

## **DF** **METHYLPHOSPHONIC DIFLUORIDE**

Pine Bluff Arsenal produced the precursor chemical methylphosphonic difluoride, or DF, at its Integrated Binary Production Facilities (IBPF) in the late 1980s and early 1990s as part of the United States' Binary Chemical Weapons Program. Binary munitions contain two non-lethal chemicals that mix together in flight to form a lethal chemical.

The Army completed its DF destruction mission at Pine Bluff Arsenal in April 2006 in accordance with U.S. international treaty obligations.

Operators filled M20 canisters with DF, a clear, non-lethal liquid chemical with a strong acidic odor. The M20 canister was designed to be inserted into an artillery projectile on the battlefield. The projectile also contained an M21 canister filled with a solution of isopropyl alcohol and isopropylamine (OPA).

The projectile consisted of a steel body containing a burster, fuze and two plastic-lined, hermetically sealed metal canisters containing the solutions. Once fired, disks in the canisters would rupture, allowing the DF and OPA to mix, forming the lethal nerve agent GB (sarin). The explosive burster would then shatter the projectile's steel body, spreading agent onto a target area.

This artillery projectile was the only binary chemical munition produced by the United States. International treaty now bans the production and stockpiling of chemical weapons and calls for their destruction, including binary chemical munitions.

### **DF Storage**

Officials stored the DF-filled M20 canisters separate from the projectiles containing the OPA-filled M21 canisters at Deseret Chemical Depot, Utah, and Umatilla Chemical Depot, Oregon. The destruction of the projectiles and M21 canisters ended at Hawthorne Army Depot,

Nevada in 1999. All M20 canisters and several 55-gallon drums of DF were sent to Pine Bluff Arsenal, Arkansas, for destruction.

### **Neutralizing DF**

For the treatment process, the Army renovated a building at PBA that was intended to fill binary munitions but was never used for that purpose. The renovated building became the Pine Bluff Binary Destruction Facility (PB BDF), where operations to neutralize DF and the chemical QL began in December 2005.

DF is neutralized by adding water. The wastewater from the neutralization process, while free of DF, contains hazardous byproducts that require additional treatment before disposal. Operators at PBA shipped the estimated 155,000 gallons of DF neutralant waste to a permitted hazardous waste disposal facility in Texas.



*The DF destruction mission was completed in April 2006. After completing its QL destruction mission in September 2006, the Army demolished the PB BDF, shown here, in accordance with U.S. international treaty obligations.*

