



# *CHEMICAL AGENT SYSTEMS TESTING*

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## Acronym

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# 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.”



## Equipment

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### ➤ SMARTMAN (SiMulant Agent Resistant Test MANikin)

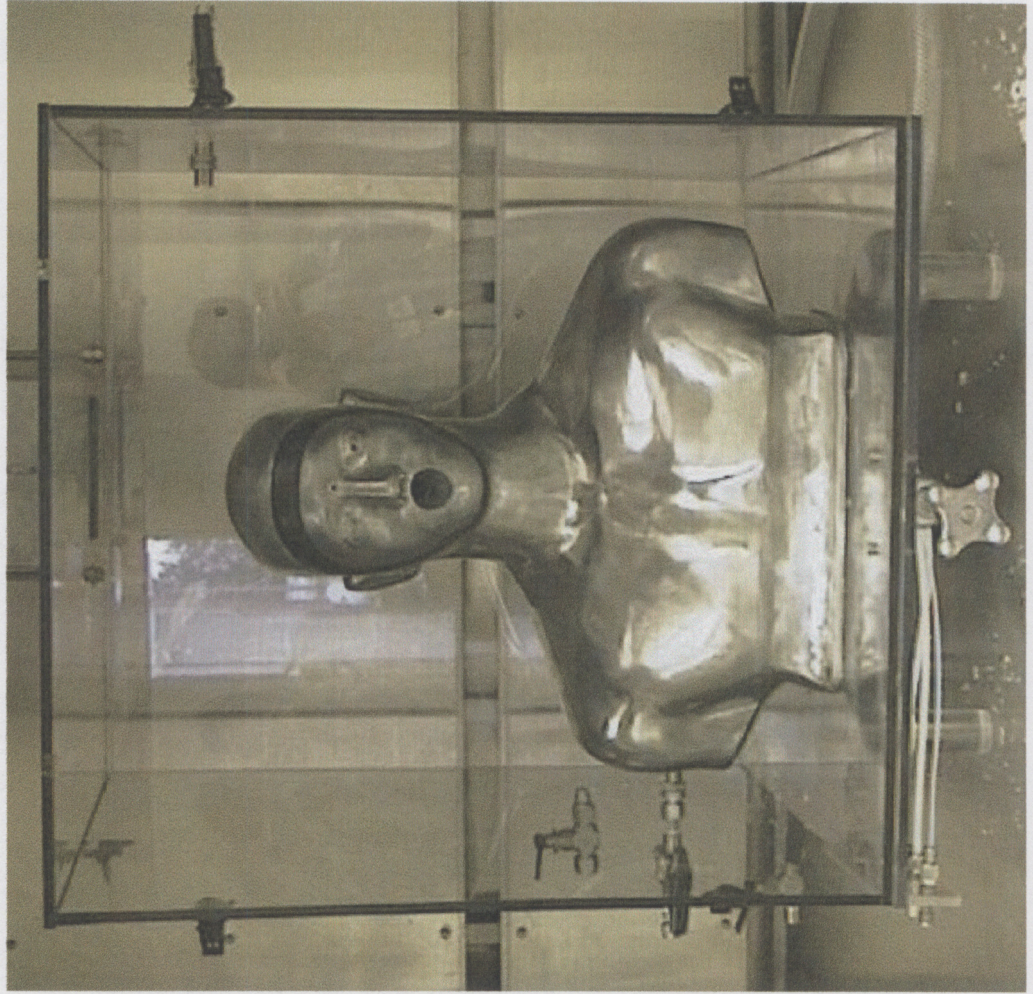
#### Components:

- 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



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# SMARTMAN



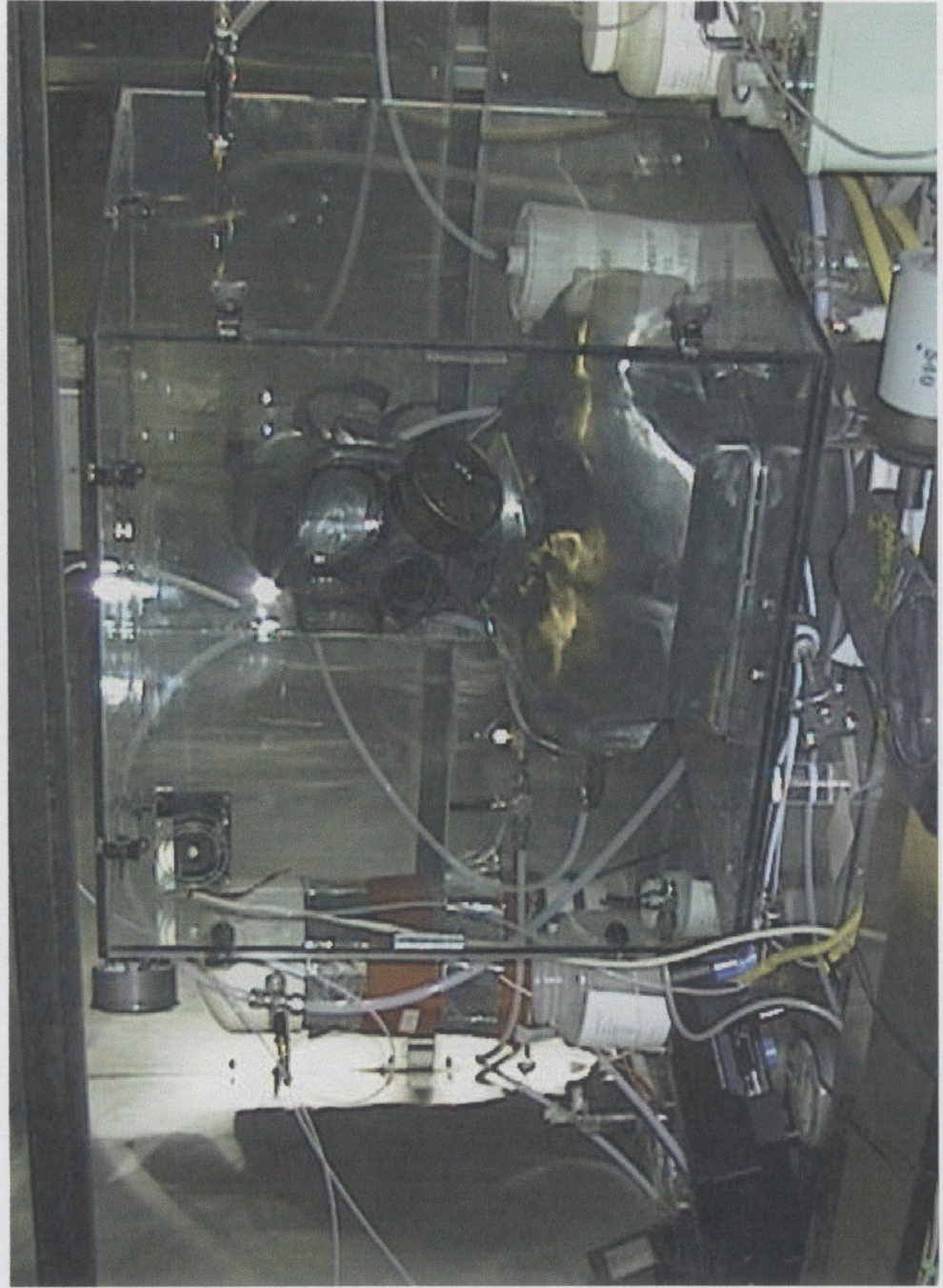
# *SMARTMAN With MCU-2P Respirator and Hood/Shroud*





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# ***SMARTMAN With M40 Respirator, No shroud.***

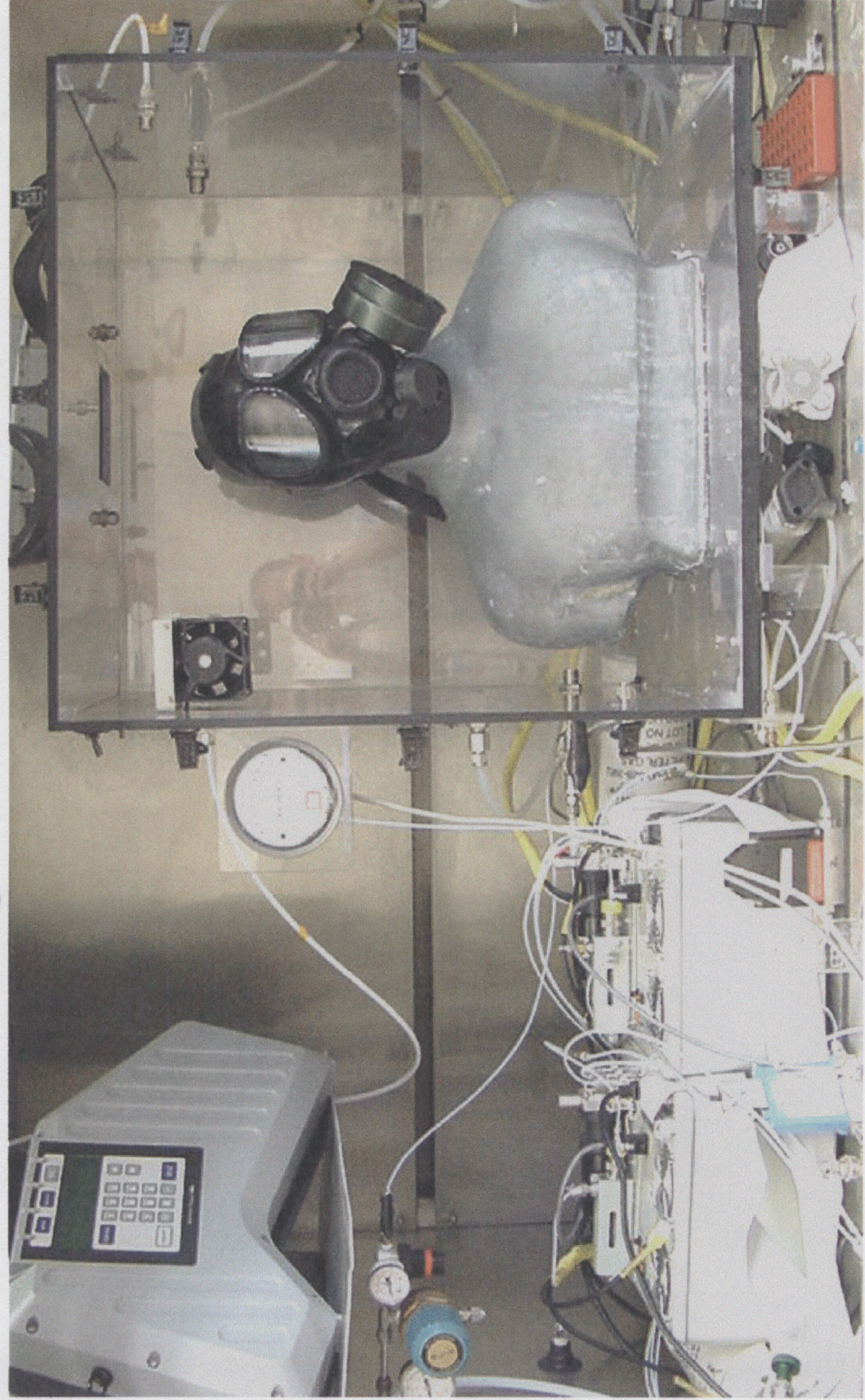




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# *SMARTMAN System with APR Negative Pressure Mode*



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# Syringe Pump

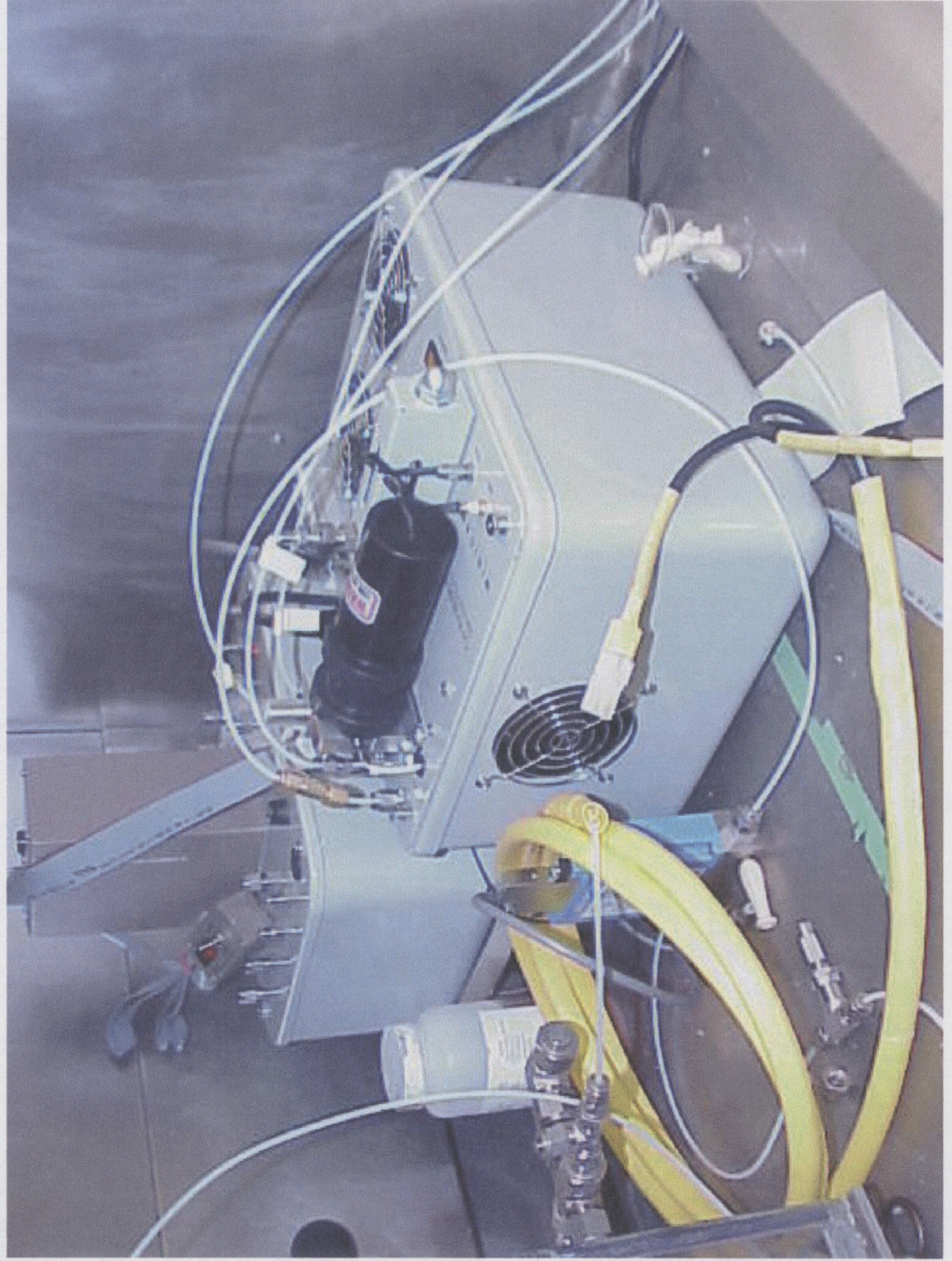






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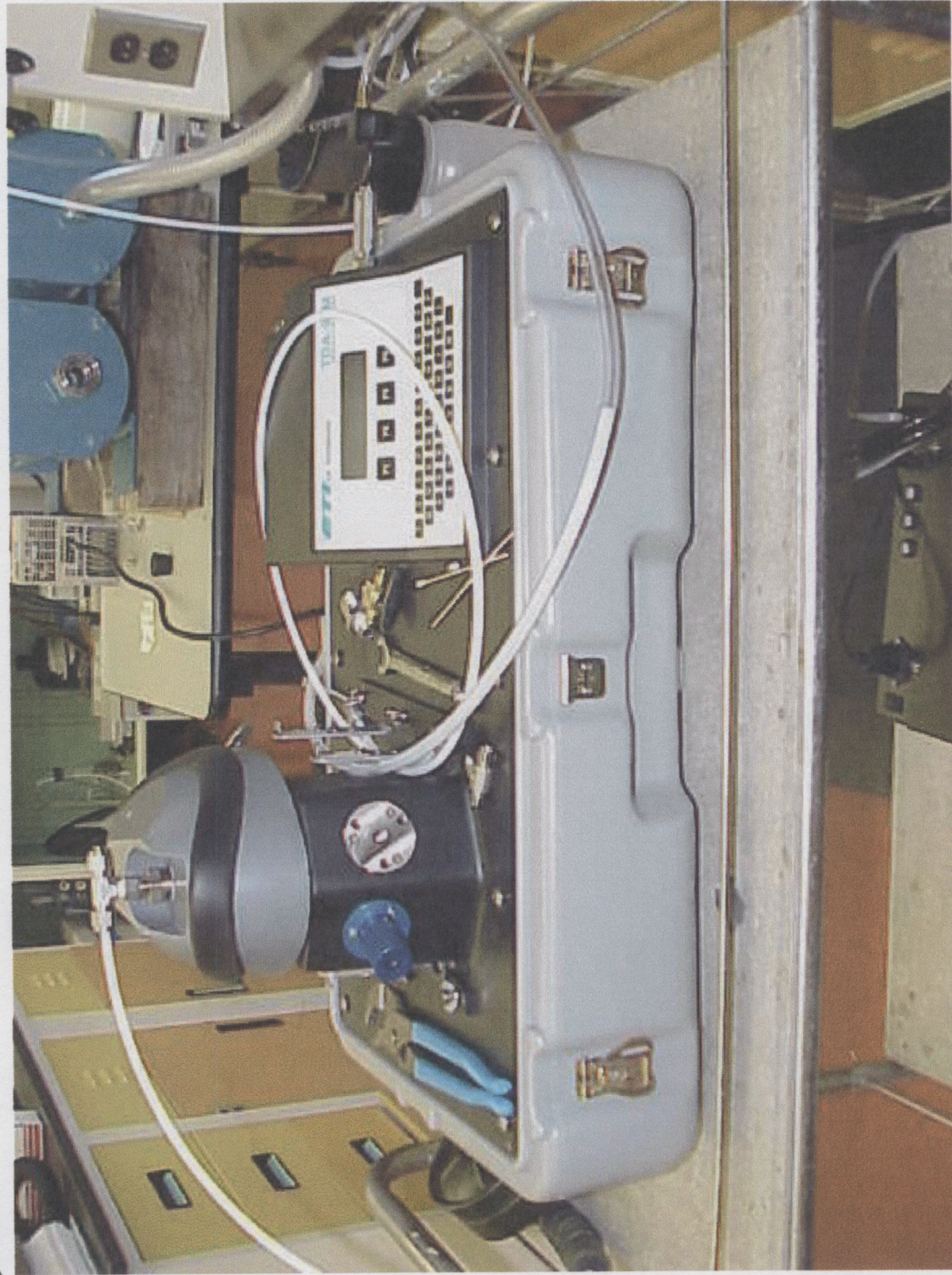
# MINICAMS





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# *TDA-99M Leak Tester*





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# *Breather Pump E1R1*



## *Notional CBRN APR Systems Test for HD*

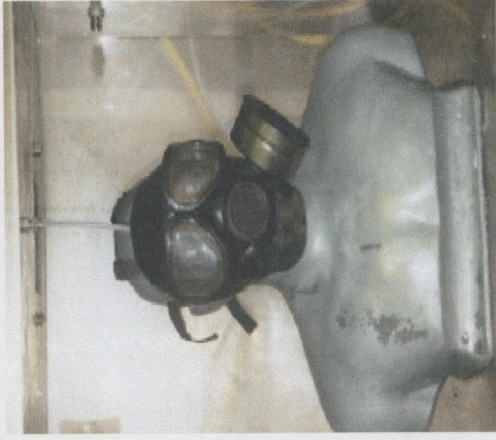
- **Method:** Based on NIOSH RCT-CBRN-STP-0200 and 0201.
  - APR systems will resist permeation/penetration of HD vapor and liquid when tested on SMARTMAN--- Live Agent Test (LAT).
- **Procedures:** NIOSH CBRN APR STP (To Be Published).
  - HD LIQUID application of 32 droplets (25/face blank + 7/canister)
  - 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/m<sup>3</sup> 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.



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## *Notional CBRN APR Systems Test for HD*



- **Temperature:**  $25 \pm 3 \text{ }^\circ\text{C}$
- **MINICAM Break Through Sampling Time:**
  - 3 Minutes each detector, 6 minute cycle.
- **Maximum Peak Excursion:** 0.60 mg/m<sup>3</sup>.
- **Maximum Ct, Cumulative:** Vapor Ct is 1080 mg-min/m<sup>3</sup>, based on vapor exposures from 300 mg/m<sup>3</sup>. LCt50 is 5,000 mg-min/m<sup>3</sup>. 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/m<sup>3</sup> or over max Ct.
- **Verification Testing:** Prove the test procedures on select RPE.



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## *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/m<sup>3</sup>) for defined duration of exposure.
  - NO Liquid GB.
  
- **Test Conditions:**
  - Challenge is 2000 mg/m<sup>3</sup> for TBD minutes after 1800 mg/m<sup>3</sup> 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:**  $25 \pm 3 \text{ }^{\circ}\text{C}$
- **Break Through Sampling Time:** 2 minutes
- each detector, 4 minute cycle, consecutively.
- **Maximum Peak Excursion:** 0.087 mg/m<sup>3</sup>.
- **Failure:** 3 consecutive data peaks at or above 0.087 mg/m<sup>3</sup> or exceed the maximum Ct over 6 hours.
- **Maximum Ct, Cumulative:** 7,200 Ct for GB Vapor. L Ct50 is 10,000 mg-min/m<sup>3</sup>.
- **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

