



## U.S. ARMY CHEMICAL MATERIALS AGENCY

# Monitoring Ensures Protection for Workers, Public and Environment

Safety is the primary concern in the storage and disposal of chemical agents and munitions. To provide the best protection possible, the U.S. Army Chemical Materials Agency (CMA) uses monitors extensively at each site where agent is stored and/or destroyed. These monitors are extremely sensitive in detecting low-level agent concentrations and alarm when agent is detected, giving workers time to put on protective masks and safely exit the area.

Monitoring stations are placed in chemical stockpile storage areas and many areas of the disposal facilities, such as process rooms, observation corridors, chemical agent munitions receiving areas, drain stations, neutralization bays, individual furnace ducts and the common exhaust stack for all of the furnaces. As an added safety measure, monitors are also located in all disposal facility ventilation systems to include ducting, filters and the exhaust stack. Extensive monitoring ensures timely notification to ensure the safety of workers, the surrounding community and an environment in the event of a chemical release.



*Automatic Continuous Air Monitoring System*

Monitors are set to detect one of three different chemical agents – nerve agents GB and VX and mustard agent HD. While each monitor detects only one type of agent, multiple monitors are installed in facilities that handle more than one



*MINICAMS®*

agent or have in the past, so that different agents can be monitored for at the same time, in the same area.

### Types of Monitors Used

CMA uses different types of monitors at its chemical weapons storage and disposal facilities to accommodate distinct monitoring functions:

- Near real-time monitors, such as the Automatic Continuous Air Monitoring System (ACAMS) and MINICAMS®
- Confirmational historical monitors, such as the Depot Area Air Monitoring System (DAAMS)
- Mobile monitoring vehicles, such as the Real Time Analytical Platform (RTAP)

Near real-time monitors and confirmational historical monitors are used for work performed at storage and disposal facilities. The DAAMS is also used at permanent perimeter monitoring stations around most disposal facilities and storage sites. Mobile monitoring vehicles are used in a variety of situations.

Regardless of whether the monitoring equipment is mobile or at a permanent station, monitor readings for agent levels are permanently recorded so that experts can review data.

For more information, contact the CMA Public Affairs Office at (410) 436-3629 (800) 488-0648

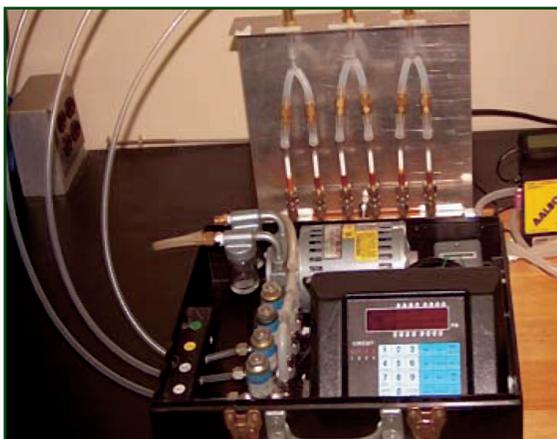
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### Near Real-Time Monitors

Near real-time monitors are automatic, continuous air monitors that sample air, then analyze the sample and display and record the results. Depending on agent type, cycle time is three to 10 minutes, which means that samples are collected continuously during this time frame then analyzed. Near real-time monitors use gas chromatography technology, a process that separates compounds in air samples to detect and report extremely low levels of chemical agents. If they detect any amount of agent exceeding the allowable levels established by regulations and CMA guidelines, then local and remote audible and visual alarms are triggered.



Depot Area Air Monitoring System (DAMS)

### Confirmational Historical Monitors

Confirmational historical monitors, like DAAMS, continually sample the air for chemical agent to quantify or confirm agent reading data collected from near real-time monitors, such as ACAMS. DAAMS monitors draw air through special glass tubes and trap any chemical agent that may be present in a special material. Samples times for DAAMS range from once every few minutes to once every 12 hours. The tube samples are then collected and analyzed at an on-site laboratory to confirm agent readings from near real-time monitors located in the same area as the DAAMS, or to give a historical record of monitoring in areas not monitored by near real-time monitors.



Real Time Analytical Platform (RTAP)

### Monitoring Capabilities

The chemical agent monitors (near real-time and confirmational) are capable of accurately detecting nerve agents VX and GB and blister agent HD at extremely low concentration levels (parts per trillion range). This is far more sensitive than the levels set by the U.S. Centers for Disease Control and Prevention as being safe for the general population. Essentially, if the monitors were looking for bad apples, they could easily detect one bad apple hidden in 2 million barrels of good apples.

### Mobile Monitoring Vehicles

Due to the number and location of storage buildings at some sites, ACAMS, DAAMS and MINICAMS® are configured into an easily transportable setup called RTAP. RTAP is a specially equipped van—containing ACAMS, DAAMS and MINICAMS as well as the necessary support equipment such as process gases, power generators, sample lines and supplies—that is driven to the building or area that needs to be monitored in order to sample and analyze for the presence of nerve and mustard agents. The system can accurately and rapidly detect agent levels lower than those that would affect unprotected persons within 15 minutes. It is also used in emergency situations to determine agent release and information on the size, direction and travel speed of an agent plume in the unlikely event of a chemical accident or incident. Proper operation of the RTAP is verified using strict quality control procedures. Specific RTAP configurations may vary

## Monitoring Ensures Protection for Workers, Public and Environment (continued)

### Interferents

*Some ordinary substances such as agricultural sprays, garlic, diesel fumes or perfume can cause the monitors to alarm. Initially, all agent alarms are treated as real until laboratory analysis of air samples from the DAAMS determines the presence or absence of chemical agent.*

from site to site depending on how it will be used and the type of agent being stored.

### Monitor Calibration and Quality Control

Part of the monitoring process is to ensure monitors are working properly and to reduce the number of false alarms. Near real-time monitors are tested at least once a day by highly-skilled technicians using diluted agent. Monitors must alarm showing the correct level of agent, or they are repaired or replaced. As an extra precaution to ensure the safety of the public and the environment, monitors on the common exhaust stack for the furnaces at each incineration disposal facility are tested every four hours. For historical monitors like DAAMS, there are scheduled inspections and quality checks to confirm proper functioning. Also, quality control samples are performed to verify the accuracy of laboratory analyses of DAAMS tubes.

At research and disposal facilities, monitors are used for substances other than chemical agent. This monitoring equipment includes Continuous Emission Monitoring Systems (CEMS) and Total Hydrocarbon Analyzers (THA).

- Continuous Emission Monitoring Systems are used on furnace ducts and the common exhaust stack at incineration disposal facilities to monitor levels of carbon monoxide, carbon dioxide, nitric oxide, oxygen and sulfur dioxide. They ensure efficient processing and emission compliance with environmental permits and regulations. CEMS are tested regularly to ensure they function properly. If these monitors alarm, automated systems shut down the facility to avoid emissions unacceptable to regulatory standards.
- Total Hydrocarbon Analyzers are used at neutralization disposal facilities. THA are located in the ventilation ducts and stacks and monitor for organic compounds produced in the neutralization process. State environmental statutes typically regulate the use of THA. Like CEMS, THA also ensure efficient processing. THA

are tested and inspected regularly to ensure they function properly.

### Advanced Monitoring Technology

The Army has decades of experience with monitoring technology and is committed to using the best technology at its chemical weapons storage and disposal sites. Though monitoring technology used currently at CMA sites was developed in the early 1980s, it remains the best technology available; recent technologies have not demonstrated the ability to monitor as accurately at the required low detection levels. CMA has an ongoing program to find and test new monitoring technologies for its sites and facilities to ensure we are using the best technology to protect workers, the public and the environment.

### Oversight and Health Standards

There are several groups and agencies, independent of CMA, which oversee and help with chemical agent and munitions monitoring. These groups include the U.S. Department of Health and Human Services' Centers for Disease Control and Prevention, the National Academy of Science's National Research Council, state regulatory agencies, along with scientific and technical experts from industry. These groups support CMA's dedication to using the best monitoring technology and processes to protect the workers, the public and the environment while safely storing and disposing of the nation's stockpile of chemical agent and munitions to create a safer tomorrow.