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## Smoke Operations in 21st Century Warfare

by

Al Mauroni

As one examines the current role of smoke generators and obscurants on the joint battlefield, there has not been significant progression in the areas of smoke doctrine and employment since the late 1970s. A key indication is the fact that all current accounts of Operation Desert Storm have ignored the four major smoke missions utilizing theater mechanized and motorized smoke assets. One explanation is that current smoke systems are obsolete and incompatible with today's high technology armed forces and doctrine, in which case, future smoke systems will be limited to the smoke grenade launchers on armored vehicles. Another possibility is that battlefield commanders have not trained sufficiently with available systems to develop the tactics and experience to exploit the employment of smoke and obscurants on the front lines as well as in depth. I would argue that it is the latter reason more than the former, and that today's armed forces should review and revisit smoke operations in the interest of retaining a vital combat multiplier.

### Historical Employment of Smoke Systems

The successful employment of thermite and smoke mortar shells in World War I caused the Chemical Warfare Service (CWS) to continue research and development of smoke pots and generators. The main concern from the 1920s through the 1940s was the protection of strategic waterways, such as the Panama Canal and Great Lakes locks in Michigan, against the strategic bomber threat envisioned by so many military theorists. Shortly after Pearl Harbor, the CWS deployed stationary M1 oil generators to protect the Canal, locks and other important industrial sites. These generators were similar to smudge pots, generating oil-burning clouds within 20 to 30 minutes

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of being lit. Because of the weight and size of the M1 smoke generators, they remained at fixed points surrounding the Canal. As the U.S. military increased its overseas involvement, the CWS saw the obvious advantage to employing these systems in ports and harbors supporting theater military operations.

The M2 smoke generator, developed just prior to June 1944, allowed a more mobile employment of smoke generators around ports in Europe. Their lack of reliability still relegated them largely to fixed points, but the lighter weight allowed commanders to develop flexible options based on moving generators around the port perimeter, allowing for shifting weather conditions. Because the M2s used fog oil instead of pure oil, the volume of smoke and its staying power on the battlefield increased as the cost of smoke operations dropped.

Initially smoke generator companies were used to cover the Mediterranean Theater of Operations rear areas, such as the ports of Bizerte and Naples and the Salerno beaches, from enemy bombers and artillery. At Anzio, the 24th Decontamination Company and 179th Smoke Generator Company provided round-the-clock obscurity after U.S. forces landed. Enemy artillery effectiveness was greatly reduced once the smoke screen rose. After the invasion of Normandy, as the Germans retreated and blew bridges, smoke generator units screened the efforts of engineers building bridges over the many rivers in Europe. It became a regular Third Army standard operating procedure to use smoke generator units in front-line operations during river crossings and bridge building, which greatly increased Allied effectiveness in contested crossings.

The Korean War saw the same employment of smoke generators in rear areas, although it was rare that the new M3 smoke generators placed around Seoul had to obscure the city from enemy air operations. Development of the M3 smoke generator meant a much more reliable and efficient capability to support smoke missions. Chemical smoke generator companies remained in theater for the duration of the war to screen Seoul, Pusan and Inchon against potential North Korean air attacks. Had the enemy been able to penetrate the Air Force's screen, these units would have obscured the supply installations and harbors.

In addition to rear support functions, smoke units supported missions on the front lines at selected fixed points. In July 1951, the 68th Smoke Generator Company obscured the Kumhwa area to allow evacuation teams to recover lost vehicles while under enemy artillery fire. Near the end of the Korean War, during operations around Pork Chop Hill, American forces were forced to carry out construction, resupply and evacuation operations under the direct observation of North Korean troops. The 338th Smoke Generator Company provided a smoke screen for four months (November 1952 to February 1953), causing enemy fire to be largely ineffective. When the commander of the 7th Division terminated the mission (due to manpower shortages), enemy fire resulted in increased casualties. The commander promptly brought the smoke generators back, where they remained until July 1953.

After the Korean War, the four services' interest in smoke obscurants declined in proportion to their increased ability to dominate ground, air and sea operations through superior firepower. The Vietnam War did not call for the doctrine of obscuring ports and rear-area supply centers from enemy air and artillery forces. Some units used helicopter-mounted M52 smoke generators to screen the insertion of airmobile troops, but there was no call for large area coverage smoke missions. The use of both smoke generators and smoke projectiles decreased, although the use of smoke grenades increased dramatically. However, these were used more for signaling than for obscurity. It was not until after the U.S. military studied the lessons of the Arab-Israeli War of 1973 that they discovered the continued and more urgent need for tactical obscurity. The Syrian army had used smoke to

obstruct the view of Israeli artillery observers on the Golan Heights. The use of smoke screens also greatly reduced tank fatalities from antitank guided missiles.

The increasing lethality of antitank munitions began to emphasize the mantra, "If you can see a target, you can kill it." This drove the search for smoke systems that supported mobile front-line forces.

Tankers had embraced the smoke grenade launchers as a vital part of their survival options and requested additional smoke support. In response, the Army developed the Vehicle Engine Exhaust Smoke System (VEESS), which would allow the tank crew to dump diesel fuel (0.6 to 0.9 gallons per minute) into the engine exhaust, producing a dense, white smoke. This allowed moving tanks to quickly generate an obscuring smoke screen to confuse antitank crews attempting to target them. Scientists at Edgewood Arsenal in Maryland later developed new infrared-defeating smoke obscurant materials (eventually incorporated into smoke grenade launchers and smoke generator systems). In December 1983, Edgewood Arsenal engineers type-classified the M825 projectile (smoke, WP [White Phosphorus], 155mm), returning smoke capabilities to modern artillery units.

Jeeps hauling M3A3 smoke generators had always been vulnerable due to their need to stop before initiating smoke operations, making them potential targets for enemy artillery. Their abilities to provide obscurant support in front of friendly forces became increasingly hazardous. To better provide this capability, the Army's PM (program Manager) Smoke Organization developed a mechanized smoke generator system, using M113A2 chassis and two modified M3A3E2 smoke generators linked together and fed from a 120-gallon fog oil tank. The XM1059, as it was known, would provide smoke on-the-move on the front lines, protected by the M113A2 chassis armor. In an effort to get away from the towed trailer concept, this new smoke system was also incorporated into a light armored High Mobility Multipurpose Wheeled Vehicle (HMMWV, or humvee) design for use in the light divisions and rear combat areas. These new capabilities began joining divisions throughout the force in the mid- to late-1980s, leaving very little time prior to the Gulf War for commanders at all levels to learn how to best utilize these assets.

## **Operation Desert Shield/Storm**

Development of dual-purpose smoke generator/decontamination chemical defense companies meant that division commanders had two capabilities for the price of one. Commanders could decide to either use their smoke assets to obscure vulnerable rear areas and airstrips or retain the units for decontamination operations. Both the 82d and 101st Airborne Divisions have smoke/decon platoons in their division chemical companies, which deployed early in the mobilization phase both to obscure rear-area logistics sites and airfields and to support division decontamination operations. To support multiservice theater needs, the 761st and 59th Chemical Companies (both dual-purpose smoke/decon units) joined Army Central Command (ARCENT) in the Gulf in September 1990. In January 1991, the 46th, 84th and 172d Chemical Companies (mechanized smoke generator units) joined ARCENT primarily to support VII Corps.

The 2d Chemical Battalion held a smoke demonstration at King Fahd International Airfield in Saudi Arabia on December 13-15, 1990. Central Air Force Command (CENTAF) had always been concerned about the chance that an Iraqi air attack might sneak in with chemical-biological agent munitions. The AirBase Operations office at Eglin Air Force Base, Florida, suggested obscuring the airport with fixed smoke generators. The 761st and 59th Chemical Companies' smoke generator platoons generated both a covering smoke haze over the airfield and a smoke curtain before the

airfield. Smoke screens would work best early in the morning or late in the evening, while smoke curtains would be better in the midday heat. Seventy-two smoke generators on 36 humvees participated.

A-10s from the 354th Tactical Fighter Wing simulated the Iraqi air force for the demonstration. Once the attacking planes were sighted, smoke generator platoons had 15 minutes to make smoke. On the first morning run, the pilots found that the only thing their weapon systems would lock onto was the control tower, jutting out of an immense sea of white smoke. On the second run, low-flying A-10s came up against a towering smoke curtain, located just prior to their munitions release point. The A-10s had to climb over the smoke curtain (not knowing what was on the other side), and ran directly into the sights of an air defense Stinger team. The one- to two-second disruption gave the Stinger teams time to lock on and "kill" the attacking A-10s before they could lock onto the airfield targets. The smoke demonstration worked so well that the 59th Chemical Company had to leave a smoke platoon at the airfield for the duration of the air phase of Desert Storm.

The 2d Chemical Battalion staff worked with the two corps to identify options to support the planned movement of the corps to the western tactical areas. The U.S. Central Command (CENTCOM) commander's intent was to hold the enemy's attention to Wadi al Batin and east of the wadi during the movement. A ground maneuver force, mixed liberally with realistic tank and armored personnel carrier (APC) decoys, would move near the front lines east of the wadi. The 59th Chemical Company would provide large-area smoke to cover the deception force, confusing the Iraqis on its real size and location.

Both corps initiated their movements after the air offensive began. This was an extremely vulnerable time for CENTCOM. XVIII Airborne Corps was lined up along Tapline Road, a single hardtop surface road that paralleled the border. As 113,000 troops and thousands of vehicles traversed the road, nervous soldiers could only hope that the Iraqis did not detect their movement. Potential casualties aside, a few Iraqi SCUD missiles impacting on the Tapline Road with persistent chemical agents would have disrupted the movement plan considerably. The task force in the al Batin area, with its decoys and large-area smoke, successfully misled the Iraqi forces into looking for a straight-up-the-middle attack into Kuwait; only one Iraqi division deployed west of the wadi after the deception operation.

With the force in place on February 20, deception operations continued. Mechanized smoke generators of the 68th and 44th Chemical Companies supported the 1st Cavalry Division's battlefield deception teams, who had set up loudspeakers and pop-up replicas of M1A1 tanks and M2 Bradley Fighting Vehicles around the Wadi al Batin. Under Operation Knight Strike, Task Force 1-5 of the 1st Cavalry Division struck up the wadi in an attempt to convince the Iraqi force that the main attack would orient on that terrain. Division artillery "prepped" the Iraqi side of the berm as the engineers moved up. Two mechanized smoke generator platoons covered the eight lanes blasted through the berm, allowing the task force to move into the wadi with relatively good obscurant cover. Artillery-delivered smoke projectiles added to the obscuration as the force pulled back. In contrast, on the same day the 1st Infantry Division attempted to conduct a fake breach further west of the 1st Cavalry Division attempt, but without smoke support. They immediately came under hostile fire and withdrew without breaching the berm. This lack of smoke support would undermine the 1st Infantry Division's plans for its offensive operations.

Since the 1st Infantry Division operation was the main initial effort of VII Corps, CENTCOM assigned two mechanized smoke generator companies to support berm-busting operations on the first day of the ground offensive. The concern was that the Iraqis would hit VII Corps units with chemical munitions as they attempted to clear their breaches; smoke obscurants would lessen the ability of

artillery units to target the engineers and following units. Intelligence reports noted Iraqi armor units pulling away from the 1st Infantry Division sector, leaving Iraqi infantry units vulnerable to a hard-hitting combined arms force. Comfortable in the knowledge the Iraqi infantry had nothing that would penetrate the front armor of an M1A1 tank, tanks outfitted with mine plows could punch through the minefields before the Iraqis could react with chemical weapons. The plan would not require extensive smoke and engineer support at the onset of the battle.

Chemical officers developed an alternate smoke plan that would employ the smoke generators on the division's east flank. This could obscure the division's flank as the 2d Brigade breached the berms. The 2d Armored Cavalry Regiment and 3d Armored Division planned to obscure their breaches west of the 1st Infantry Division's position. The 172d Chemical Company would support both units by dropping an obscuring haze over engineers blowing lanes through the berm. On February 24, severe weather — a smoke unit's true foe — halted all smoke operations. Meeting no resistance or artillery fire at the breach, the divisions were able to quickly move through the berms. The 1st Division had successfully gambled to exclude smoke support; had there been Iraqi artillery and a counterattack planned, the operation might have gone the other way.

Once the 2d Chemical Battalion had concluded its operations in support of the 1st Infantry Division breach, VII Corps tasked them to move forward to support 3d Armored Division and 1st Armored Division. Unfortunately, it took two days for the M1059 smoke systems to catch up to the armored units and rest and refuel for continued operations. By then, the Gulf War was over.

One last example of smoke support comes from the Iraqis. As the main site of the Iraqi nuclear research program, Tuwaitha had been an especially well-protected target, surrounded by surface-to-air-missile (SAM) batteries, antiaircraft guns and sand berms. Several F-117s had bombed the reactors and laboratory on the first day, but the goal was to have the installation flattened. F-16s flew out to level the remaining buildings. As they approached the facility, the Iraqis lit several smoke pots, effectively concealing the buildings from view. This, combined with the antiaircraft fire and SAMs lofting skyward, stopped the F-16s from bombing the targets without risking collateral damage. Consequently, the allies had to rely on the Tomahawks and F-117s to knock out Tuwaitha.

## **Today's Mission Requirements and Solutions**

These recent examples illustrate the continued potential of smoke and obscurant systems on the modern battlefield for units on land, sea and air. In order to identify how the armed forces of the 21st century might employ smoke, we should use the Joint Chiefs of Staff's "Joint Vision 2010" as a template for discussion. This vision outlines four new concepts to guide future military operations toward full spectrum dominance: dominant maneuver, precision engagement, full-dimensional protection, and focused logistics.

Dominant maneuver argues that forces can outmaneuver and outpace opposing forces, allowing the commander to bring widely dispersed air, sea and land forces to converge on enemy weak points. Smoke operations will continue to play a role in deception operations that mislead opposing forces as to the exact whereabouts of U.S. armed forces, blind the opposing forces to our fighting positions, and screen air and sea assets against enemy observation. Operation Desert Storm experiences have convinced Air Force and Navy program offices to investigate smoke generator systems for airfield and amphibious operations. If smoke operations are to support ground forces in fast-moving offensive operations, the armed forces will have to invest in a more capable chassis than the vulnerable M113A2 armored personnel carrier. The Gulf War clearly showed that the current

mechanized smoke system cannot keep pace with today's modern force. A second option is the use of projected smoke. This can take a variety of forms, from modified APCs with smoke rocket launchers to increased support for smoke artillery projectiles. This will require coordination between the Chemical and Artillery Schools to resolve doctrinal and operational issues.

Precision engagement relies on an array of systems that can locate and identify targets, send forces to destroy enemy targets, assess battle damage, and reengage targets if required. The Chemical Corps has already demonstrated a capability to use infrared and millimeter wave obscurants in addition to visual smoke. Potential adversaries can be expected to continue their efforts to decrease the U.S. military's high-technology advantage; further U.S. research into infrared and millimeter wave obscurants is necessary to develop targeting systems and observation platforms capable of penetrating enemy obscuration.

Full-dimensional protection calls for a multitiered defensive system providing full awareness of threats to mobile and maneuvering U.S. forces. This is the traditional "bread-and-butter" mission of smoke units, to provide smoke screens and blankets throughout the battlespace to support the commander's concept of operations. Future smoke missions that answer this requirement will not differ from those observed in the Gulf War.

Focused logistics includes the fusion of information, logistics and transportation technologies that support U.S. armed forces. While smoke operations do not directly support logistics, smoke generator units must ensure the theater can continue to support their ability to generate and sustain large-area smoke missions. One bright lesson of the Gulf War was that only smoke generator units used fog oil. No other units competed for this particular resource, which enabled prompt and accurate logistics support. What must be added is the constant development and transmission to smoke units of weather data that will enable unit commanders to maneuver at the right time and place.

## **Summary**

Smoke operations have evolved from rear-area support missions to direct support of front-line maneuver units. Lessons from Operation Desert Storm suggest that smoke missions will continue to have capabilities that influence operations throughout the theater. How today's, and more importantly, tomorrow's commanders will utilize these combat multipliers remains an unknown, since the majority of smoke generator companies remain in the reserve force. We need to study these recent examples, examine the current and future capabilities of smoke generator systems and, most importantly, identify how future commanders can develop the tactics that will make armed forces more survivable in the 21st century battlespace. We need to encourage increased realistic training and doctrine development between maneuver commanders and their chemical companies to develop expertise and confidence in new smoke systems. This active interest will keep smoke operations where they traditionally have been, supporting combat operations throughout the theater as a vital combat multiplier for the next century's force.

(Mr. Al Mauroni is a former Chemical Corps officer with seven years of active duty, and is currently a management consultant with Booz-Allen & Hamilton, Inc.)

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