EV 09 – Critical Incidents
Session 27 – LERA/Survey and Monitoring PPE Level C
LD43 – Emergency Management

Date Revised: 12/09/19

Event Goal: To teach recruit officers how to respond to a critical incident.

Session Goal: This hands-on training lane provides the responder with a working knowledge of equipment capable of surveying and monitoring compounds to detect CBRNE hazards. The lane provides an overview of some of the current technologies readily available for purchase and in use throughout the United States. It provides the responder with functional characteristics of each piece of equipment and the proper operating procedures necessary to detect residual contamination before and after decontamination in the warm zone at a CBNRNE event. While this module provides the responder with some terminology often associated with performance-offensive tasks, the emphasis is directed away from the tasks and functions of the hazardous materials technician and is focused on performance-defensive utilization of survey and monitoring equipment. This course does not certify or teach technical aspects of surveying and monitoring: those tasks should still be conducted by HAZMAT technicians or other certified personnel.

Learning Objectives:

- Identify selected chemical agent detection and classification equipment and its application in a CBRNE environment, including the operations, capabilities, and limitations of M8/C8 paper, the M256A1 kit, the Chemical Agent Monitor (CAM), and the APD2000
- Identify radiological monitoring equipment and its application in a CBRNE environment to include the operations, capabilities, and limitations of the Ludlum 2241
- Utilize PPE Level C while engaged in police actions in a CBRNE environment
- Identify Weapons of Mass Destruction (WMD) **[43.V.A]**

Session Time: 1.5 Hours

Resources:

- Power Point
- Audio/video device
- Classroom with tables

- **Session Summary:** The student will demonstrate the ability to perform triage of mass casualties at the scene of a CBRNE MCI and to support the efforts of on-scene responders to evacuate victims from the incident site through the initiation of definitive medical care.

Outline	Instructor Notes
I. Survey and Monitoring- PPE Level C A. Chemical Survey and Monitoring- No single system will detect all hazardous materials or chemical agents. Responders must use several items, each serving a specific role during a response. There are many different types of systems, from very simple	Facilitated discussion (1.5 hours)

chemical-reactive papers (that work in seconds) to very sophisticated laboratory instruments (that can take from minutes to hours to give results); simple systems provide broad information, while complex systems provide detailed information **[43.V.A] [LD41] [1]** 1. M8/C8 Paper a. Military/Civilian b. Very small and light weight c. Quick ID of nerve and blister d. Liquid detection only e. Color code inside front cover f. False positives 1) High temperatures 2) Solvents 3) Decontaminants 2. Utilization of M8/C8 Paper a. Tear a sheet of the M8/C8 paper from the booklet (although the paper is perforated, ensure that an entire sheet is used). b. Locate the liquid contamination, such as puddles and/or small or barely visible droplets, in a suspected area. c. With a gloved hand, blot the M8/C8 detector paper on the suspected liquid agent without touching the liquid. d. Observe the paper for a color change. e. Identify the contaminant by comparing any color change on the paper to the color chart on the inside front cover of the booklet. f. Close the booklet and report the results. g. Dispose of the sheet as a hazardous waste. 3. M256A1 Chemical Agent Detector Kit a. Military b. Small, portable lightweight c. 12 per kit with a pad of M8 paper d. Highly reliable, mini chem lab e. Detects nerve, blood, blister, lewisite 4. Utilization of the M256A1 Kit a. Prepare the kit for use 1) Read all the instruction cards in the kit. 2) Remove one sampler-detector from the kit, and read the instructions printed on the bag. 3) Remove the sampler-detector from the bag. Dispose of the sampler-detector if there are broken or missing ampoules,	**[LD 43]** Identify Weapons of Mass Destruction **[LD 41]** Recognize the indicators of a WMD/hazardous materials incident. **[1] ASK –** Has anyone used or know someone that has used survey and monitoring equipment? • Answer- This has no correct answer and is used to understand your audience and have prior military personnel that have used monitoring equipment to engage in speaking about their incident.

missing spots, crushed reagent channels, or if the blood agent test spot is pinkish.

b. Test for toxic agent vapors.
   1) The protective strip should still cover the spots.
   2) Pull the discard tab #1 to expose the tablet.
   3) Rub the top half of the white paper tab (#2) on the tablet.
   4) Hold the sampler with arrow up. Using the v-shaped protective device (in lieu of the heater pads), crush the ampoules in three center pockets (#3).
   5) Rotate the sampler so arrow is down. Force the liquid to each spot with the right hand, while pressing protective strip with left hand to ensure covered spots are wet.
   6) With the left thumb over the center of the protective strip, hold the sampler flat and swing the heater (green ampoules) away from the blister spot.
   7) Being sure not to use the crushing device, crush one heater ampoule (#4) and swing the heater over the spot. Vent the heater vapor away from the user and other personnel.
   8) Leave the heater over the spot for two minutes, and then, swing the heater and the protective strip away from the spots.
   9) Expose the spots to air, shielding from direct sun for 10 minutes.
   10) Crush the second green ampoule (#4) and swing the heater back over the test spot. Leave in place one minute. Swing the heater away from the test spot.
   11) Hold the sampler with the arrow down. Crush the two outside ampoules (#5) using the crushing device.
   12) Rerub the bottom half of the white paper tab (#2) next to the first mark.
   13) Immediately look for a difference in color between the two marks.
   14) Turn the sampler over to determine safe or dangerous conditions. Wait three minutes for nerve agent results.
       a) Blister agents (H and CX) develop

color immediately after all ampoules are broken. b) M256A1: If no color develops, a positive nerve test is indicated. c) Disregard any blue-green edge around the nerve spot rim. d) At temperatures below 50*F, the nerve spot may take up to five minutes to develop color. e) At high temperatures, a faint blue color may appear in the blister spot in the absence of H. f) Yellow and orange sometimes occur on the blood spot when no agent is present. Pink or blue color must be present for a positive test. g) Nerve, blood, and blister tests must be read no later than five minutes after crushing the two outside ampoules (#5). h) Report the results and dispose of the sampler. Handle the sampler as hazardous material. 5. Chemical Agent Monitor (CAM) **[LD41]** a. Capabilities and features 1) Portable, handheld instrument 2) Ion Mobility Spectrometry Technology 3) Monitors for contamination 4) LCD shows relative vapor concentrations, Backlit for night time use 5) Beta radiation source b. Handheld, portable, point-source monitor-will detect if vapor concentration is high c. Weight approx. 5.5 lbs d. "G" agents in nerve G-mode. 6. Startup and Operating Procedures a. Ensure the nozzle protective cap assembly is in position on the CAM. b. Press ON/OFF switch to ON and observe the display to ensure H-mode, markers, three vertical dots, BL, WAIT, and all eight bars are shown. c. Display will clear from self-test after 30 seconds (H-mode, WAIT, and A and B markers remain). WAIT clears from display within two minutes. d. Place a filtered nozzle standoff filter onto the	**[LD 41]** Notify communications the type of hazardous material if known

nozzle as follows:
   1) Peel the back covering from the top of the filtered nozzle package until one filtered nozzle standoff is exposed.
   2) Quickly insert the CAM nozzle assembly into the exposed filtered nozzle standoff and remove. Do not touch the filter with your fingers.
   3) Lay the covering back in place across the top of the filtered nozzle package assembly.

e. Ensure that the nozzle of the CAM is positioned one-half inch to one inch from source.
f. To avoid saturation, ensure that the instrument is withdrawn from source proximity immediately upon receipt of alarm.
g. Report all alarms to the command element (instructor).

7. APD2000
   a. Portable handheld chemical agent monitor and detector
   b. Designed for responders
   c. Detects Chemical Warfare Agents (CWA) and civilian threats (pepper spray, mace, etc.)
   d. Provides actual identity and relative agent concentration
      1) 26 – 50 = low
      2) 51 – 75 = medium
      3) 76 – 100 = high
8. Startup and Operating procedures
   a. Ensure that the cap is removed from the ADP2000.
   b. Place the filter nozzle standoff onto the nozzle as follows:
      1) Peel the back covering from the top of the filter nozzle standoff package until one filter nozzle standoff is exposed.
      2) Place the nozzle of the APD2000 into the opening of one filter nozzle standoff. Press lightly to ensure the filter nozzle standoff is securely attached. Pull the filter nozzle standoff package assembly away from the APD2000.
      3) Lay the covering back in place across the top of the filter nozzle package assembly.
   c. Press the power button to turn on the

instrument.

d. After the APD2000 completes self-calibration, identify the information on the LCD. It should read, READY CW.
e. Press the mode button once and observe the following reading on the LCD: READY CWVX; press once again and observe the following reading READY CW.
f. Ensure that the nozzle of the ADP2000 is positioned one-half inch to one inch away from the source.
g. Press the select button when the instrument alarms. This will silence the instrument.
h. After silencing an alarm, press the clear button to assist in clearing the instrument.
i. Report all alarms to the command element (instructor).

B. Radiological Survey and Monitoring Equipment
1. Ionizing radiation not detected by senses
2. Separate equipment for detecting contaminants (Alpha/Beta probes)
3. Dosimeters
4. Geiger Mueller Instruments
5. Pager-like gamma detectors
6. Ludlum 2241 – The Ludlum 2241, a recently developed portable general purpose survey meter equipped with a Geiger-Mueller probe, is capable of measuring alpha, beta, and gamma radiation. This radiation detection tool has become increasingly popular in the response community because of ease of operation, range of capabilities, and sensitivity to ionizing radiation. This model provides counts per minute (cpm) and thousand counts per minute (kepm), in addition to a reading in milli-Roentgen (mR) per hour.