

CHAPTER 7

Combat Effectiveness In MOPP 4: Lessons from the U.S. Army CANE Exercises

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From the early 1980s until the early 1990s, the U.S. Army ran a series of exercises to gauge the combat effectiveness of military forces engaged in combat when forced to wear protective gear to prevent casualties from chemical and nuclear attacks. These exercises were called CANE or Combined Arms in a Nuclear/Chemical Environment.

Those who have worn the cumbersome Mission Oriented Protective Posture (MOPP) 4 overgarments, gas masks, gloves and heavy boots that provide a measure of protection against different chemical and biological agents, know first hand that wearing such gear significantly degrades the efficiency and effectiveness of military personnel in combat operations. The longer our military is forced to wear such protective equipment, the worse the problem of conventional combat effectiveness becomes. Protection against one threat -- chemical weapons -- raises other risks to our forces and can hinder the accomplishment of their mission against opponents also waging conventional warfare.

The psychological and physical effects of prolonged wear of nuclear, biological, and chemical (NBC) protective gear can severely degrade command and control, communications, mobility, rates of fire, sortie rates, and defensive measures when compared to the unit's baseline performance in these areas when not forced into the protective posture against chemical and biological warfare (CBW) threats. One of the conclusions of virtually every CANE exercise for a decade is that combat effectiveness at all unit levels, large and small, is adversely affected and the effect is likely to be dangerously significant the longer MOPP gear is worn, the more extreme the temperatures, the more physically demanding the jobs to be performed, and the more complex the task at hand.

Since the CANE exercises, and the results of the Air Force equivalent exercise in SALTY DEMO, the U.S. armed services have made some equipment upgrades to reduce the weight and heat problems of the battle dress overgarments (BDOs).

Today, the Joint Service Light Weight Integrated Suit Technology (JS-LIST) suit has replaced the older heavier, bulkier, warmer protective garments. JS-LIST suits provide 45 days of wear versus 22 days for the BDOs. In addition, they can be washed up to six times without losing protective qualities. Thus, fewer suits are needed, provided soap and water are at hand in combat zones. New better fitting protective boots and improved masks are also coming on line. Nevertheless, most of the same problems remain for the fighter clothed in still-somewhat restrictive MOPP 3/4 gear, and combat efficiency will suffer compared to that of fighters not so encumbered.

The Exercises

The Combined Arms in a Nuclear/Chemical Environment (CANE) exercises were two-sided, force-on-force, real-time casualty assessment war games conducted with four types of units. CANE I tested how well U.S. Army mechanized infantry squadrons and platoons fare in performing their missions in extended operations where simulated nuclear and chemical weapons were employed. This set of exercises was completed by May 1983. CANE IIA tested the combat effectiveness of tank company teams in that same stressful environment and was completed by April 1985. CANE IIB tested an Army heavy armor battalion in the same mode and these exercises were completed by March 1988. Finally, the Army ran similar tests with close combat light infantry rifle companies and platoons, these exercises coming to an end in May 1991. Another such series was completed and run from March to May 1992.¹ Each engagement was performed on two tracks. First, Army units performed in normal battle array. Then, the exercise was repeated at another time in full MOPP 4 gear. Each engagement was performed at approximately the same time and on the same terrain in each of the exercises.

MOPP 4 Command and Control Implications

As one U.S. Army report concludes “command and control suffers significantly in the nuclear chemical environment due to exhaustion of leaders, leadership behavioral changes and increased periods when no one is in charge.”² Prolonged wearing of masks and full overgarments can lead to stress, fatigue, disorientation, confusion, frustration, and irritability. Dehydration causes problems and in these exercises 17 percent of the soldiers involved were clinically dehydrated. The wearing of masks led to problems of recognizing who the leader was and whether the leader was still functioning. Even with special markings, there was delayed recognition of leaders on the simulated battlefields.

When U.S. Army platoon leaders were deemed killed in action during the exercises, the next senior man assumed command in only 23 percent of the cases when in full MOPP gear as compared to 100 percent in normal gear. As one report summarizes, “it takes a unit four times as long to realize they are leaderless when the leader is incapacitated.”³ Wearing cumbersome MOPP gear also makes the leaders less agile and more vulnerable to conventional fire. In CANE II exercises it was reported that “leaders are more active, sleep less, delegate less, and do not pace themselves. They get lost more easily, and find it difficult to reorient themselves.” Disorientation, confusion, and frustration are common. Leaders become irritable, impatient with subordinates, and effectiveness declines rapidly after six hours in MOPP 4. Leaders especially can become seriously dehydrated, but do not know it. Dehydration causes further irritation and paranoia, compounding leadership dehydration. During these periods, battle casualties among leaders doubles.⁴ In the Combined Arms in a Nuclear/Chemical Environment (CANE) there was registered a 34 percent increase in leaders being killed in action as compared to combat exercises where such gear was not worn.

These exercises of rifle platoons and companies showed that leaders operating behind masks, wearing protective overgarments and having to operate in heavy boots and gloves, continually tended to delegate less to subordinates, generally got more involved in direct battle command, and

became both mentally and physically exhausted sooner than in normal conditions.⁵ This led often to lack of focus and irritability.

Leaders often had a tendency to delegate less authority and to communicate less frequently and in less detail. As exhaustion set in leaders sometimes neglected critical tasks and coordination of the units and synchronization of movements with adjacent units suffered.

People operating in a highly stressful and tiring posture often performed less well when met with novel challenges that could not be met with standard operating procedures. As one study states, "Routine tasks which were reduced to SOP 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 and chemical conditions, greatly affecting command and control."⁶

In MOPP 4, leaders tended to cut corners, took easier routes, used roads and trails more often, and took unnecessary tactical risks.

One of the lessons from these field exercises in a simulated chemical and nuclear environment is that "leaders must pace themselves, delegate, and observe a strict work-rest regimen. Forced liquid intake, especially when operating in a nuclear and chemical environment, will minimize dehydration, stress and poor performance."⁷

Communications and MOPP 4

Communications in the CANE maneuvers were deemed only about half as effective in that environment as in a non-threatening one. In MOPP 4 conditions, "soldiers perceive radio communications to be garbled, even though recordings show the transmissions to be clear."⁸ The length of radio transmissions increased by 47 percent and by 100 percent in battles. Even verbal face-to-face communications were only half as effective while each was trying to talk and hear through a mask. Obviously, non-verbal communications conveyed through facial expressions were eliminated. As a result, soldiers more readily communicated with each other by hand and arm signals where feasible.

Fire Support and MOPP 4

Platoons in full mask and overgarments were more reliant on supporting indirect fires from artillery and mortars and other sources. They also called on three times more supporting fire than in a non-nuclear, non-chemical environment. More firepower was asked for due to the longer attack times caused by wearing cumbersome gear and the fear within advancing platoons that they could not be as effective in accurately aiming direct fire weapons at the enemy. Units generally took twice as long to complete attacks in MOPP 4 as compared to normal clothing.

Units in MOPP gear did not engage the enemy force until they were at shorter ranges.⁹ An after-action report stated that, “25 percent fewer soldiers fired their weapons and 45 percent fewer firers hit a target in the nuclear and chemical environment.”¹⁰ In this situation, all units fired their weapons from 25 to 60 percent less than in the non-contaminated battlefield exercise.¹¹ Overall, it was calculated that 73 percent fewer enemy targets were engaged when friendly rifle units were in full chemical protective gear because of the lower rate of fire and increased inaccuracy of fire.¹²

Light infantry platoons were slower to advance, called for more indirect fire support, and their supporting artillery and mortars were slower to respond when the forward and supporting units were both in full protective postures.

The fire support system was slower to respond and both forward platoons and supporting units fired fewer rounds and were less accurate in MOPP 4 conditions because more mistakes were made in communicating coordinates of targets and, in the process of firing. Firing units moved more slowly, taking one-third more time to put guns into position after unit movements.¹³

As a result of operating in MOPP gear, Army rifle platoons took twice as long to complete attacks, firing rates declined from 20 to 40 percent, and twice as many soldiers were required to achieve objectives. As they advanced they were less effective in taking cover and concealing their locations. Also, soldiers in overgarments and masks had more difficulty in locating and identifying their targets.¹⁴

Casualty Rates in MOPP 4

During the CANE maneuvers, friendly forces burdened with wearing masks, protective overgarments, special gloves and boots, were able to inflict only half as many “deaths” on enemy forces as would have occurred in conventional combat where troops were not so equipped.

Casualties mounted, increasing by 75 percent when the enemy counterattacked. Friendly troops were more vulnerable in the nuclear-chemical battlefield simply because of the requirement to wear masks and overgarments and gloves. They made more noise and did not maintain good discipline about restricting lights from lamps, flashlights, fires, and other sources. They also moved slower and were less disciplined in their maneuvers, and this allowed the enemy to find them and target them more effectively. There was also more fratricide, as soldiers in full protective gear, confused by the mask and burdened by the protective gear, fired 20 percent of their rifle rounds at friendly forces as compared to 5 percent in conventional combat exercises.

Many other military tasks were under-performed once rifle platoons and companies donned full chemical protection gear. For example, some tasks were omitted to simplify life for those burdened by MOPP 4 masks and overgarments. Illustratively, these units cut camouflage actions by 15 percent the first day in such gear and 30 percent by the second day. By the third day, camouflaging was abandoned altogether in these exercises. Overstressed leaders did less supervision as time wore on and their personnel did less on their own.¹⁵

Discipline and Cohesion Decline in MOPP 4

As one U.S. Army study reports, “enforcement of tactical discipline declined, units became less cohesive, and the synchronization of plans, maneuver, and both direct- and indirect fire support . . . were significantly degraded. Units took longer to establish communications and had to ask for more radio transmissions to be repeated and clarified. In contrast, tasks which were routine in nature and practiced on a regular basis revealed little or no degradation.”¹⁶

Difficult Engineering Tasks Harder in MOPP 4

Engineers, operating in full MOPP gear, also had a harder time and were less efficient. At times it took engineers three to four times longer to complete tasks when encumbered with protective gear. One report states “MOPP 4 caused greater fatigue and slowed completion of tasks involving physical labor . . . Protective gloves caused loss of manual dexterity while both emplacing obstacles and breaching wire . . . The M-1 protective mask created problems in seeing and communicating.”¹⁷ For example, “breaching of wire obstacles took over twice as long”¹⁸ and such units’ movement on the battlefield was degraded by 50 percent.¹⁹

According to another CANE report, “Engineering support was degraded in the nuclear-chemical environment. The rate of movement, engineer security, and coordination of obstacles were degraded by 36 percent, 37 percent, and 14 percent respectively.”²⁰

Conclusions and Recommendations

As one CANE summary evaluation report concludes about light infantry combat performance on the simulated nuclear-chemical battlefield, there were a number of battle implications for units adopting a MOPP 4 protective posture:²¹

- “Leaders took tactical risks by selecting easier tasks.”
- “(Units) maintained direction of movement one-sixth less effectively.”
- “(Units) synchronized plans about one-fourth less effectively.”
- “(Units) rehearsed about one-tenth less.”
- “One-fourth of leaders received inadequate information on the opposing forces.”
- “(Units) required clarification/repetition of one-fourth more radio messages.”

- “(Units) received one-sixth fewer reports from security elements.”
- “(Units) suppressed opposing forces one-fourth less effectively.”
- “(Units) maintained unit cohesiveness one-fifth less effectively.”

The longer friendly forces were in full MOPP 4 protective gear, the more poorly they performed on the simulated chemical and nuclear battlefield. As one observer reported, “After six hours in MOPP 4, personnel tend to omit such tasks as camouflage and combat service support activities. The unit takes significantly longer to execute the same mission on the third day of extended operations compared to the first day.”²²

The U.S. Army’s conclusion was that more of their forces needed extended NBC training to prepare to cope with this contaminated situation when units would have to operate in full protective modes. After-action evaluators concluded that the Army’s participants were “marginally trained to operate in MOPP 4. If the units had come under actual chemical attack, they would have suffered needless casualties.”²³

While by most measures U.S. Army units performed very poorly in full protective gear compared to normal battle dress, not all Army activities were degraded as a result of wearing individual protective equipment. In some cases of planning and coordination there was an actual improvement as units prepared to enter the battle exercises in the chemical/nuclear scenarios because more care was given in advance to mission analysis, developing alternative courses of action, and making of tentative plans. The after action report concluded that, these units knowing they would be tested in the harder environment, paid more advance attention to solutions in planning and coordination.

Notes

1. Mr. Fraker, U.S. Army Information Paper, “Combined Arms in a Nuclear/Chemical Environment,” October 4, 1991, 1.

2. U.S. Army Chemical School, “CANE: Summary Evaluation Report, Phase I,” Ft. McClellan, Alabama, March 1986, 1-2. See also, Col. Knoop, “Information Paper,

CANE II, Force Development Test and Experimentation,” U.S. Army Chemical School, Ft. McClellan, Alabama. These were supplied to the author by the U.S. Army Chemical School, Fort Leonard Wood, MO, undated, 2 pages.

3. Col Knopp, “Information Paper, CANE II, Force Development Test and Experimentation,” U.S. Army Chemical School, Ft. McClellan, Alabama, 1.

4. Ibid.

5. U.S. Army Chemical School, “Close Combat Light (CCL) Lessons Learned: Combined Arms in a Nuclear/Chemical Environment (CANE), Force Development Test and Experimentation,” Fort McClellan, Alabama, March 12, 1993, 1-1.

6. Ibid., 2-10.

7. U.S. Army Pamphlet, “Winning in a Nuclear/Chemical Environment,” Undated.

8. Knoop, op. cit.

9. U.S. Army Chemical School, “Close Combat Light (CCL) Lessons Learned: Combined Arms in a Nuclear/Chemical Environment (CANE), Force Development Test and Experimentation,” Fort McClellan, Alabama, March 12, 1993, 2-6.

10. Ibid.

11. Ibid.

12. Ibid.

13. CANE Summary Evaluation Report, Close Combat Light, op. cit., 1-3.

14. U.S. Army Pamphlet, “Winning in a Nuclear/Chemical Environment,” Undated.

15. Ibid.

16. Ibid., 1-2.

17. Ibid., 2-12.

18. Ibid.

19. Ibid.

20. CANE Summary Evaluation Report, Close Combat Light, 2-11.

21. CANE Summary Evaluation Report, Close Combat Light, op. cit., 1-3.

22. Knoop, op. cit., 2.

23. CANE Summary Evaluation Report, Close Combat Light, op. cit., For example, it was reported that prior to their first CANE maneuvers, 18 percent of participating soldiers had never worn MOPP 4 protective gear, and 60 percent had done so for only 1-3 hours. 22 percent had never before performed skin decontamination. Only 42 percent of frontline soldiers and 30 percent of the entire infantry team, had received training in firing their weapons in MOPP 4. Only 30 percent of drivers had been trained to drive in MOPP 4. Only 34 percent had been trained to operate the M8A1 alarm.