

CANE

—Light Infantry Operations

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Since 1980, the US Army has conducted a series of field tests under the Combined Arms in a Nuclear/ Chemical Environment (CANE) testing program. The purpose of the field tests is to determine the effects of nuclear, biological, and chemical weapons on combined arms operations over an extended period of time.

These tests found noted common deficiencies that have resulted in

doctrinal, equipment, organizational, training, and leadership fixes. While the first three tests concentrated on mechanized forces, in May 1992 a test was completed that focused on a combined arms force made up of light forces.

The CANE Close Combat-Light (CCL) test took place at Fort Hunter-Liggett, California, from February through May 1992. It evaluated the light infantry company with its combat support and combat

service support elements against elements of a motorized rifle battalion company over a 96-hour period.

The test scenario included three night attacks and one day defense. The light infantry company and its supporting elements received an operations order from its battalion headquarters and the company planned and conducted all the necessary rehearsals and preparations,



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executed the mission, and conducted consolidation and reorganization phases.

Soldiers and their weapons were highly instrumented in order to obtain data on real time casualty assessments, unit and soldier locations, and command and control information. Experienced military subject matter experts from FORSCOM and TRAOC units gathered detailed subjective data through direct observation of subordinate elements of the evaluated unit. Human factors evaluators monitored and recorded soldiers' and leaders' levels of physical activity and mental acuity.

The participating units conducted missions in a conventional environment, where there was no NBC threat, used as a baseline environment. The missions were then evaluated in a nuclear/chemical environment using the same scenario and terrain. All data were carefully recorded and used in later analysis, which quantified any differences in performance while in MOPP. To

avoid any learning curve by the units performing the same scenario twice, two units started the test in the baseline environment, and two units started in the nuclear/chemical environment.

The results of CANE-CCL support findings in these areas:

Maneuver

There was a significant difference in the ability of the light forces to maneuver between the two environments. Light forces moved at a one-third slower rate in the nuclear/chemical environment; that is, the unit required more time to reach the objective. Movement techniques were less effective and movement control was also degraded in the nuclear/chemical environment.

During movement to the objective while in MOPP gear, light forces were less effective in avoiding skylineing, using natural concealment, using concealment in tactical movements, employing noise/light discipline, positioning key weapons

and in taking appropriate actions at danger areas.

Movement control techniques that were also adversely affected included movement in the designated formation, movement on specified routes, and compliance with graphic control measures. In after-action reviews, unit leaders reported that, in the nuclear/chemical environment, movement was slower, difficult to control, and that personnel bunched up, fell often, were noisy, and became disoriented.

Weapons Effectiveness

In the nuclear/chemical environment, direct fire weapons during the attack were significantly less effective. The light force did not detect and engage the opposing forces (OPOR) until they were much closer. Twenty-five percent fewer soldiers fired their weapons and, of those soldiers firing, 45 percent fewer firers hit their targets. Of all the shots fired, 25-to-60 percent less rounds were fired. The reduced rate of fire

Casualty evacuation took twice as long in MOPP gear.





Soldiers wore vestpacks which recorded their locations back to a monitoring station. Their weapons were instrumented and provided real-time assessment of casualties that was recorded for later analysis.

and the increase in number of rounds required to hit a target resulted in 73 percent less OPFOR targets being engaged.

Survivability

The light forces were less survivable in the nuclear/chemical environment. The OPFOR detected and engaged the light forces at greater ranges. The light forces moved slower, bunched up, and maintained less security. In after-action reviews, unit leaders reported that in movement, they took trails and roads more often and took more tactical risks with closer formations and slower movements.

Soldiers also experienced problems when trying to use the AN/PVS7 night vision devices, which were not compatible with the mask and hood. Weapon accuracy was reduced because of the lack of training in MOPP3/MOPP4. Only 30 percent of the infantry players had ever fired their weapons in MOPP4, despite a twice yearly requirement to

do so, and experienced compatibility problems between the mask and direct-fire weapons.

Battle Command

While moving, the light forces were degraded in their ability to maintain directional orientation for all elements. Leaders in the nuclear/chemical environment phase gave more care to mission analysis and restating the mission, developing courses of action, and making tentative plans while in the nuclear/chemical environment. Leaders had a tendency to keep more control over subordinates and delegated less authority.

As pressures and time increased in the nuclear/chemical environment, leaders became more exhausted, and critical tasks were neglected or poorly done. Synchronization of plans and operations became more difficult and coordination with supported and supporting units declined. Tactical discipline, camouflage, and OPSEC measures were

normally not enforced, and unit cohesiveness suffered.

Troops began to worry more about their individual survival than the unit's mission performance. When communicating, there was a significant increase in requests for repetitions and clarifications of radio messages. Units were degraded in establishing radio nets and were more inclined to use range-enhancing antennas in the nuclear/chemical environment. Both radio and face-to-face communications were impaired by the M17-series masks and hoods, which hampered hearing and voice recognition, volume, and clarity.

In after-action reviews, unit leaders stated that they used the radio more and had difficulties in hearing or using the TA-1 handset in the nuclear/chemical environment. There was a tendency for leaders to try to keep things simple, and they modified their tactics accordingly.



Human factors such as sleep, soldier effectiveness, hydration, and visual accuracy were recorded during the test.

Execution

While executing the missions in the nuclear/chemical environment, the security elements tended to alert the company about one-sixth less often, and provided fewer contact reports to the company. More difficulty was encountered in the nuclear/chemical environment in suppressing the enemy to avoid fixing.

The ability of the light forces to maintain contact with the enemy and in platoon consolidation and reorganization were also degraded. Routine tasks that were reduced to SOPs could be accomplished with little or no degradation. However, battlefield tasks involving cognitive skills, movement to contact, maneuver and attack or defense over difficult terrain under varying weather conditions were rapidly

degraded under nuclear/chemical conditions.

Mobility/Counter-Mobility

One combat engineer squad supported the light infantry company during the test. This squad of sappers experienced similar difficulties of operating in the nuclear/chemical environment as did the infantry. Specifically, the performance of engineer tasks were degraded in the nuclear/chemical environment because MOPP4 caused greater fatigue and slowed completion of tasks involving physical labor.

Movement from the line of departure to the objective was especially difficult since the engineers were heavily burdened with combat equipment with MOPP4 as an additional encumbrance. Construction of obstacles and the

breaching of obstacles were made even more difficult because the chemical protective gloves caused the loss of manual dexterity. The breaching of wire obstacles took twice as long to complete.

Fire Support.

Indirect fire support was provided by a 105mm artillery battery, the infantry battalion's 81mm mortars, and the infantry company's organic 60mm mortars. Fire support killed about half as many OPFOR, less indirect-fire rounds were fired, and it required twice as many rounds to get a hit in the nuclear/chemical environment when compared to the baseline.

At the 105mm battery, the FIST acquired one-fourth more targets, but was less accurate in calling for fire, and took more time to transmit the

calls for fire in the nuclear/chemical environment. There were 50 percent more errors in settings on the guns, and the errors were twice as large. Firing the missions took 19 percent more time. The battery was slower in moving and laying the guns, there were errors when the guns were laid, and laying wire took longer.

Air Defense

During the test, passive air defense measures were degraded. Soldiers spent 43 percent more time performing camouflage activities while in the nuclear/chemical environment. Additionally, soldiers in MOPP were more vulnerable to air attack because of degradation of shielding heat sources, more movement within the unit area, and less use of air guards.

Combat Service Support

The light force had its slice of combat service support elements during the tests. Maintenance was degraded throughout the force, and performing and supervising preventive maintenance checks and services declined. Medical treatment and evacuation were degraded in the nuclear/chemical environment. During the direct fire battles in the nuclear/chemical environment, it took twice as long for the light forces to move casualties to the collection point, treat, and evacuate the casualties.

Demographics/Human Factors

Pre- and post-test questionnaires were administered to test soldiers to get the demographics and training characteristics. The characteristics and opinions of the soldiers were

analyzed to obtain profiles of the test participants, man-machine interface assessments, unit NBC training status, nuclear/chemical environment and BLE comparisons, and leadership assessments. Levels of hydration were measured using daily urine samples. Visual acuity of masked and unmasked soldiers was measured before the test. Cognitive/perceptual performance was measured by a daily performance assessment battery.

The light forces experienced significant challenges during the CANE evaluations in performing effectively on a battlefield with a chemical threat. However, there was a significant learning curve which proved that soldiers trained in operations in MOPP can perform their missions and overcome the challenges. Examples of the learning curves of soldiers operating in the nuclear/chemical environment: infantry survivability increased from the first day of the test to the fourth day. Degradation of howitzer crews decreased from 58 percent on day one to 29 percent on day four. In after-action reviews, most leaders reported that they were surprised that they could overcome the effects of MOPP by working through it and agreed that the test was a training benefit.

The results of the CANE CCL test are still being analyzed. Specific measurements will be identified as deficiencies and incorporated into the CANE implementation program. The CANE implementation program is a "fix" program where the problems of operating in the nuclear/chemical environment are identified to the

responsible TRADOC or AMC command. The command, in turn, develops solutions. Since the CANE series of tests started, there have been over 100 corrective actions initiated in doctrinal, material, organizational, leadership, and training areas. Future CANE tests will examine air defense (May 1993), smoke (FY95), and aviation (FY96) issues.

In summary, the results of CANE CCL indicated that light infantry combat operations were significantly degraded in a chemical environment, but soldiers can learn to operate effectively in the nuclear/chemical environment—in the first days of war or now.

Soldiers learned to operate in MOPP4 after only 96 hours of intensive experience in a nuclear/chemical environment. Thus, training to perform missions under NBC conditions has a rapid payback in unit effectiveness.

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