

Cities: Inviting

— increasing urbanization points

by George Schechter
and
Amnon Birenzvig

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Targets for Chemical Attack

up need for a credible chemical warfare defense

The continued worldwide increase of urbanization and industrialization, particularly in Europe, has altered the terrain of the future battlefield. This is recognized at the highest levels of command of the US and NATO defense establishments.

In a letter dated 26 June 1984, to the participants of the Defense Science Board summer study, Secretary of Defense Caspar W. Weinberger emphasized the importance of this aspect of preparedness to the overall national security and stated the need "...improve urban warfare capabilities."

The requirement to improve US and NATO capabilities in urban warfare was supported in statements by the under secretary of defense for research and engineering and the chairman of the Joint Chiefs of Staff.

GEN Hans Joachim Mack, the NATO deputy supreme allied commander, stated that "the network of roadways, villages, towns and small cities can form the backbone of an overall battle plan." Similar sentiments were expressed by other high-ranking commanders and planners in the United States, West Germany, and the United Kingdom.

Military history is replete with examples of the importance of urban areas in the conduct of battles and campaigns. In World War II, for example, the events and outcomes of the battles of Stalingrad, Leningrad, Berlin, Aachen, and so many others are indicative of the importance of cities in terms of their defensibilities, their criticality as centers of culture

and industry, and their symbolic values, that is, their importance to the national morale and resolve in the success or failure of such battles.

Although these battles, taken one at a time, were tactically localized, the outcome of each battle reached strategic magnitude. Whole armies were destroyed, in some cases by battering themselves against stubbornly defended cities.

More recent military experience is just as indicative of these effects. In Lebanon in 1978, for example, Syrian heavy armored columns of overwhelming strength suffered extensive casualties and considerable delays in the battles for Sidon and Beirut against light but determined Christian

and concealment, exacted heavy materiel and tactical penalties.

Since World War II, more and more of the world population is concentrated in urban areas, which cover ever-increasing portions of the terrain. Whereas in 1950 the urban population was about 60 percent of the population in the developed world and 20 percent in the developing world, it is projected that by the year 2025 about 90 percent of the population in the developed world and 60 percent in the developing world will live in urban areas. (Note that in this article the designation "urban areas" refers to villages, towns, and small cities as well as large metropolitan areas.)

An attack on Western Europe might include chemical warfare if only to speed passage through dense, unavoidable urban areas.

militia forces fighting from the buildings and in the streets.

Another example is the battle for Suez City during the 1973 Arab-Israeli War. In this battle, highly experienced and well-equipped Israeli armored units took excessive casualties and were foiled in their attempt to take the city by comparatively light Egyptian defending forces.

In both cases, small but determined forces equipped with light weapons, properly deployed and taking advantage of buildings for cover

As the population shifts, political, cultural, and industrial powers concentrate increasingly in the urban areas to a point where control of the major urban areas is critical to the control of the whole country.

Increased urbanization of the European topography would have an especially large impact on the battlefield in any future East-West conflict. Because of the spread of urban areas, open areas and roadways suitable for maneuvering large armored forces are within infantry antitank weapon range of urban areas.

In addition, major traffic arteries pass through or near urban areas, which also include the major nodes of the transportation system.

To protect its flanks without splitting its forces into small units in order to contain and suppress the urban pockets (which is contrary to Soviet doctrine), an attacking army will have to take at least some urban areas. According to the Soviets, they expect to encounter at least three major urban areas for every 20-kilometer advance.

Urban areas present a unique situation in time of war. The concealment and protection offered by the buildings coupled with the difficulties and limitations in maneuvering armored units in the narrow streets provide a force multiplier of at least six to one and sometimes ten to one or more for the defending forces compared to a three-to-one to five-to-one advantage that the defender has in open areas.

If we assume a scenario in which the Warsaw Pact forces launch a massive attack with only conventional (nonchemical) weapons, we can expect the NATO forces properly equipped and trained for combat in urban areas, to slow down the

or to use massive conventional bombardment, tactical nuclear weapons, or chemical weapons.

Because of the large spread of urban areas in Europe and the proximity of the road system to these areas, bypassing them would expose the Soviet flanks to interlocking fields of fire. If invading forces surround urban areas, it will break their forces into small units, thus negating their numerical superiority.

Use of massive bombardment by conventional munitions to clear the passage for their forces will require excessive time and materiel and create a large amount of rubble, which will further slow down their momentum and destroy the industrial and commercial assets that the Soviets would wish to preserve for postwar reconstruction.

As was shown in the past, conventional bombardment is not always successful. Again, this option has a high probability of slowing down an attacker's momentum.

Soviet doctrine holds that any use of tactical nuclear weapons will very quickly escalate to a global exchange in which the Soviet Union will sustain severe losses. In addition, nuclear weapons used in urban areas will

and Warsaw Pact forces.

Chemical agents can penetrate buildings and defeat the unprotected and unprepared defender. To summarize, by using chemical weapons the Soviets would:

- Avoid or defer nuclear escalation.
- Preserve industrial and commercial assets for postwar reconstruction.
- Achieve tactical goals with a minimum of destruction and rubble and thus maintain the rate of advance.
- Exploit the surprise and shock effect and the psychological fear of chemical weapons that exist in the Western world to strain or even crack the alliance.

A study by Edward P. Kerlin, Dale L. Moody and Alan J. Rolfe recognized the effect of the use of chemical weapons by an attacking Soviet force in central Europe and estimated that such use would double the Soviet rate of advance and substantially increase Allied casualties. The Soviet advantage in using chemical weapons will be reduced, according to Mr. Kerlin *et al*, if NATO forces have an enhanced protective posture and reversed if NATO can credibly threaten retaliation in kind.

It is not clear whether Kerlin *et al* considered the urban factors in their study. The buildings in urban areas provide partial protection from chemical contamination. The concentration of agent vapor indoors lags behind the outside concentration. Staying indoors provides the occupants sufficient time to put on their protective gear once the agent has been detected outside the building.

This additional time is of great operational importance, since the defenders can wait indoors without their protective clothing and maintain their strength. Furthermore, the defenders can find suitable rooms and prepare citadels in the building in which a shirt-sleeve environment can be maintained.

The "clean" rooms could allow the troops rest and relaxation in

Towns and cities offer important advantages for chemical defense if these are properly recognized and systematically exploited.

numerically superior attackers, reduce their forces, and disrupt the schedule of advance, thus disrupting the campaign plan.

The invading forces, fighting their way through urban clusters at great cost in men and materiel, will face one obstacle after another. To regain the initiative, maintain momentum, and attain their goal, the Warsaw Pact forces will have to find a way to defeat these urban citadels. Their options will be to bypass urban areas

destroy the cultural and industrial assets that the Soviets would like to use for their postwar reconstruction and create piles of rubble that impede the movement of armored columns. Thus, it is assumed that the Soviets will use their nuclear option only as a last resort.

Chemical weapons provide the Soviets with an alternative that could achieve their objectives, especially with the large disparity in chemical warfare capability between NATO

Study estimates use of chemical weapons would double the Soviet rate of advance and substantially increase Allied casualties.

shifts, thus keeping relatively fresh and proficient teams in chemical protective gear manning the weapons positions.

The use of chemical weapons will degrade the performance of both sides; however, the degradation will be asymmetric and favor the defense since the offensive force must move constantly with no respite from the rigors of operating in protective gear.

The performance of the attackers will be relentlessly degraded, and they will still be under fire from the many concealed vantage points.

Finding suitable rooms for conversion to clean citadels will require both training and development of equipment kits for sealing the citadel and for measuring leakage rates. Specific recommendations are given below.

Since World War II, more and more of the world population is moving into urban areas and a greater fraction of the terrain is becoming urbanized. It is projected that this trend will continue to accelerate in the next few decades.

The results of this demographic shift and urban sprawl are that, in case of war, urban fighting almost certainly cannot be avoided. This is particularly true in Europe where urbanization has already reached the point where large armored forces cannot avoid passing through or near urban areas.

Use of chemical weapons to defeat the Allied forces in urban areas provides an attractive alternative to the attacking Soviet forces. This is particularly true in light of the large advantage in chemical capabilities enjoyed by the Soviets.

The use of chemical weapons presents a special challenge in the battlefield. It requires the troops to wear special equipment that hampers their

operation; however, the characteristics of the urban area—multi-compartments, compartment within compartment, and so forth—provide the defending forces with opportunities to reverse the advantage with only defensive means.

To do so, the troops must receive special equipment and training that is unique to the conduct of military operations in built-up areas in the chemical environment. These measures range from training troops to seal a room and perform a simple leakage test to the development of a small, low-capacity, filter-blower unit that is capable of pressurizing selected rooms to provide safe citadels within the building.

We make the following recommendations:

- To find the best rooms for chemical defense, some tests are needed to determine the leakage characteristics of candidate rooms. A small, easy-to-use test kit, composed of a small blower and flow and pressure gauges, should be developed and the troops trained in its use.
- Means to detect leaks in rooms and to seal these leaks should be developed, such as smoke candles to detect the leaks, and spray or tape sealing kits for minimizing leakage, and troops trained in their use. Potential leak areas are around doors, windows, ventilation systems, and electrical outlets.
- A small, low-volume blower-filter system should be developed. The unit should be mountable in a window opening, an opening in a wall, or an opening in the upper part of a door. The unit should be able to provide a small overpressure in the room. The level of overpressure needed is not clear at this time and should be determined; however, we estimate that an

overpressure in the range of between 25 and 50 pascals (roughly 0.5 to one pound per square inch greater than the standard atmosphere) will be required.

- As was discussed before, troops who stay indoors will be afforded additional time to don their protective gear once the agent has been detected outside. Because of the complex way in which air flows around and into buildings, the location and number of sensors to be placed outside must be determined. A research program to establish guidelines for this is recommended.

- Improve the capability to model agent movement into and through urban areas.

- Include chemical warfare in urban areas in the higher level war-gaming and combat simulation models such as TRASANA's (Training and Doctrine Command's systems analysis activity), ACABUG, the Army Concept Analysis Agency's CEM (concepts evaluation model) and the Army's SCORES (scenario-oriented evaluation system) war-gaming models.

- Intelligence collection requirements should be established. This should include: Soviet doctrine and training for chemical warfare in urban areas, specific defensive and offensive equipment for fighting in a chemical environment in urban terrain, and any other information relevant to this subject area.

Mr. George Schechter, vice president of McLean Research Center, Inc., in McLean, Virginia, has a BS in physics from Temple University, in Philadelphia, Pennsylvania. He has served on the Defense Science Board, Naval Research Advisory Council, Marine Corps Technical Advisory Board, Research Society of America and Military Operations Research Society. Mr. Amnon Birenzvi is a senior scientist at the US Army Chemical Research, Development, and Engineering Center at Aberdeen Proving Ground, Maryland. He has a PhD in atmospheric sciences from the State University of New York at Albany.