ATTACHMENT 5- AGENT AND AIR MONITORING

5.1 General Monitoring Conditions

Air monitoring results must meet required vapor screening levels (VSLs) identified for each waste in Table 3 or further treatment must be conducted. All monitoring shall be conducted in accordance with the approved sampling and analysis plan and the site specific monitoring plan.

Monitoring shall be conducted by a laboratory that meets the requirements to conduct chemical air monitoring established by RCMD. Monitoring provisions of this Permit shall also apply.

Air monitoring using the VSLs in Tables 8 and 13 shall be used to screen solid wastes to ensure they meet the required treatment levels before they are shipped off-site to a permitted TSDF.

Air monitoring shall follow the protocols in Attachments 1, 4, 5, 6 and 7 and related SOP's.

The Permittee shall perform all monitoring for chemical agent at levels required for unmasked workers, designated as "no respiratory protection" in the airborne exposure limit (AEL) tables.

During operations, continuous near real-time (NRT) monitoring and historical monitoring will be performed.

The Permittee shall perform monitoring at the short-term exposure limit (STEL) in areas where worker protection monitoring is conducted. Because the NRT monitors measure and report the concentration at the vapor screening level (VSL), the STEL shall be manually calculated using this concentration reported by the NRT monitor to determine if the STEL has been exceeded.

The VSL shall be for applications and/or locations that require monitoring for an environmental release, engineering controls (for example, filters), process upset condition, or vapor decontamination classification monitoring. The VSL is a concentration-only value and does not consider the analytical method's sampling duration other than to determine the volume of air sampled to calculate the analyte concentration.

5.2 Respiratory Protection Standards

The Permittee shall comply with the respiratory protection noted based upon the AELs for chemical agents in Table 16, 17 and 18.

Table 16 – AELs for H/HD/HT

H/HD/HT	Averaging Time					
	WPL (12 hours)	WPL (8 hours)	WPL (4 hours)	WPL (2 hours)	STEL[a] (15 minutes)	Variable
No Respiratory Protection	2.7×10^{-4} mg/m^3	4×10^{-4} mg/m^3	8×10^{-4} mg/m^3	1.6×10^{-3} mg/m^3	3×10^{-3} mg/m^3	
Air-Purifying Respirator	Use only in accordance with Army/NIOSH approval and restrictions on use.					
M40-Series Mask[b]	1.0×10^{-3}	1.5×10^{-3}	3.0×10^{-3}	6.0×10^{-3}	3.0×10^{-2}	
Supplied-Air Respirator w/o Escape Bottle	0.27 mg/m^3	0.4 mg/m^3	0.4 mg/m^3	0.4 mg/m^3	0.7 mg/m^3	
Self-Contained Breathing Apparatus or Supplied-Air Respirator with Escape Bottle	2.7 mg/m^3	4 mg/m^3	8 mg/m^3	16 mg/m^3	30 mg/m^3	
Vapor Screening Limit						3×10^{-3} mg/m^3

Notes:

[a] Exposures at the STEL shall occur not more than one time per day.

[b] Use of the M40-series mask in sulfur mustard operations (in addition to escape purposes) is authorized by Exemption #CMA-HD-2, Use of the M40-series Mask in Mustard Operations. Any organization or contractor applying this exemption to its operations shall maintain a copy on file in its safety office.

Airborne exposure limits (AELs) are taken from the U.S. Army Chemical Materials Agency Programmatic Monitoring Concept Plan (MCP) and 69 FR 24164-24168 (3 May 2004).

All AELs are concentration and time values, not concentration only values. Administrative controls may be used to limit potential exposure to workers. However, because administrative controls cannot be used to limit the duration of potential public exposure, only the WPL protective action level is significantly affected by administrative controls, which limit the duration of potential exposure.

The maximum use concentration is the product of the AEL and the assigned protection factor for the respirator. The assigned protection factors used in this table are taken from 68 FR 34036-34119, 6 June 2003. For sulfur mustards, air-purifying respirators are for escape purposes only.

H = Levinstein mustard

HD = distilled sulfur mustard

HT = mustard-T mixture

mg/m^3 = milligram per cubic meter

NIOSH = National Institute for Occupational Safety and Health

STEL = short-term exposure limit

WPL = worker population limit

Table 17 – AELs for HN-3

	Averaging Time					
HN-3	WPL (12 hours)	WPL (8 hours)	WPL (4 hours)	WPL (2 hours)	STEL (15 minutes)	Variable
No Respiratory Protection	3×10^{-3} mg/m^3	3×10^{-3} mg/m^3	3×10^{-3} mg/m^3	3×10^{-3} mg/m^3	3×10^{-3} mg/m^3	

Air-Purifying Respirator	For nitrogen mustards, air-purifying respirators are for escape purposes only.					
Supplied-Air Respirator w/o Escape Bottle	0.4 mg/m^3	0.4 mg/m^3	0.4 mg/m^3	0.4 mg/m^3	0.7 mg/m^3	
Self-Contained Breathing Apparatus or Supplied-Air Respirator with Escape Bottle	30 mg/m^3	30 mg/m^3	30 mg/m^3	30 mg/m^3	30 mg/m^3	
Vapor Screening Limit						3×10^{-3} mg/m^3

Notes:
Airborne exposure limits (AELs) are taken from Army Regulation 385-61 (12 October 2001).

All AELs are concentration only values, regardless of duration. Personal protective equipment (PPE) may be used to limit potential exposure to workers.

HN-3 = nitrogen mustard

mg/m^3 = milligram per cubic meter

STEL = short-term exposure limit

WPL = worker population limit

Table 18 – AELs for GB/GA

	Averaging Time					
GB/GA	WPL (12 hours)	WPL (8 hours)	WPL (4 hours)	WPL (2 hours)	STEL[a] (15 minutes)	Variable
No Respiratory Protection	2×10^{-5} mg/m^3	3×10^{-5} mg/m^3	6×10^{-5} mg/m^3	6×10^{-5} mg/m^3	1×10^{-4} mg/m^3	

Air-Purifying Respirator	1×10^{-3} mg/m^3	1.5×10^{-3} mg/m^3	3×10^{-3} mg/m^3	3×10^{-3} mg/m^3	5×10^{-3} mg/m^3	
Supplied-Air Respirator w/o Escape Bottle	2×10^{-2} mg/m^3	3×10^{-2} mg/m^3	6×10^{-2} mg/m^3	6×10^{-2} mg/m^3	1×10^{-1} mg/m^3	
Self-Contained Breathing Apparatus or Supplied-Air Respirator with Escape Bottle	2×10^{-1} mg/m^3	3×10^{-1} mg/m^3	6×10^{-1} mg/m^3	6×10^{-1} mg/m^3	1 mg/m^3	
Vapor Screening Limit						1×10^{-4} mg/m^3

Notes:

[a] Exposures at the STEL shall not occur more than four times per day, and at least 60 minutes must lapse between successive exposures.

Airborne exposure limits (AELs) are taken from Army Regulation 385-10 (September 2007) and 68 FR 58348-58351 (9 October 2003).

All AELs are concentration and time values, not concentration only values. Administrative controls may be used to limit potential exposure to workers. However, because administrative controls cannot be used to limit the duration of potential public exposure, only the WPL protective action level is significantly affected by administrative controls, which limit the duration of potential exposure.

The maximum use concentration is the product of the AEL and the assigned protection factor for the respirator. The assigned protection factors used in this table are taken from 68 FR 34036-34119, 6 June 2003.

GA = tabun

GB = sarin

mg/m^3 = milligram per cubic meter

STEL = short-term exposure limit

WPL = worker population limit

5.3 NRT (MINICAMS) and DAAMS Monitoring

The Permittee shall place NRT (on-line) monitoring in areas where contamination is possible in order to determine airborne chemical concentration in the shortest amount of time at the monitoring level commensurate with engineering controls and worker protection. An NRT monitoring system shall have the capability to automatically collect, analyze, and report/display the results within 15 minutes.

All NRT chemical agent monitoring shall be performed using MINICAMS. The MINICAMS is an automated gas chromatograph (GC) that operates by alternating between sampling and analysis cycles.

During EDS operations, the following alarm set-points shall be used:

• 0.7Z will be used in all areas where worker protection is being performed (all locations inside the Environmental Enclosure).

• 0.5Z will be used in all process monitoring areas (within the air filtration units).

The Permittee shall perform confirmation monitoring to validate or invalidate an alarm or positive measurement received from the principle monitoring method, (either an NRT method or historical method) and shall be accomplished by collecting a vapor sample in the immediate vicinity of the NRT monitor or historical sampling location. Subsequent analysis shall be conducted offline at the onsite laboratory.

The Permittee shall perform confirmation monitoring for informational and qualitative data reporting purposes in the event of a chemical materiel release. The confirmation sample shall be analyzed by a method different from the principal method (NRT or historical) to increase the likelihood of detecting interferences and only upon a principal method (NRT or historical) positive response. Confirmation monitoring samples shall be given priority over all routine samples.

The Permittee shall employ confirmation DAAMS tubes that are continually aspirated throughout the workday. In the event of an NRT alarm, the DAAMS tubes collocated with the alarming MINICAMS® shall be collected and analyzed.

The Permittee shall co-locate confirmation monitoring equipment at all NRT monitoring locations during chemical agent operations.

The Permittee shall perform historical monitoring during operations to measure very low concentrations of airborne analytes at the worker population limit (WPL). Sampling shall be accomplished by collecting an air sample over an extended period of time (usually the duration of 1 a workday); subsequent analysis shall be conducted offline at the onsite laboratory. Historical monitoring shall be designed to trigger activities to investigate the source of

contamination that may be found below the alarm level of the NRT system. All historical DAAMS samples shall be analyzed within 72 hours of sampling termination.

During operations (whenever unmasked workers are in the Environmental Enclosure), historical DAAMS stations shall be located at the inlet to the air filtration unit. During chemical agent operations, historical DAAMS stations shall also be located at the exhaust of the air filtration unit and in the laboratory.

Because the chemical agents will be processed in campaigns, monitoring at the filter exhaust shall normally be conducted for the chemical agent being processed in the current campaign. However, in the event there is a confirmed NRT alarm in the Environmental Enclosure during an earlier campaign, the agent that resulted in the alarm shall continue to be monitored historically with DAAMS at the filter exhaust throughout all subsequent campaigns or until all the carbon filters are replaced. This process could result in monitoring for more than one agent in this location.

In the event of NRT concentrations at or above 0.2Z, the MINICAMS operator shall notify the Command Post. Subsequent NRT concentrations shall be evaluated to determine whether concentrations are increasing or decreasing as operations proceed. Sub-alarm concentrations shall not require operations to cease or confirmation monitoring.

Table 19 lists several possible scenarios, persons to be notified and possible actions to be taken.

Table 19 – NRT Alarm Notification Matrix

Situation	Notification	Possible Action[a]
Single MINICAMS® Alarm	• Command Post • SSHO	• Await result of next MINICAMS cycle • Evacuate non-essential personnel • Evaluate PPE • Analyze DAAMS tubes
Two Consecutive MINICAMS Alarms	• Command Post • SSHO	• Await result of next MINICAMS cycle • Evaluate PPE • Determine source of contamination
Three Consecutive MINICAMS Alarms	• Command Post • SSHO	• Determine source of contamination

Notes:

[a] This table is based on detection of chemical warfare materiel (CWM) at the alarm setpoint. Decision on actual actions taken will reside with the RCMD Site Manager. Actions may vary, depending on the actual concentration of CWM detected.

DAAMS = Depot Area Air Monitoring System

PPE = personal protective equipment

SSHO = Site Safety Health Officer

Reportable limits: The reportable limit (RL) for historical methods is 0.5 WPL. The reportable limit for NRT methods is 0.5 VSL. For class /type III DAAMS methods used for NRT confirmation, any response in the retention window will indicate the presence of agent unless that peak can be identified as non-agent/interferent by GC/MS.

When reporting agent detections from two samples or methods from the same sampling event, the greater of the two results will be reported to represent the worst case condition.

The sampling and analysis cycle of the MINICAMS shall be no more than 15 minutes. All MINICAMS units shall be located in a monitoring shed and will be equipped with a Teflon® HTSL that will not exceed 150 feet in length. The distal end of each sample line shall be positioned at an NRT sampling location.

The Permittee shall use DAAMS tubes to confirm agent MINICAMS alarms and to provide historical monitoring at the WPL. The DAAMS stations shall incorporate a vacuum source and be comprised of solid sorbent DAAMS tubes, pumps, and flow control devices as illustrated in the DAAMS diagram and description in Figure 16 of this Permit. Any tubing upstream of the DAAMS tube will be constructed of stainless steel or Teflon type tubing. A flow control device shall be associated with each individual tube. Flow rates and sample times will be subject to configuration control (flow rate tolerance of +/- 10%).

Air monitoring with DAAMS employs air aspiration through the DAAMS tube for a predetermined period of time at a controlled airflow rate. Contaminants in the air are adsorbed on the solid sorbent. Aspirated DAAMS samples shall then be analyzed in the laboratory to detect chemical materiel at the prescribed monitoring levels. Laboratory analysis uses thermal desorption of the analytes from the sorbent tubes into a gas chromatograph/mass spectrometer (GC/MS) or gas chromatograph/flame photometric detector (GC/FPD).

Nitrogen oxide (NO_x) filters shall be used for HD DAAMS methods unless the laboratory can prove satisfactory recovery. NO_x filters shall be changed weekly at a minimum.

5.4 Quality Control

The Permittee shall require the laboratory to perform a certification and validation process for operators, instruments, and methods to confirm that analytical processes are suitable for use.

The Permittee shall require method certification by completion of a successful precision and accuracy (P&A) study and initial baseline study. Method certification will be required before the

method can be used in support operations. Method validation will be demonstrated through the continuous baseline study.

Precision and accuracy studies shall be performed on site prior to the pre-operational survey for data evaluation by the RCMD Monitoring Office. All P&A studies must be completed in accordance with the U.S. Army Chemical Materials Agency LMQAP (most current version).

All historical DAAMS methods and all NRT methods shall meet class I air method certification criteria. Confirmation methods shall meet class/type III criteria as defined by the laboratory's QC plan.

The Permittee shall ensure that all methods successfully satisfy the requirements of an alternate baseline study in accordance with certification and validation requirements detailed in the CMA LMQAP.

During the initial baseline studies, all sampling and analysis operations shall be performed exactly as set forth in the applicable analytical procedures under similar operating conditions for instruments shown to be in control. The CMA Monitoring Office must approve all alternate baseline strategies submitted by the monitoring contractor prior to the start of operations.

The continuing baseline study shall be conducted to validate long-term performance of the monitoring systems. The continuing baseline study begins immediately after successful completion of the initial baseline.

For monitoring cessation less than 60 days, method re-certification baselines shall be performed in accordance with the U.S. Army Chemical Materials Agency LMQAP.

The laboratory shall have an established and documented calibration program. All monitoring and laboratory equipment used to support this mission shall be calibrated in accordance with the requirements detailed in the U.S. Army Chemical Materials Agency LMQAP. The laboratory shall address the effects of high elevation on calibrated items that are affected by changes in elevation.

Calibration data shall be formatted to support storage and retrieval. Calibration records shall identify the following:

Chemical name
Date and time
Instrument identification number
Name or unique identification number of operator
Calibration standard identification number
Analyte standard introduction, where applicable.

The Permittee shall utilize ICV and CCV QL samples using the methodology, concentration, acceptance criteria and frequency specified in the LMQAP.

All instruments and monitoring methods used for the analysis of chemical agents shall be subject to periodic QC sample analysis for each chemical the instrument will analyze. All instruments/methods will be challenged in accordance with criteria from the approved version of the U.S. Army Chemical Materials Agency LMQAP.

DAAMS QC samples shall be used to confirm that DAAMS methods are generated to provide evidence of acceptable method performance. DAAMS QC samples are designated as "QP" samples. All QP samples shall be field samples.

QP samples for class I methods are pre-spiked, aspirated in the field, then analyzed. A minimum of one set of QP samples per method will be collected and the QP locations shall be rotated. Sample results shall be corrected based on QP recovery in accordance with DAAMS analysis procedures. The acceptance criteria for class I QP samples shall be +/- 40 percent.

QP samples for class III methods are post spiked following sample collection. Class III QP samples are field class III samples that are post spiked in response to NRT alarms. Class III confirmation QPs are spiked at the 1.0 STEL MINICAMS mass equivalent.

The laboratory will track QP recoveries by specific by specific method, position of collection and analyte of interest. Corrective action and additional sampling will be performed as recoveries dictate.

A spiking record shall be maintained for spiked samples, including the tube number, standard ID number, volume spiked and operator identification.

Monitoring systems must be qualified by meeting or exceeding qualification requirements as specified in the approved version of the U.S. Army Chemical Materials Agency LMQAP.

Acceptance testing shall be performed. Acceptance test pass/fail criteria and detailed requirements for equipment criteria are specified in the U.S. Army Chemical Materials Agency LMQAP.

The Permittee shall conduct monitoring systems alternate baseline studies (both initial and continuing) in accordance with the LMQAP.

The Permittee shall document statistical validation in reports including QC data, statistical analysis, and corrective actions. The laboratory will submit the QC data to the RCMD mandated statistical program from baseline through closure at https://home.cma.army.mil/qcdrs.

The Permittee shall ensure all RCMD operations are governed by LCOs. The Permittee shall determine that all monitoring LCOs have been achieved on a daily basis before chemical operations can commence.

Agent standards received by the agent custodian or designated alternates will be maintained onsite, accounted for, undamaged, and properly labeled at all times. Agent standards shall be

prepared using two different source standards: a “C” for calibration standards and a “Q” for challenge standards. All calibration activities shall be conducted using standards derived from the “C” standard. All challenge (QC) activities shall be conducted using the “Q” standards derived from the “Q” standard. Agent standards may be used as either single agent standards or combination standards that contain two or more agents.

5.5 Documentation

During operations, the Permittee shall maintain documentation of all monitoring activities. All data collected in support of actual operations shall be retained in the operating record. The documentation will include activity information on daily air monitoring, sample records, chain-of-custody forms or transfer of possession, sample analysis records, equipment calibration, equipment maintenance records, agent response, and Standing Operating Procedures, and/or Internal Operating Procedures (IOPs) for air monitoring and laboratory analysis.

The Permittee will ensure that all support laboratory analytical equipment information will be documented by support laboratory personnel. The laboratory will document and maintain all acceptance test results for the equipment. Information regarding each instrument is documented in logbooks, an electronic database, or other applicable format.