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Although it seems ridiculous, we are discovering, largely for the first time since World War II, that smoke is and can be a significant combat multiplier on the battlefield. I now think of it as a combat system. I would not want to fight anywhere without having that combat system if I could possibly access it.

Smoke, more than most combat multipliers, cuts two ways. It can and will do as much damage to you as it does to the enemy if not properly employed. Employment of smoke, as much an art as a science, cannot be used simply as a direct fire weapon system by positioning a unit and preparing to shoot/blow some smoke. We must employ smoke much more subtly, using both technical knowledge and an artistic bent to get the most out of it. We need to develop that artistic bent.

The National Training Center (NTC) drove smoke to the forefront. The smoke renaissance took place

there and it is still the principal driver. Because it is used there extensively, we all have suddenly become more aware of what it can do *for* you and what it can do *to* you. The unique characteristics of smoke provide a wide variety of employment opportunities.

One of the many employment possibilities stems from the fact that smoke is in some ways more effective at night than it is in the daytime, a fact that is not apparent on superficial analysis. We tend to think that darkness obscures effectively and count heavily on the darkness. The truth is that smoke is extremely effective at night and should and can be used to advantage. Smoke makes it difficult for reconnaissance elements, within visual range of activity at night, to figure out what's going on. Reconnaissance elements can be expected to be frequently within 500 meters of key activity, lying low and observing.

A light haze combined with darkness can totally obscure what is really happening. While our own

soldiers can see 30 to 40 meters clearly as they go about their business, anyone farther away cannot.

In conjunction with darkness, smoke obscures what is really happening and contributes to deception and counter-reconnaissance efforts. We need to include the use of smoke in night operations in our doctrine and teach our soldiers how to use it at night. Whatever the spectrum of employment is, our ability to use it effectively on the battlefield will be tied to the quality of our training.

Training

Employment of smoke and the subtleties involved in getting the most leverage out of it must continue as an important part of the courses that are taught to chemical officers. In addition, it should be broached in the basic combat arms courses, at least to the extent that an understanding of its effects are covered. And, it must be incorporated in the tactical portion of combat arms advanced courses and Command and General Staff College and covered in the operational planning exercises of CAS³. We have not done this well and it is one reason

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that we collectively know so little about the subject.

Our smoke unit soldiers are just discovering how useful smoke can be. The reason they're "discovering" it is because until recently few commanders have asked them to go to the field and operate. Smoke unit soldiers now receive a good deal of attention. They have been around a long time, but the truth of the matter is that few of us knew or cared. Units which before were pulling a lot of extra duty, and whose smoke generators were not high on the maintenance priority list, are now getting a lot of requests to participate in and support various types of training.

As that occurs they are also receiving a lot of training and are learning a lot about how to advise commanders on the best ways to use smoke. As we get reacquainted, we see executors periodically overestimating their own capabilities, and commanders overestimating the capacity of smoke units to deliver, and where we can safely position them on the battlefield.

As we grapple with the training issues in the field, we are trying to get smoke incorporated into as much training as possible and frequently use considerably more than we are likely to normally receive on the battlefield.

We encourage this because we want our soldiers to experience the difficulties of operating against it, and the advantages and methods of using it. We want our soldiers to understand something about the effects, positive and negative, of smoke on the battlefield. And, we want our commanders prepared to use it and operate in it effectively. I view smoke as being in about the same category as artillery in terms of its potential importance on the forward edge of the battlefield.

The chemical soldiers themselves do a fine job, and it's fairly easy to train them on the basics. The soldiers who need to be trained in detail are the ones who decide where to place the smoke resources and how to use it to *make something happen on the battlefield*. This is the hard part — it requires precise calculations and detailed understanding of smoke characteristics and capabilities on the part of chemical unit commanders, staff officers, and units.

Equipment Development

One of the things which can make the job easier for these soldiers to give the maneuver commander better advice and assistance early in the decisionmaking process is meteorological information and equipment. Soldiers need, as a minimum, some means of accessing weather reports, and a meteorological kit for local wind

speed direction, humidity, and barometric pressure. This minimum essential capability will provide the *technical* foundation that is essential to the *art* of employing it at the right time and place to get the most out of it. Some special research and development effort should be placed on developing these tools and a matrix method of depicting the results of various combinations of key factors.

Most of our smoke is wheel mounted and the generators are very reliable; they're easy to maintain, reliable, and relatively easy to operate and employ. Some problems persist. One is the problem of logistics — supplying and resupplying fog oil. At the base level our S4s do not have charts that tell us such things as the number of drums of fog oil to lay on if we want to lay down a smoke screen of a prescribed type and duration. *[USACMLS subject matter experts point out that this information can be obtained from the chemical officer or from FM 3-50. —EDITOR]*

Outside of simple logistical mathematics, there are other problems — it's difficult to stockpile fog oil drums forward as the proper location of the stockpile depends on winds and weather factors we are often least able to predict. Fuel and ammunition may be stocked independently of these factors, based on a relative and tolerable risk determination of where you want units to go next.

It's considerably more difficult to do that with fog oil and current

part science, part art, and...

(decision time) winds may predict points precisely where we do not, at execution time, want to start generating smoke. This phenomenon leads to the obvious conclusion that we need a mobile system which can carry fog oil or other substances around and keep them loaded and responsive until we are ready to use them. In turn, that means dedicated trucks, trailers, or other alternatives to provide us with responsive logistical support. In short, the factors of METT-T (mission, enemy, terrain, troops, and time available) restrict stockpiling this versus other kinds of resources.

Vehicle Protection

A key problem with current wheeled vehicles is protection. In virtually all cases it seems clearly unwise to plan on sending open quarter-tons to the forward edge of friendly lines in order to provide smoke. At the moment, that is precisely what is required. Two obvious answers exist — move them there with better protection, or find a way to deliver smoke from a distance with accuracy. Doing the latter is costly and can create additional difficulties. We avoid forward positioning once in a while, but not often, and we can't possibly expect

our smoke teams to survive unprotected in the kinds of positions they normally need to be in to do their job. This is not purely a materiel problem. At the moment we tend to take risks in training that we would not take on the battlefield. We, the operators, have to learn how to find or create "safe" areas which provide some degree of protection for the smokers, and we have not fully thought out just how best to do this. Present doctrine and techniques are immature at best.

The best answer to increased protection and mobility is to phase out of wheels where possible. The TIGER Brigade experimented a bit with the new turbine generator, mounted on the M113, and it has all the makings of a system good from the "get-go." It turned out to be extremely reliable at the NTC in spite of some apparent down-time which, in fact, was a simple matter of tightening up a wire in the control panel. The simple fix provided a turbine system operational during the full NTC period.

Mounting the generator on a tracked vehicle produces some interesting ancillary advantages. When the track kicks up dirt, it helps make the smoke cloud more effective and less vulnerable to penetration by enemy systems. The bottom line? This system performed reliably and continuously, and looks like a low cost

developmental concept we ought to buy into. In spite of this good news, it may be that our light forces will have an even greater need for smoke than our heavy forces, and they cannot use M113s.

More Smoke—Smaller Pots

To help the light force and to beef up the capacity of the heavy force, we do need some work. Generators are the principal, but not the only means of securing smoke. Our current smoke pots put out a pretty good density of smoke for quick concealment purposes. But volumes and duration are insufficient for many potential uses. We should be able to develop and field a capability to put out three times as much smoke from the same size smoke pot.

The capability to produce local smoke quickly, carried by individuals or units on board combat and other kinds of vehicles, can be invaluable for local protection for immediate concealment of movement, etcetera, when major smoke assets are not available. In addition to increasing the duration/intensity of the smoke, it would be extremely beneficial to reduce the size of the smoke pot as well. Something about the size of a football would be ideal, and if it can be thrown without breaking, so much the better. If our infantrymen had something they could easily carry with them that put out a high volume of smoke, they would have a valuable capability they just don't have now.

**...It's time for a full-scale awakening
to this key combat multiplier...**

Another method of dispensing smoke is to project it through the use of indirect fires; however, there is a key problem with the use of artillery projected smoke — we are trading off carrying capacity in rounds that kill people and destroy things for rounds that obscure them.

The artillery has never had a significant capability to sustain smoke operations, principally because the logistics system trade-offs do not permit. What we have works when we put it on the ground, but we run out it quickly, and it takes a lot of rounds to put out and maintain the kind of smoke that we normally want. This is another reason for placing a high priority on a ground system. If we spend a lot of research and development dollars to make a better smoke round, it is not likely to give us the leverage we can obtain in other ways. The largest part of our tactical logistics haul capacity is already used up in moving artillery ammunition. The weight and cube of artillery ammunition eats up huge quantities of transport, and that isn't going to change soon.

Mortars are a different story. I'm not sure that I wouldn't be just as happy with nothing but smoke in the basic load of mechanized mortars and a preponderance of it in others. If I were going to place emphasis on the development of an improved smoke round of some kind, I would do it for the mortar. In most cases I would prefer to have half of the mortar basic load as smoke. I am inclined to be willing to make a major trade-off of killing for smoke rounds in mortar platoons.

Make Better Smoke

Despite the fact that we should work on our offensive capability to see through smoke better, I am not convinced that the reverse, making ours less penetrable, is critical. I would opt for making what we have better rather than different. What we need is better smoke, longer duration, higher density, and smaller packages. From a tactical point of view, I do not see a lot of leverage in IR defeating smoke in the foreseeable future. The up-front efforts in smoke development likely to pay the biggest dividends do not need to search the horizon of technology. The fog of war together with a solid capability to produce a good fog will be more than enough.

At the lowest level, we already have some systems and they can be improved. The smoke grenades on our tanks can be improved radically. They don't throw out enough smoke and it goes away too fast. It doesn't burn very long on the ground. If they hit the ground and operated as mini smoke pots, things would be very different. A better combat vehicle grenade would probably be more valuable than developing one for use on a helicopter, simply because combat vehicles are going to stay in the direct fire engagement area and helicopters are not. In addition, we may not want to risk sending a helicopter out to produce smoke on a high intensity battlefield full of automatic weapons.

If the battalion commander has his own smoke capability because somebody has developed one that can be carried around in packages the sizes of footballs or smaller, he has an important capability, and doesn't have to call on a division asset in order to use it.

Most tank battalion commanders have experimented with the use of smoke from the vehicle engine exhaust systems for individual tank tactics and to supplement generators. Like other smoke, it's a two-edged sword which, if used inappropriately, simply gives away the position of the vehicle and provides an identifier on the battlefield for somebody to shoot at.

Used correctly, it can significantly decrease the probability of a vehicle being hit. There are situations in which we can conceal a combat vehicle inside a chunk of smoke. The enemy still knows the vehicle is there, but they don't know exactly where. For a tank commander, it beats having the enemy know exactly where he is, and the probability of hitting something under these conditions is low — the probability of hitting it in a critical place even lower.

While the catalyst for the Army's new-found interest in smoke is Fort Irwin, California, it can't stay just there. It's time for a full-scale awakening to this key combat multiplier, and this awakening is underway. 

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