2.5 times more effective than conventional ammunition since they can hit adversaries concealed behind cover and in shelters.
- To clear corridors for military convoys on roads blocked by the population, a combination of sound-and-light, smoke, and irritant-charged hand grenades were used that explode without scattering splinters and produce only a psychological effect on crowds.[32]

When constructing a plan for the use of NLWs, it must be stated precisely how conventional and NLWs are to be employed together. This is particularly important in regard to time limits, since the employment of NLWs implies that effects last only for a certain period of time. Using NLWs against control centers will produce the greatest disorganization in an opponent's control cycle.[33] NLWs can achieve surprise because they can inhibit countermeasures and destabilize an opponent psychologically. Actions must be taken with resolve once enemy troops are incapacitated and are unable to put up a real fight. In the offense they are most effective on an adversary's troops hiding in buildings; when confronting a defending adversary NLWs reduce freedom of maneuver and help disorganize control, reconnaissance, and information gathering.[34]

It was noted that the Russian Academy of Missile and Artillery Sciences was working on the organization and methodological support for developing NLWs, while the Scientific Research Institute of Applied Chemistry was working on developing, manufacturing, and delivering NLW ammunition and related devices.[35] Thus, NLW development is supported by both military and civilian industry.

Physical, Chemical, Biological, Radiation, and Information NLWs

In 2005 an article in Russia's *Military-Industrial Courier* listed the following as types of NLWs:

- Mechanical devices (basket throwers, water cannons, and catapults to disperse materials)
- Guns (electromagnetic, subsonic, radio wave, super-high frequency)
- Direct effect sources (generators, phased or pulsed emissions)
- Circular effects (vortex generators, vibroacoustic devices)
- Next-generation light and smoke elements (smoke and pyrotechnic means, etc.)
- Physical and chemical compositions, compounds, and suspensions (foams, gels, powder, etc.)
- Chemical and biological substances (odorants, irritants, marker agents, viruses, etc.)[36]

These types of NLWs can be dispersed by various delivery means.

After 2005 a more succinct list of NLWs was developed, with physical, chemical, biological, radiation, and information weapons receiving the most attention. Of interest is that both personnel and equipment are mentioned as targets in the discussion below, with some articles written as late as 2018, indicating that the definitions discussed above may still not be fixed in stone.

Physical-based NLWs include lasers that can incapacitate manpower and optoelectronic surveillance devices; microwave weapons that disable weapons and equipment by knocking out electronic components; high-frequency weapons that raise body temperatures; and acoustic weapons that cause dizziness, psychoneurotic breakdowns, and loss of hearing and sight. The range of these weapons is thought to be a few hundred meters to two or three kilometers.[37]

Chemical NLWs are those that can cause drowsiness and behavioral dysfunctions, that use adhesive (blocking) properties or alter the quality of fuels and lubricants, that increase the brittleness of metals, and that stall engines or block up ventilation systems. Many are offered in any caliber for NLW ammunition. One article noted that NLW systems of greater efficiency are under development, especially for the use of a variety of chemical irritants. This includes a special NLW ammunition[38] available for machine guns that produce a large irritant cloud. It was also noted that:

> *Another weapon is an irritant aerosol sprayer that can be used as a nonlethal landmine. Still another is a portable autonomous aerosol sprayer programmable to be activated in water in special operations. Small-size ammunition, for example, close combat irritant-containing grenades fired from under the barrels of grenade guns and hand grenades, may have a key role in neutralizing point targets, such as snipers hiding in dispersed locations on terrain or in buildings.*[39]

Another discussion covered the advantages of chemical-related NLWs. They include the following: incapacitating targets for specific time periods, the ability to selectively affect targets and penetrate various types of shelter, the use of "damage control" operations that suit the situation, and the ability to integrate with and complement standard

armaments. Chemical NLWs lower the chances of casualties among civilians and friendly units and can be used in operations such as peacekeeping, the de-escalation of armed conflicts, hostage rescues, and humanitarian support operations, where traditional warfare capabilities are less useful.[40] It was stated that:

> *The idea of non-lethality may also aid the efforts targeting areas of drug production, storage, and transportation, as well as forces preparing inter- or intra-national armed actions … At present, commitments to respect state sovereignty restrict conditions in which pre-emptive strikes against these targets are possible. The use of NLWs makes such strikes "politically acceptable."*[41]

Biological NLWs carry microorganisms that can harm humans, animals, and plants or disable weapons and other such items. Bacteria can decompose lubricants and block fuel flow passages, or it can cause swelling in artillery and firearm barrels.[42]

Radiation weaponry was the focus of another set of authors.[43] Electromagnetic radiation is broken into frequency ranges, including optical and radio. Optical NLWs include laser radiation blinding devices and are used against snipers, observers, and fighting vehicle drivers. Its features of long range, straight propagation, and little divergence are important principles for deployment. Radio frequency NLWs use EHFs, which can have NLW effects at a range of 15-700 meters. Most missions require only 250 meters. Acoustic radiation offers good utility in water and in the dispersal of large crowds of rioters at a range of about 60 meters. It does, however, have a wide divergence angle and thus low selectivity. On the positive side, it can be used in any weather or season.[44] While this article favored radiation weaponry and stated that it holds the greatest promise, it also noted that no single incapacitating agent is suitable for all operations. The specific effects of all NLWs indicate that they can be used only "in tactical situations for which they have been found to be fit."[45] A way must be found to develop "nonlethal weapons using several incapacitating agents in combination, the effect of which is yet to be studied."[46]

One article described information weapons as NLWs. The development of the mass media creates prerequisites for the use of an information NLW (via the inflation of specific concepts) in the opinion of some writers. Of interest is that psychological NLWs were also considered but have not yet been scientifically confirmed as effective. These types of NLWs included telepathy, telekinesis, clairvoyance, and other psychological means.[47]

There continued to be NLW links to equipment. In 2018 NLWs were listed as a type of weapon based on new physical principles. For example, NLWs included glues, fuel-diluent chemical formulations, and enmeshing networks.[48] Another article stated that NLWs included traumatic weapons, foam and water cannons, emitters within a spectrum of several hertz to ultrahigh frequencies, and chemical and biological reagents based on adhesion or the ability to change physical and chemical characteristics of substances (elasticity, viscosity, electronical properties, mechanical density, or sliding properties).[49] Their use is still thought to be focused on restricting freedom of movement, but they also have the ability to incapacitate humans.

Conclusions

NLWs are often described as a way to keep crisis escalation in check and to give leaders more time to resolve a conflict before it passes a point of no return. Russian military analysts appear in agreement, as they believe NLWs offer commanders new options and ways to handle crises. Flexible responses to situations offer more efficient methods for controlling them and reducing the chances of serious injury among noncombatants. Recent exercises and discussions in military journals indicate that NLWs are increasing in importance and use. Further, NLWs offer several distinct advantages, including high efficiency of use, the ability to neutralize an adversary's fighting capabilities, parameter control and selective effect capability, choice of time to take effect, and compatibility and potential integration with existing types of weapons.

However, it is just as clear that a final definition of what constitutes NLWs is still in flux. The definitions and explanations of NLWs do not coincide with their proposed use against people and equipment. While there seems to be a push to make NLWs a humane choice of engagement, articles continue to appear that describe chemical and biological NLWs that damage equipment.

Further, Russian NLWs are not described in the Western press at nearly the same rate as other developments, such as hybrid or asymmetric warfare. They deserve more attention. Perhaps NLWs are part of President Vladimir Putin's asymmetric approach to conflict. With a focus on NLW development trends projected out 20-25 years and critical military technologies predicted at least 15-20 years out, the concept appears to continue to play an active role in Russia's weapon technology planning process. Further, it is the types of NLWs that should concern the West, since they are not just physical and information but chemical, biological, and radiological. All can affect a situation and cause unforeseen consequences, including serious psychological effects.

Finally, Russia's division of NLW use into internal and external areas is of interest. The former implies that Russia's National Guard will undoubtedly utilize NLWs when confronting demonstrators or other protestors, or when confronting terrorists inside the country. Externally to Russia it is most certain that they will be used against terrorists first and then perhaps later against a traditional opponent. Most likely they will be used in conjunction with traditional means of warfare in the latter case.

An article in *Armeyskiy Sbornik (Army Journal)* in January 2019 noted that warfare will be waged with the objective of disorganizing enemy efforts in the political and military spheres, with the goal being to coerce a side to accept proposed terms. This will require NLW effects, the author noted. More important, the journal is planning on publishing a series of articles on NLWs. This makes it clear that the concept is drawing additional attention in the Russian military at the moment, indicating that it has become another military priority in Russia to monitor in the near future.

Endnotes

1. S. G. Chekinov and S. A. Bogdanov, "Predicting the Nature and Content of Future Wars: Problems and Opinions," *Voennaya Mysl' (Military Thought)*, No. 10 2015, p. 46.
2. L. N. Ilyin and V. V. Rylin, "Several Aspects of the Use of Nonlethal Toxic Agents," *Voennaya Mysl' (Military Thought),* No. 12 2018, p. 90.
3. D. V. Zaitsev, D. Yu. Soskov, and A. V. Foteyev, "Weapons of Nonlethal Action on the Basis of Radiation: Physical Particularities and Prospects for Their Use," *Voennaya Mysl' (Military Thought)*, No. 4 2013, p. 31.
4. No author or title provided, *Interfax* (in English), 15 May 2019.
5. No author provided, "Russian Blinding Weapon Becomes More Powerful," News.ru, 17 March 2019.
6. A. A. Nogovitsyn, A. V. Grudzinsky, and A. I. Sporykhin, "Nonlethal Weapons and the Outlook for Their Use by the Forces of the Collective Security Treaty Organization," *Voennaya Mysl' (Military Thought)*, No. 3 2011, pp. 52-53.
7. L. N. Ilyin and V. V. Rylin, "Incapacitants as a Weapon of Nonlethal Action," Voennaya Mysl' (Military Thought), No. 9 2014, pp. 41-42.
8. Ibid., pp. 37-38.
9. Ibid., p. 37
10. Ibid., pp. 39, 42.
11. D. V. Zaitsev, V. I. Orlyansky, and D. Yu. Soskov, "Nonlethal Weapons Can Be Used to Prevent Armed Conflicts," *Voennaya Mysl' (Military Thought)*, No. 10 2015, p. 51.
12. Ibid., 52.
13. D. V. Zaitsev, D. Yu. Soskov, and A. V. Foteyev, "Weapons of Nonlethal Action…," p. 32.
14. Ibid., p. 31.
15. D. V. Zaitsev, V. I. Orlyansky, and D. Yu. Soskov, "Nonlethal Weapons Can Be Used…," p. 55.
16. D. Yu. Soskov, D. V. Zaitsev, and S. V. Kholod, "Developing a Conceptual Apparatus for Issues of Nonlethal Weapon Actions," *Voennaya Mysl' (Military Thought)*, No. 8 2018, p. 75.
17. Ibid., p. 76.
18. Ibid., p. 77.
19. V. Tsygichko and V. Dyachenko, "Non-Lethal Weapons," *Yadernyy Kontrol (Nuclear Control),* 18 September 2002, pp. 58-67.
20. A. Yu. Pronin, A. V. Leonov, and L. M. Kaplyarchuk, "Basic Criteria for a Military-Economic Assessment of Nonlethal Weapons," *Voennaya Mysl' (Military Thought)*, No. 10 2012, pp. 43-50.
21. Ibid.
22. V. V. Selivanov, D. P. Levin, and Yu. D. Ilyin, "Methodologies for Nonlethal Weapon Development," *Voennaya Mysl' (Military Thought)*, No. 2 2015, pp. 14-15.
23. Ibid., pp. 21-23.
24. Ibid., p. 24.
25. Ibid., p. 21.
26. Ibid., pp. 15-18.
27. D. Yu. Soskov, S. F. Sergeyev, and D. V. Zaitsev, "Using Nonlethal Weapons in Internal Armed Conflicts," Voennaya Mysl' (Military Thought), No. 4 2018, pp. 56-58.
28. Ibid., pp. 58-59.
29. Ibid., p. 61.
30. D. V. Zaitsev, V. I. Orlyansky, and D. Yu. Soskov, "Nonlethal Weapons Can Be Used…," p. 51.
31. A. A. Nogovitsyn, A. V. Grudzinsky, and A. I. Sporykhin, "Nonlethal Weapons and the Outlook for Their Use by…," p. 55.
32. Ibid., pp. 56-58.
33. V. M. Moiseyev and V. I. Orlyansky, "Nonlethal

Weapons: Tactical Principles," *Voennaya Mysl' (Military Thought),* No. 6 2011, p. 33.

34. Ibid., pp. 31-32.
35. A. A. Nogovitsyn, A. V. Grudzinsky, and A. I. Sporykhin, "Nonlethal Weapons and the Outlook for Their Use by…," p. 59.
36. V. Lyashchenko, "Features of Trade in Arms Based on New Physical Principles," *Voyenno-Promyshlenny Kuryer (Military-Industrial Courier)*, 8 June 2005.
37. V. M. Moiseyev and V. I. Orlyansky, "Nonlethal Weapons: Tactical Principles," p. 27.
38. Ibid.
39. L. N. Ilyin and V. V. Rylin, "Incapacitants as a Weapon of Nonlethal Action," p. 41.
40. V. B. Antipov and S. V. Novichkov, "On the Question of the Development and Use of Nonlethal Chemical Weapons," *Voennaya Mysl' (Military Thought),* No. 9 2009, p. 54.
41. Ibid., pp. 60-61.
42. V. M. Moiseyev and V. I. Orlyansky, "Nonlethal Weapons: Tactical Principles," pp. 27-28.
43. D. V. Zaitsev, D. Yu. Soskov, and A. V. Foteyev, "Weapons of Nonlethal Action…," p. 33.
44. Ibid., pp. 34-35.
45. Ibid., p. 37.
46. Ibid.
47. V. Tsygichko and V. Dyachenko, "Non-Lethal Weapons," pp. 58-67.
48. A. V. Nazarenko and V. P. Gerasimov, "Maintaining and Recovering the Combativity of Units Against Weapons Based on New Physical Principles," *Voennaya Mysl' (Military Thought)*, No. 8 2018, p. 22.
49. N. V. Ageyev, "Matrix Method of Weapons Classification with Multidimensional Bases of Decomposition," *Voennaya Mysl' (Military Thought)*, No. 9 2018, pp. 56-57.
50. N. Poroskov, "In Search of a 'Humane' Weapon," *Armeyskiy Sbornik Online (Army Journal Online)*, January 2019, pp. 74-81.

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