19June2002
Aberdeen Proving Ground, MD 21010-5424
Chemical Analysts Team
Edgewood Chemical Biological Center
Lee Campbell, ECBC and Terrence Cloonan, NIOSH

TESTING

CHEMICAL AGENT SYSTEMS
SMARTMAN
(SiMulant Agent Resistant Test MANikin)
LIVE AGENT TESTING (LAT).
“A PROBED MECHANICAL BLADDER
HEADFORM SYSTEM USED TO EVALUATE
GB & HD PENETRATION AND
PERMEATION EFFECTS ON RESPIRATORS.”
SMARTMAN (Simulant Agent Resistant Test MANikin)

Components:

- Syringe Pumps to Generate Chemical Terrorism Agent Vapors.
- TDA-99M Aerosol Leak Tester for Terrorism Aerosol Pathways.
- Miller-Nelson Humidity Temperature Flow Control Units.
- Breather Pumps, Sinusoidal & Constant Flow. Functional Rate.
- Mixing Chamber/System for Dispersion of Agent Vapor.
- Miran Infrared Detector for Exposure Concentration Detection.
- MINICAMS for Breathing Zone Detection and Pass/Fail Results.
- Real Time Monitoring Devices and Quantitative Data Print Outs
Notional CBRN APR Systems Test for HD

- **Method:** Based on NIOSH RCT-CBRN-STP-0200 and 0201.
  - APR systems will resist permeation/penetration of HD vapor and liquid when tested on SMARTMAN--- Live Agent Test (LAT).

- **Procedures:** NIOSH CBRN APR STP (To Be Published).
  - HD LIQUID application of **32 droplets** (25/face blank + 7/canister)
  - HD LIQUID application of **36 droplets** (32 + 4 on canteen)
  - HD VAPOR exposure for defined duration--- To Be Determined.

- **Test Conditions:**
  - Liquid Droplets deposited at selected locations. Total Liquid concentration no greater than 0.86ml of HD per respirator.
  - Vapor Challenge of 300mg/m3 for defined duration.

- **Test Time:** 6 Hours--- Exposure plus decay observation.

- **Flow Rate:** 40 L/min: 115 Max Peak, only a Functional Rate; 36 respirations/min; 1.1 liters tidal volume.
Notional CBRN APR Systems Test for HD

- **Temperature**: 25 ± 3 °C

- **MINICAM Break Through Sampling Time**: 3 Minutes each detector, 6 minute cycle.

- **Maximum Peak Excursion**: 0.60 mg/m³.

- **Maximum Ct, Cumulative**: Vapor Ct is 1080 mg-min/m³, based on vapor exposures from 300 mg/m³. LCT50 is 5,000 mg-min/m³. Dermal CT value is to be determined based on number of droplets applied.

- **Pass**: Three (3) Consecutive Trials, One (1) Respirator per trial.

- **Failure**: 3 consecutive peaks at or above 0.60 mg/m³ or over max Ct.

- **Verification Testing**: Prove the test procedures on select RPE.
**Notional CBRN APR Systems Test for GB**

**Method:** Based on NIOSH RCT-CBRN-STP-0200 and 0201.
- APR systems will resist permeation/penetration of GB vapor when tested on SMARTMAN---- Live Agent Test (LAT).

**Procedures:** NIOSH CBRN APR STP (To Be Published).
- GB vapor (2000 mg/m3) for defined duration of exposure.
- NO Liquid GB.

**Test Conditions:**
- Challenge is 2000 mg/m3 for TBD minutes after 1800 mg/m3 is reached during 3.5 minutes of ambient vapor ramp up.
- Challenge Duration is dependent on Specs of Reasonable Event.

**Test Time:** 6 hours--- Exposure plus decay observation.

**Flow Rate:** 40 L/min; 36 respirations/min; 1.1 liters tidal volume.
Notional CBRN APR Systems Test for GB

- **Temperature**: 25 ± 3 °C

- **Break Through Sampling Time**: 2 minutes
  each detector, 4 minute cycle, consecutively.

- **Maximum Peak Excursion**: 0.087 mg/m3.

- **Failure**: 3 consecutive data peaks at or above 0.087 mg/m3 or exceed the maximum Ct over 6 hours.

- **Maximum Ct, Cumulative**: 7,200 Ct for GB Vapor. LCt50 is 10,000 mg-min/m3.

- **Verification Testing**: Prove the test procedures on select RPE.
SUMMARY: CBRN APR GB/HD LAT

- CONTINUITY
- DUAL PASS/FAIL
- TAILORED DURATION
- LOW Ct VALUES
- HD DROPLETS
- DRINKING DEVICE
- VERIFICATION TESTING