

CBRN Escape Respirators

Chemical Warfare Agent Testing

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SBCCOM



CWA Testing Conducted at Edgewood Chemical Biological Center (ECBC) in Support of Escape Hood Projects

- Escape Hoods for Select Federal Agencies – 1985
- Technical Support Working Group (TSWG) Escape Hood– 2000-Present
- Joint Service Chemical Environment Survivability Mask – 2001- Present
- NIOSH Baseline Testing for Escape Hoods - 2003

CWA System Testing

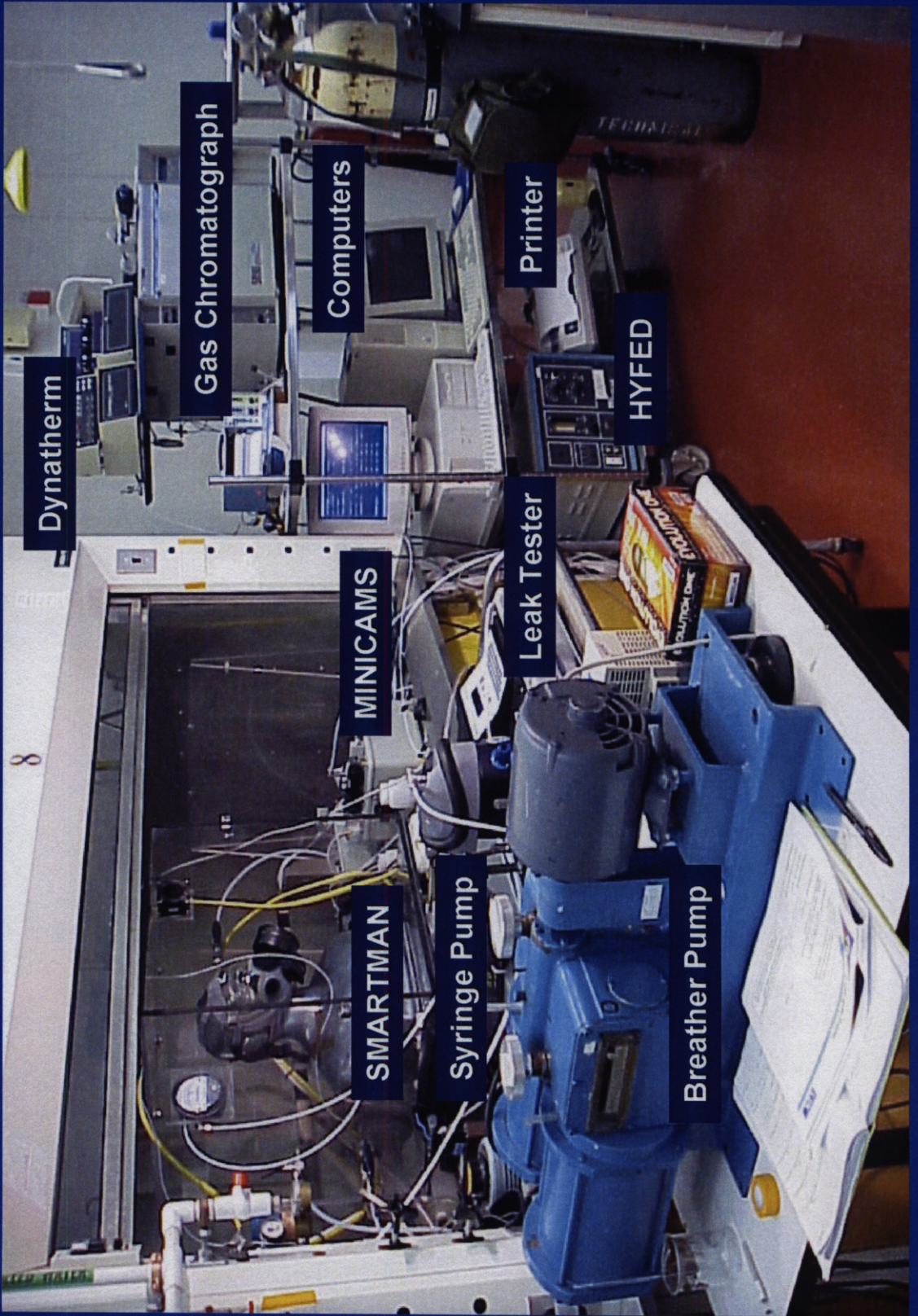
SMARTMAN System (SiMulant Agent Resistant
Test MANikin)

A headform system used to evaluate Chemical Warfare Agent penetration and permeation effects on respirators under simulated breathing conditions with “perfect” respirator sealing to the SMARTMAN.

SMARTMAN Equipment

- ◆ Syringe pump to generate agent vapors
- ◆ Air Controller
- ◆ Breather Pump, Sinusoidal
- ◆ Mixing Chamber
- ◆ MINICAMS or Gas Chromatograph - Dynatherm
- ◆ HYFED (Hydrogen Flame Emission Detector)
- ◆ Miran Detectors
- ◆ Computer

Equipment Setup

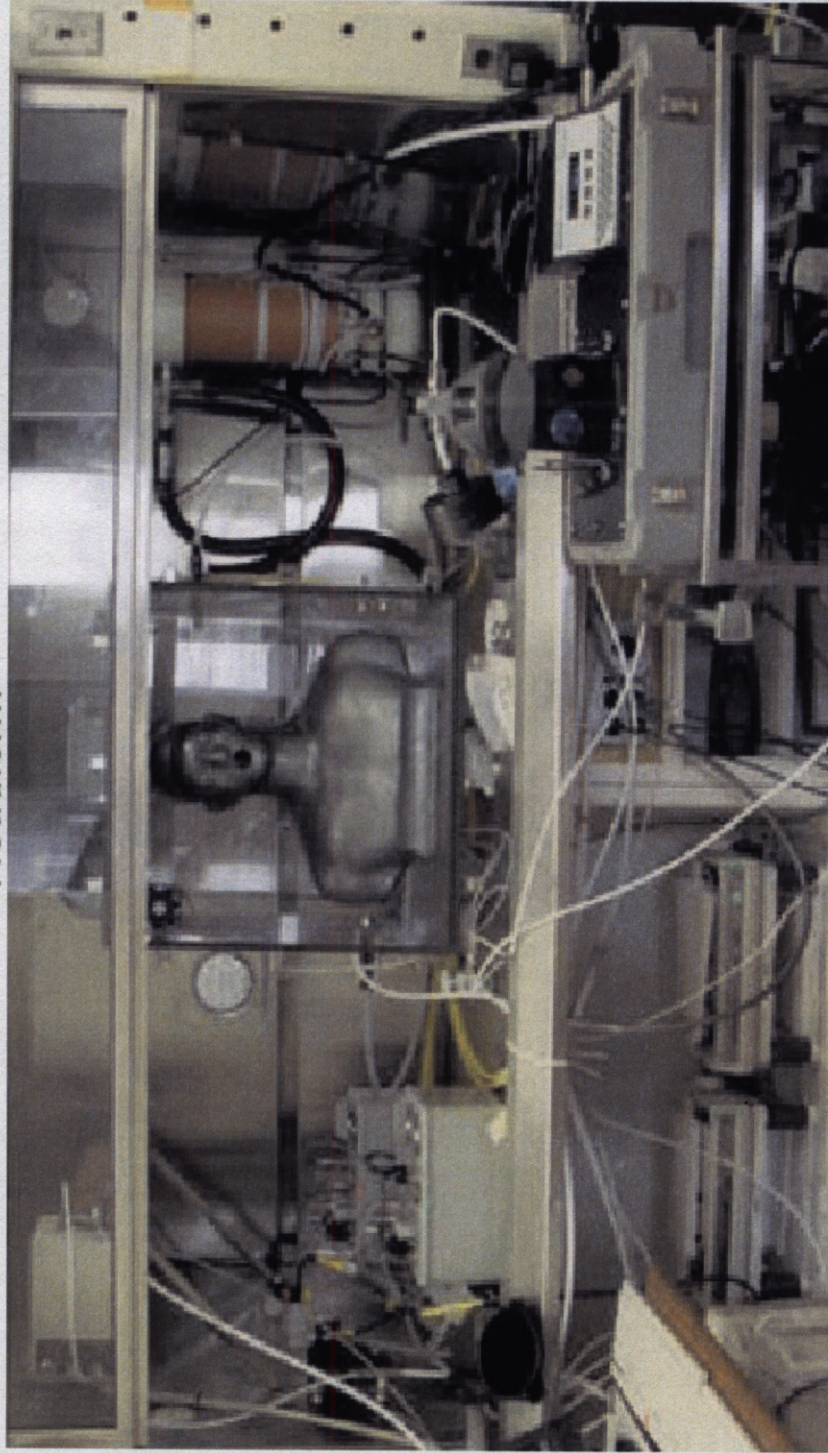


Equipment Setup

Miran

SMARTMAN
Headform

Mixing Chamber

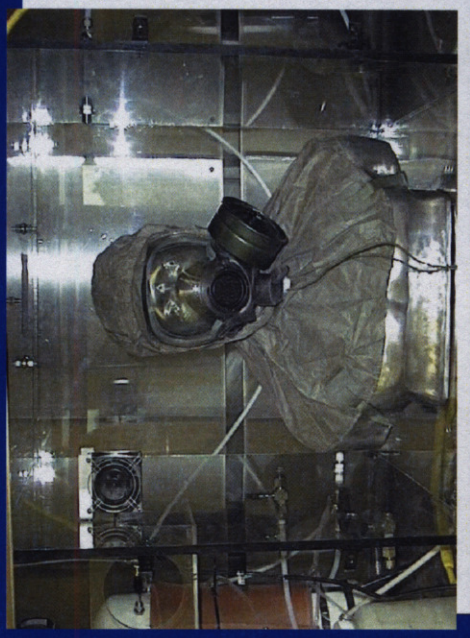
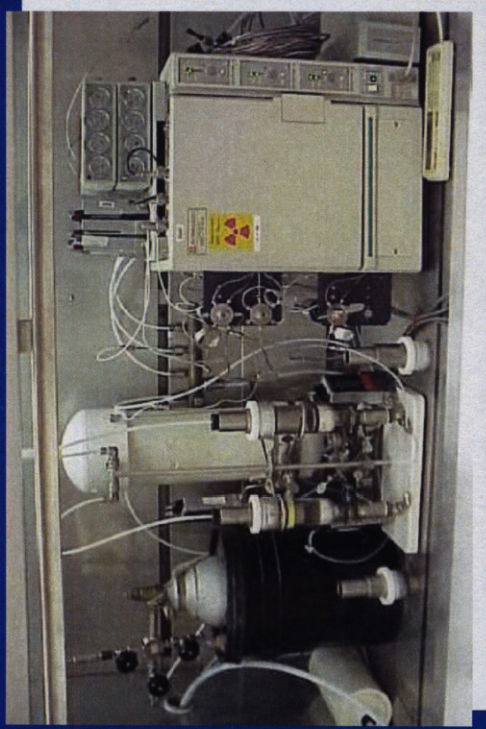


MiniCAMS

TDA99

Test Method Development & Validation

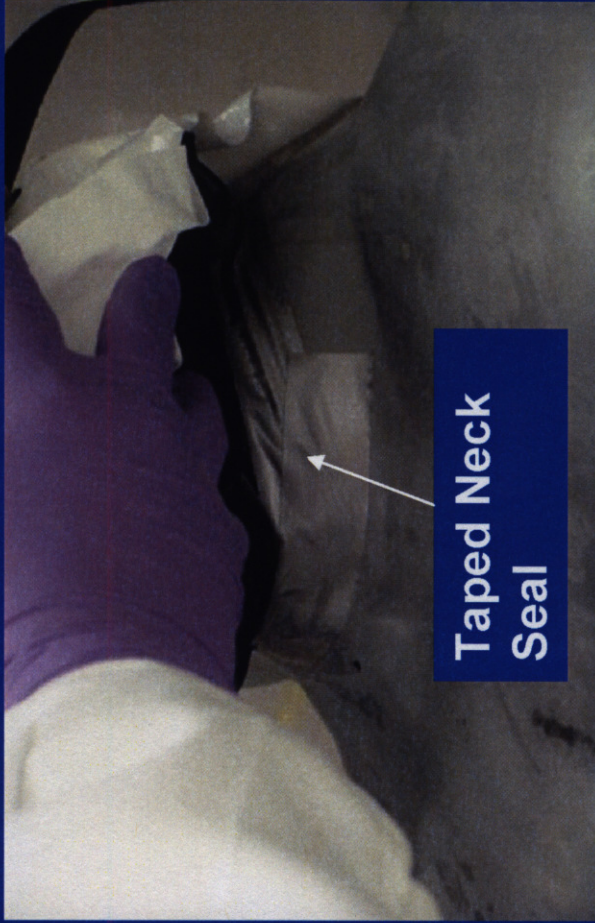
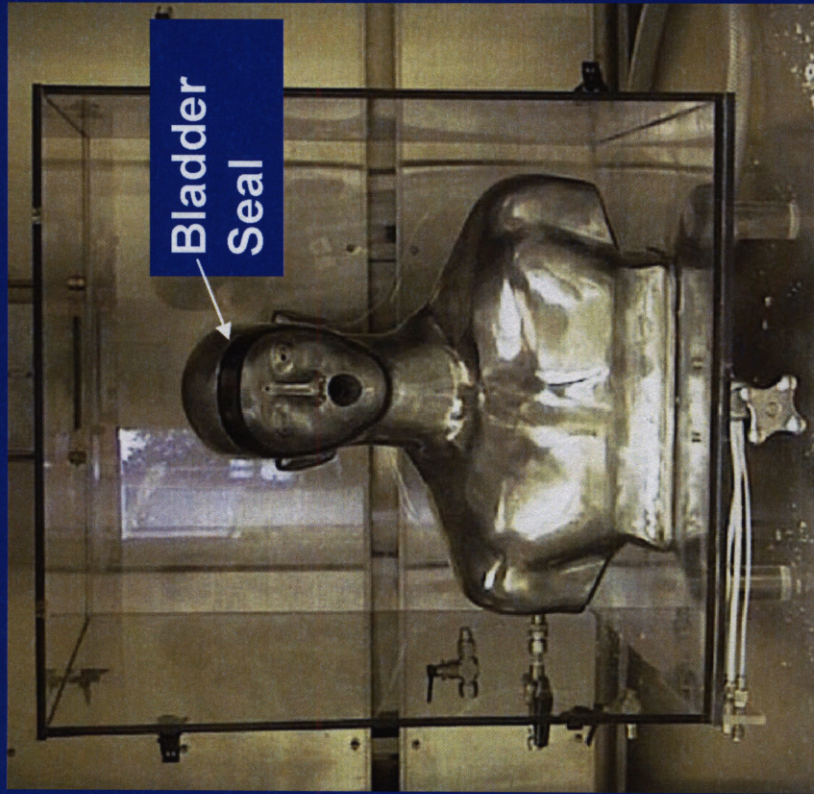
- ◆ Established test procedures
- ◆ Develop test protocol
- ◆ Validate test method/procedures for specific protocol
- ◆ Document as a Standard Test Procedure



Approved and Validated Test Methods
for SCBA and APR

Escape Hood Testing Changes

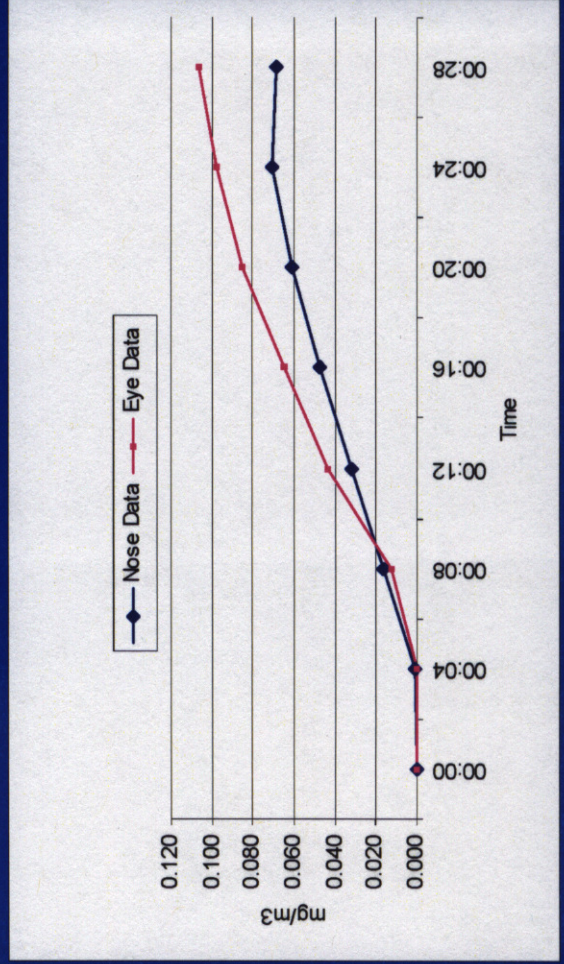
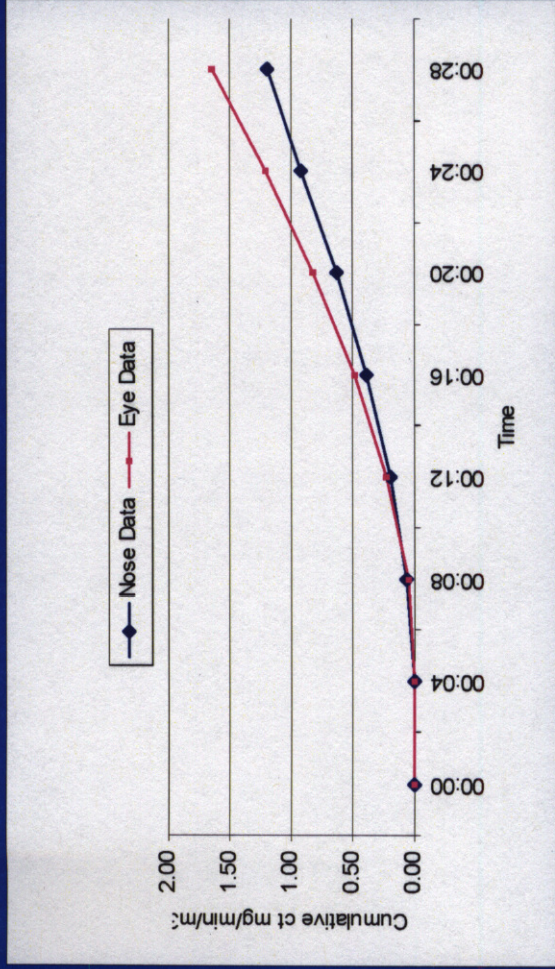
- Neck seal is taped to obtain a “leak tight” SMARTMAN to hood interface. Seal verified with a TDA-99 particle leak tester.
- TDA-99 Test accomplished on agent test SMARTMAN



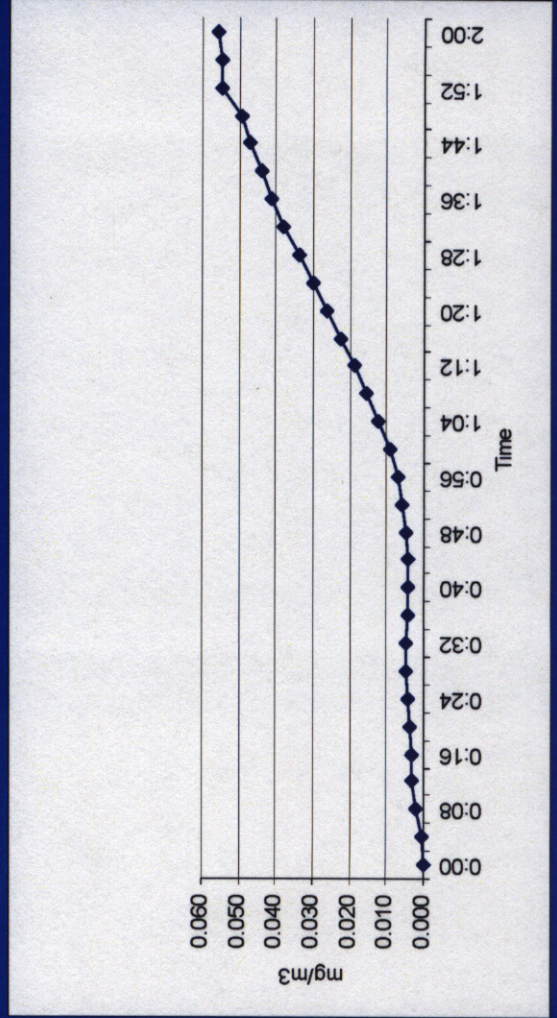
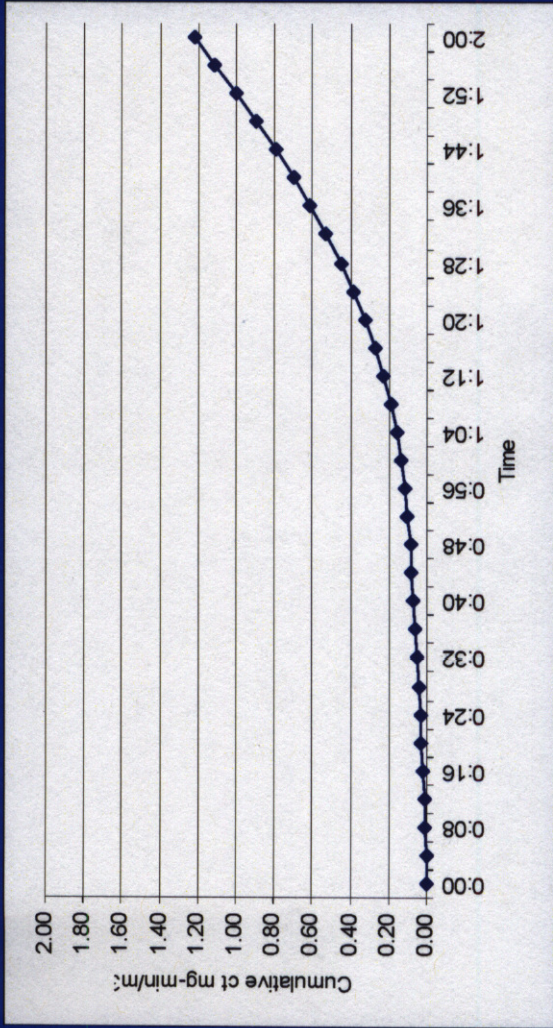
Escape Hood CWA Baseline Data

- Commercial Escape Hoods were obtained and tested to determine potential CWA capabilities
- SCBA CBRNE Test Parameters Used
 - Sarin (GB) Challenge: 2000 mg/m³ for 30 minutes
 - Mustard (HD) Challenge: 300 mg/m³ for 30 minutes and liquid HD on the hood system at 10 grams/m²
 - Breather flow rate of 40 liters/minute
- Considered worse case scenario

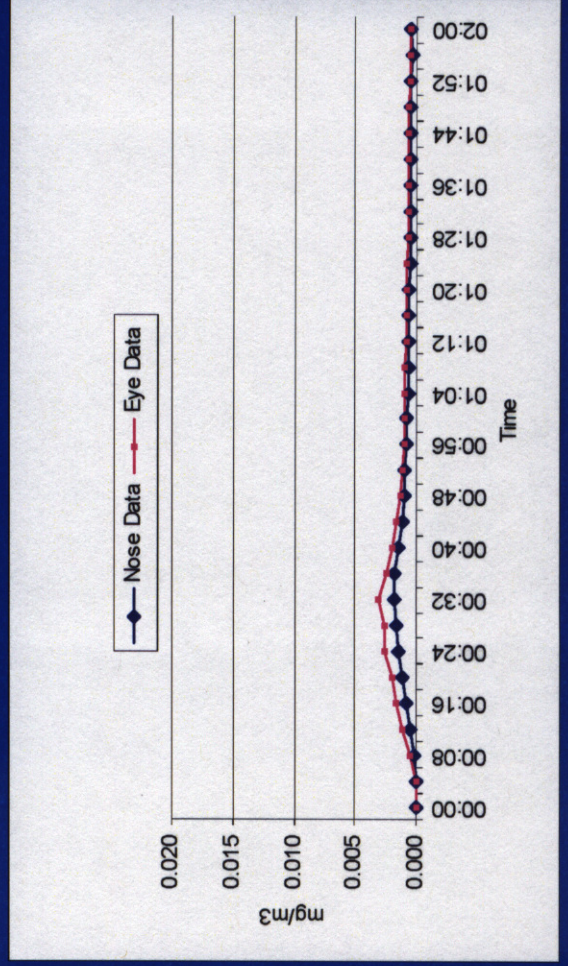
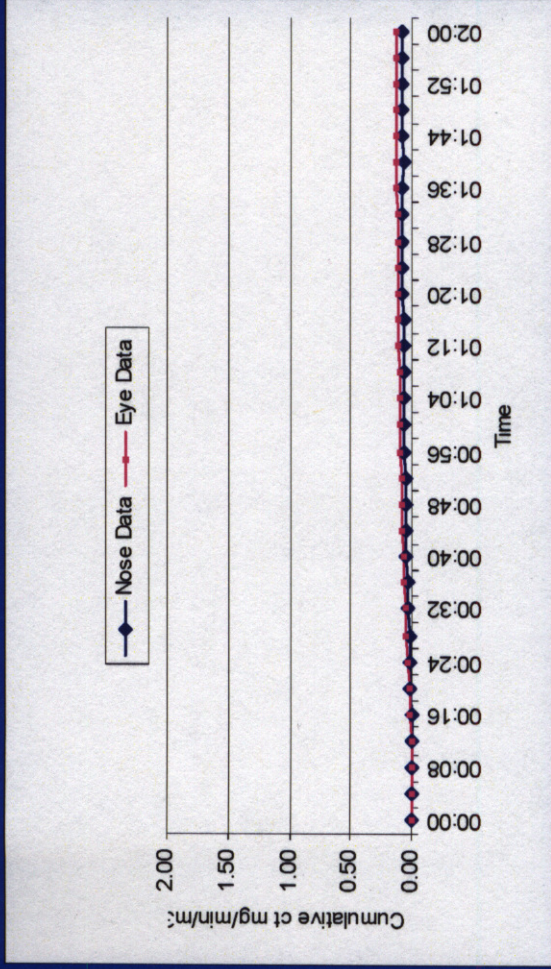
GB Sample Data



Sample GB Data

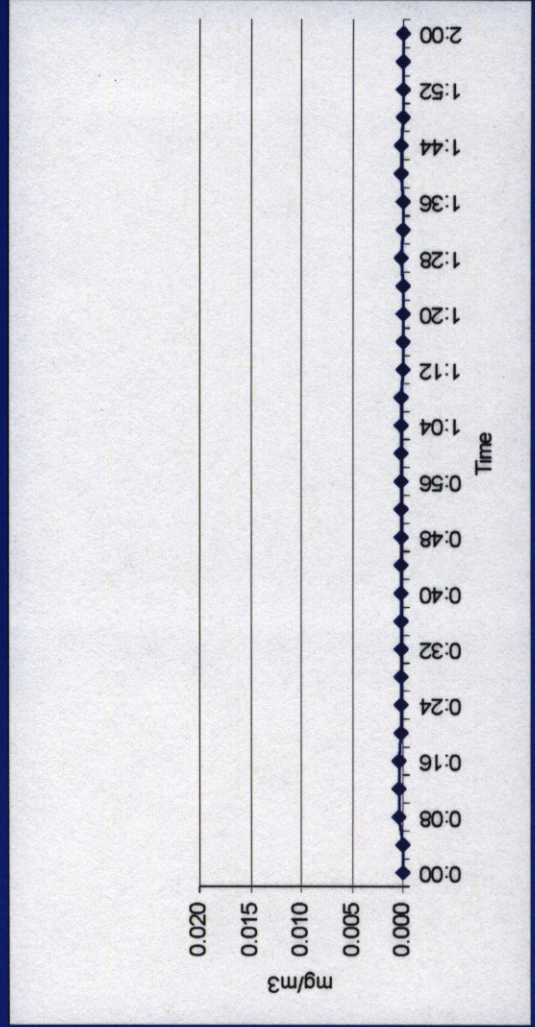
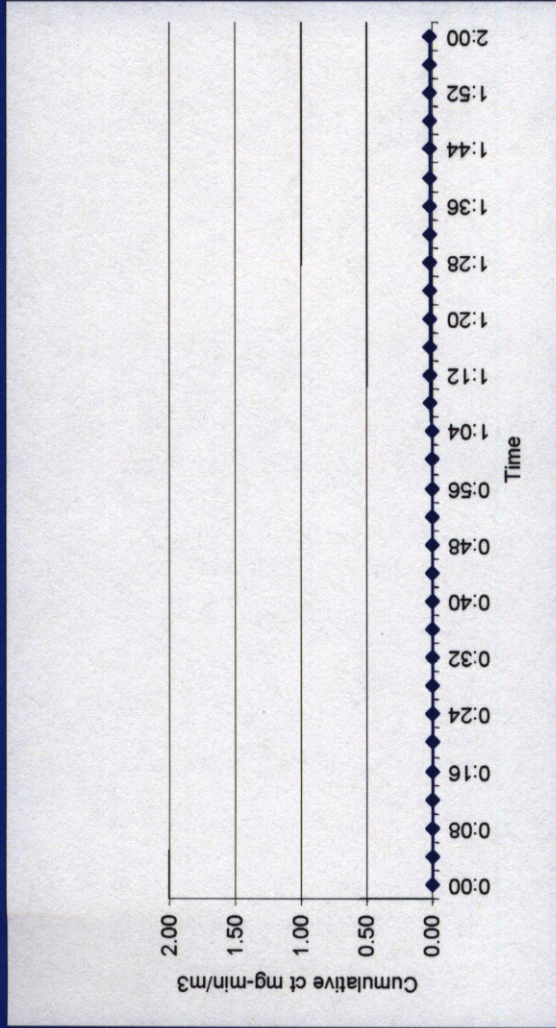


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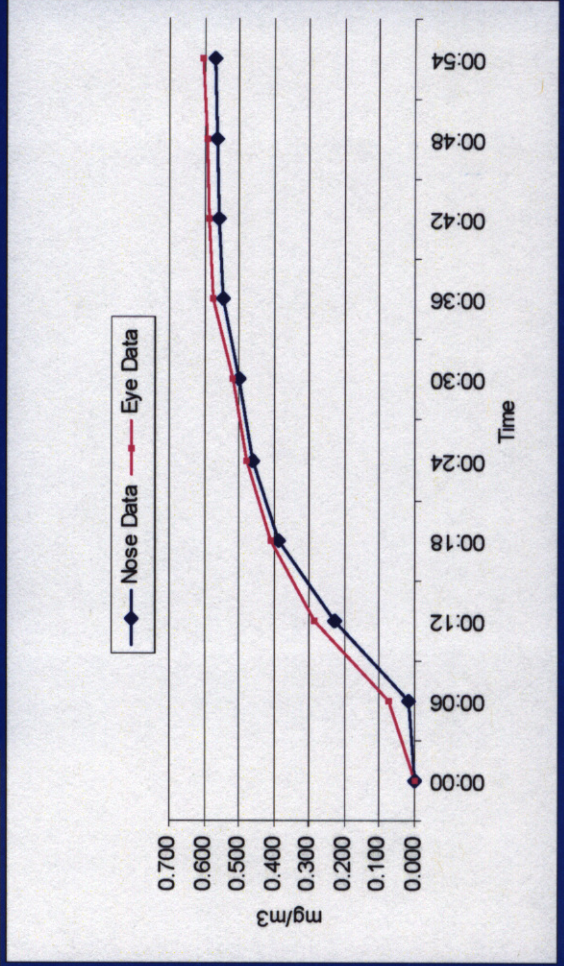
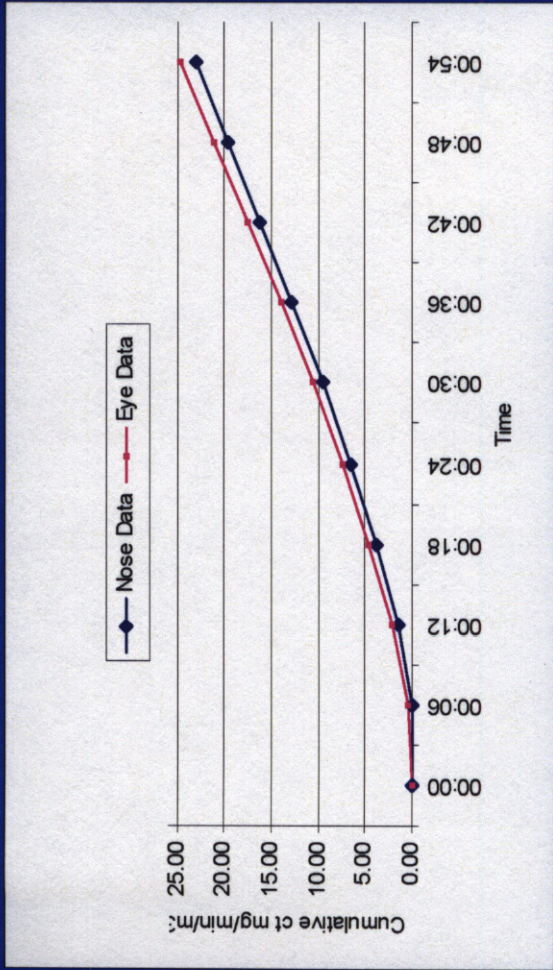


Sample GB Data

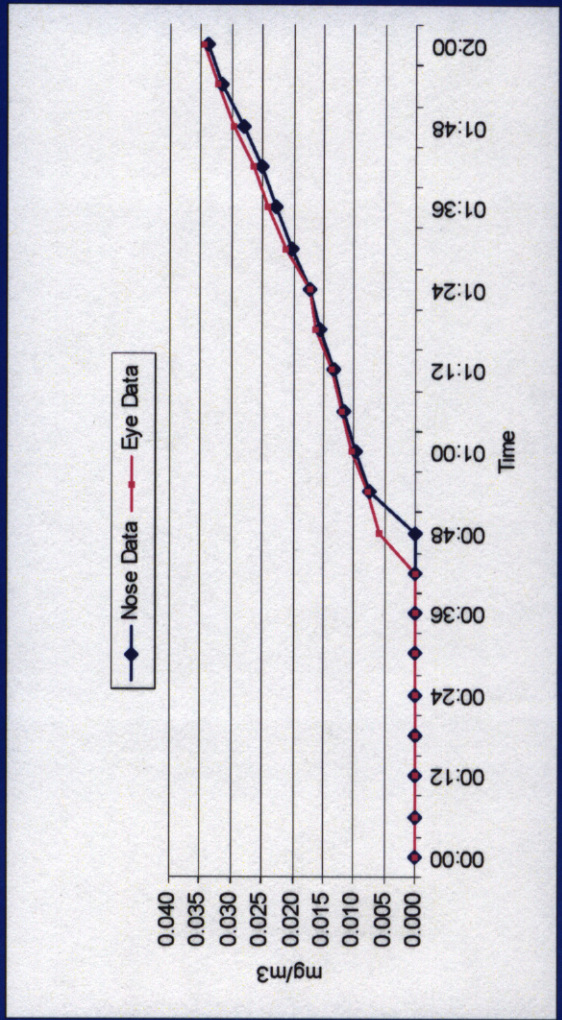
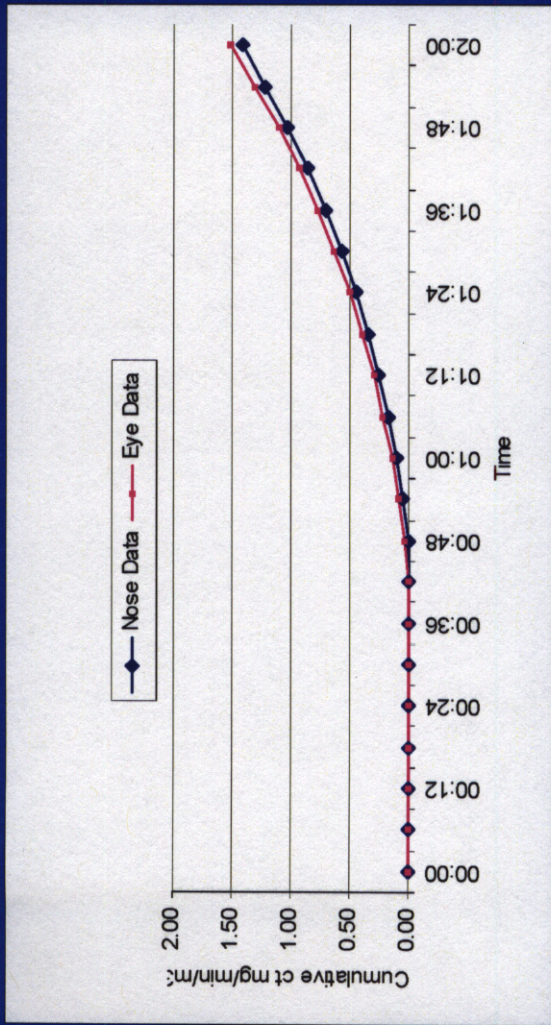
Two Samples Showed
"Baseline" Results



Sample HD Data

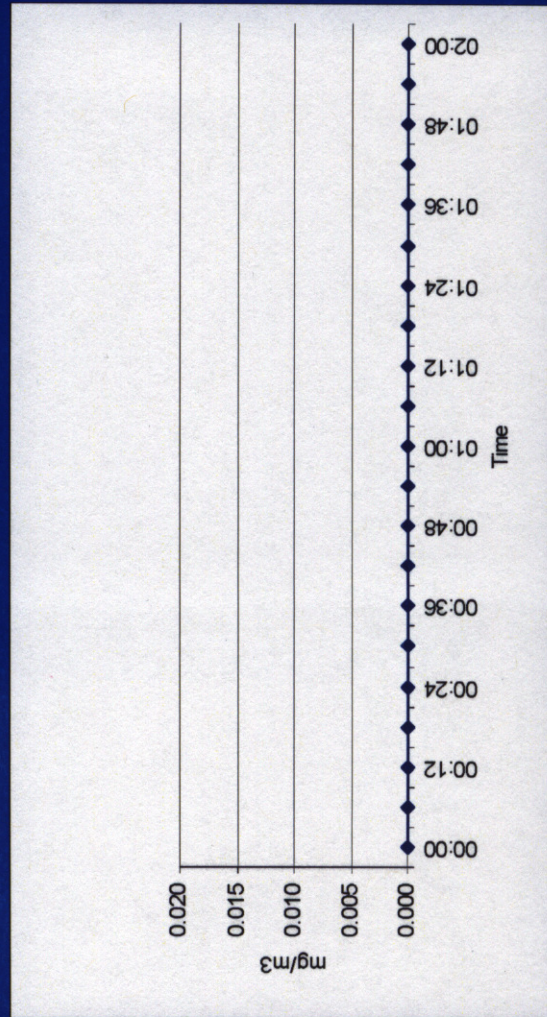
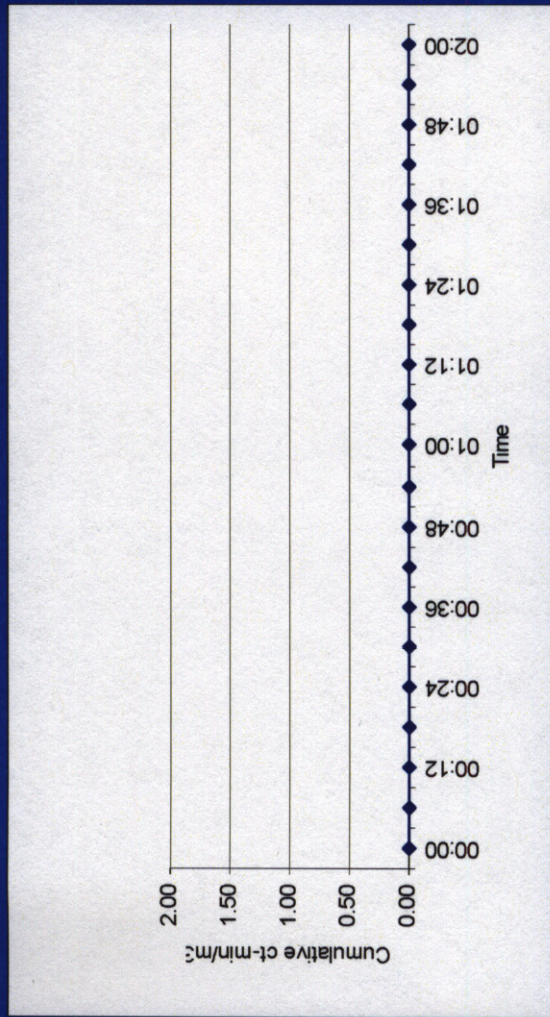


Sample HD Data



Sample HD Data

Three Samples Showed
"Baseline" Results



Lessons Learned

- Other Tests Can Significantly Impact CWA Results
 - High temperature Storage
 - Packaged Rough handling
- Materials and Methods of Construction – Soft Material to Hard Material Interfaces

Summary of Results

- Escape Hoods Are Capable of High Level CWA Protection