



M56 Smoke System. (Photo provided by Tropic Test Site, Panama.)

M56/M58 Smoke Systems

—visual and infrared obscuration

By CPT Alysia Cramer

The fielding of the motorized M56 and the mechanized M58 smoke systems will fulfill the Army's need for mobile smoke systems that can selectively provide visual and infrared obscuration. Field commanders identified this need after *Operation Desert Shield* and *Operation Desert Storm*.

Little did commanders and chemical soldiers know that work on a new motorized smoke system began in 1985. With the onset of a Force XXI Army and its use of technology to maintain an edge in projecting, protecting, sustain-

ing, and employing combat power, the new system must defeat all infrared systems of the enemy and the mechanized model must keep pace with the main battle forces. This article will explain why the Army needs a new system, discuss the history of the development of the M56 and M58 systems, and discuss basic system characteristics.

Smoke generators are the only large-area smoke devices available to field commanders. The mechanical smoke generator is used to vaporize fog oil,

which condenses when it strikes the cooler ambient air to form a white smoke cloud. The current fielded M157 smoke generator is mounted on an M1037 HMMWV or on the mechanized version of the M1059 smoke track (M113A2) and both systems produce mobile or static smoke. A big disadvantage to these systems is that they only defeat the visual and near infrared systems of the enemy. Although the M56 cannot keep pace with the main battle forces, it, along with the M58, defeats visual as well as the



M56 Smoke System. (Photo provided by Visual Information Division, CBDCOM.)

infrared systems of the enemy and will have the future capability of defeating enemy millimeter wavelength systems.

Why does smoke work?

FM 3-50, *Smoke Operations*, states "Smoke placed between a target and viewer degrades the effectiveness of that viewer by interfering with the reflected electromagnetic radiation. Smoke clouds reduce target-to-background contrast, making targets more difficult to detect." Currently, fog oil smoke can produce effective obscuration of the visual through near-infrared portions of the electromagnetic spectrum. The new smoke generator system uses multispectral obscurants that defeat or degrade multiple portions of the electromagnetic spectrum.

Development

The smoke system used on both the M56 and M58 systems was contractor-developed with government guidance and testing. After the Gulf War, commanders realized that potential threat countries were introducing weapons that operated in the visual, infrared, and MMW regions of the electromagnetic spectrum. The idea that began in

1985 for the development of an improved motorized smoke system was revised to include the mechanized version of the smoke system, or M58.

According to an in-process review packet published by the US Army Chemical and Biological Defense Command (CBDCOM), TRADOC published a Required Operational Capability Memorandum in 1993 and chose the expedient "in-house" development program for the mechanized smoke systems.

Instead of spending a lot of time and money, the idea allowed contractors to develop new smoke generators and combine them with M113 tracks already in the Army system. The "in-house" system fabricated M58 mechanized systems starting with unserviceable M113A2 chassis identified as excess. The M113A2s were upgraded to M113A3s and then the smoke generator systems were integrated to make the M58 system. Red River Army Depot was given the mission producing the "in-house" system and the Project Manager for Smoke/Obscurants (PM Smoke) for the smoke generator components.

The motorized smoke generator

system uses a gas turbine engine mounted on an M1113 HMMWV. The M56 started out as a dual-purpose smoke/decon system but the Chemical School dropped the requirement for a hot water decon system in 1989. The M56 ended up as a HMMWV smoke-only system and the Chemical School adopted the XM22 high-pressure washer that is now part of the modular decon system.

Testing of the smoke generator was conducted at Yuma Proving Ground, Dugway Proving Ground, White Sands Missile Range, Cold Regions Test Center, Tropics Test Site, and Aberdeen Test Center between 1991 and 1994. These tests

verified the reliability of the M56/M58 systems and validated the systems' survivability and operation in electromagnetic environmental effects. In December 1993, an M58 underwent testing at Fort Hood, Texas, for one month. Three separate crews operated the vehicle and smoke generation system during a field training exercise. Six M56 systems were operationally tested at Fort McClellan during June 1994.

System Characteristics

The in-process review packets published by CBDCOM also cited the characteristics of each system. The new smoke generator provides visual and infrared obscuration on the battlefield. The generator is a modular system and uses a gas turbine engine as a power source to disseminate obscurants to the atmosphere. The system has five components which work together in providing obscuration for friendly forces and denying the enemy information about friendly activities.

The power module runs on JP or diesel fuels and uses a gas turbine engine that provides electrical power and hot air to operate the system. The

infrared module consists of an infrared material hopper, a grinder, a material transport hose, and an air ejector. The hopper holds 360 pounds of graphite (infrared material) and the graphite size is reduced in the grinder and then the air ejector disseminates the graphite into the atmosphere. The visual module uses the same principle as the M157 generator except a turbine engine vaporizes the fog oil.

The M58 system has a 120-gallon fog oil tank and the M56 system has two 62-gallon fog oil tanks. The IR and visual modules can operate at the same time. The control module consists of a control panel, motor controllers (fog oil pump and infrared grinder) and electrical cables. The M56 control panel is mounted in the cab of the M1113 and will allow remote operation of the generators from inside the vehicle by the operator or the driver. The MMW module is a future development that will use carbon fibers to screen enemy

millimeter radiation. The M56 system also consists of a frame that provides mounting locations for the power, visual, and infrared models.

As compared to the one-hour visual screen capability of the M157 generator, the turbine smoke generator is 50 percent better. The fog oil for visual obscuration burns at a rate of 1.3 gallons per hour. The graphite for IR obscuration is disseminated (not burned) into the atmosphere at a rate of 10 pounds per minute or 600 pounds per hour. The system is capable of producing 90 minutes of visual smoke and 30 minutes of infrared. The generator system burns 12 gallons of diesel fuel per hour.

The infrared obscurant, graphite, is distributed in 30-pound bags and fog oil is still distributed in 55-gallon drums.

Add-ons for the M58 mechanized system include SINCGARS, the M8A3 gas particulate filter, 66mm smoke grenade launchers, and a driver's thermal

night viewer, which defeats the enemy visual obscuration clouds.

The M56 motorized system along with the trailer-mounted XM22 high-pressure washer will replace the current M1037 with trailer-mounted M17 Sanator for dual-purpose chemical companies.

Environmental Impacts

The Office of the Product Manager for Smoke/Obscurants published a Life Cycle Environmental Assessment in October 1992 which evaluated the impacts anticipated from the turbine-operated smoke generator development and use in peacetime training. Overall, the system does not violate any plans, policies, laws, or controls of either the Federal, state, or local land and water use. Fog oil and graphite do not display any hazardous waste characteristics stated by the Resource Conservation and Recovery Act and neither one of them is listed as a hazardous waste.



M58 Smoke System. (Photo provided by Visual Information Division, CBDCOM.)



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The transportation of fog oil, graphite, and carbon filters used by the future MMW module are not regulated as hazardous materials by the Department of Transportation. The 66mm smoke grenades will be labeled and transported as explosives.

Funding and Fielding

Eight M56 systems were provided to the Chemical School in March 1997 as part of a training release. The full release is planned in September 1997 and First Unit Equipped to the 18th Airborne Corps will take place by October 1997. The current program funding will produce 333 M56 systems for Force Package One units at a cost of approximately \$141,000 per system.

One hundred and forty M58 Mechanized Smoke Systems will replace the currently fielded M1059 systems in training and tactical Force Package One units. The unit cost for

140 M58s is \$308,000. Delivery of the systems will occur to units between FY97 and FY00.

All units will receive the smoke generator system at the ratio of one smoke generator system for one M157 or M1059 generator.

Changes in the Chemical Company Mission?

Upcoming fielding plans for dual-purpose companies include mounting the smoke generator system on HMMWVs and towing the trailer-mounted Modular Decontamination System. These systems will be capable of performing mobile or stationary smoke operations, as well as operational and thorough decon operations. Mechanized smoke units will continue to operate in the main battle area, with limited operations in the covering force area, performing mobile or stationary smoke in support of heavy divisions.

Additional military occupational skills or chemical soldiers (as stated by MTOE) are not required to operate or repair the M56/58 systems. New equipment training on the system by PM Smoke will occur as units receive them from FY97 through FY00.

Conclusion

The development of the M56/58 smoke generator system is evidence of the Army's Force XXI plan to redesign its combat power to meet the challenges of a changing world in the 21st Century. Both the M56 and the M58 provide improved safety and operational capability to the soldier and allow field commanders a decisive edge on

today's modern battlefield.

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—Editor

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