UNCLASSIFIED

Test Standard Development for Protection Technologies

Joint Project Manager for Individual Protection and Collective Protection Industry Day

Amy Maxwell
Principle Investigator for CA06PRO411
Amy.maxwell@us.army.mil

Agenda

- Objective
- Overview
- Approach
- Single Pass Filtration
- CATOX
- REGEN
- Particulate Removal/Biological Neutralization
- TICs/Battlefield Contaminants
- Full-Scale ColPro Chamber Testing
- Full-Scale ColPro Field Testing
- Novel Closures
- Summary

Objective

- **Develop Standardized Test Methods for Collective Protection Testing of Existing and New Technologies.**
  - **Testing of devices/materials against various threats to assess the protection capability of that device/material**

Overview – Test Methodologies

- **Air Purification**
  - Single Pass – Sorbent, Filter (Complete)
  - CATOX - Catalyst, PTF, CATOX System (FY08)
  - REGEN - Sorbent, REGEN System (FY10)
  - Biological Neutralization - Media, Filter (Complete)
  - Particulate Removal -Media, Filter (Complete)
  - BFC/TIC Down Selection Processes (FY08)
  - BFC/Chemical Vapor Test Methodology (FY09-FY10)

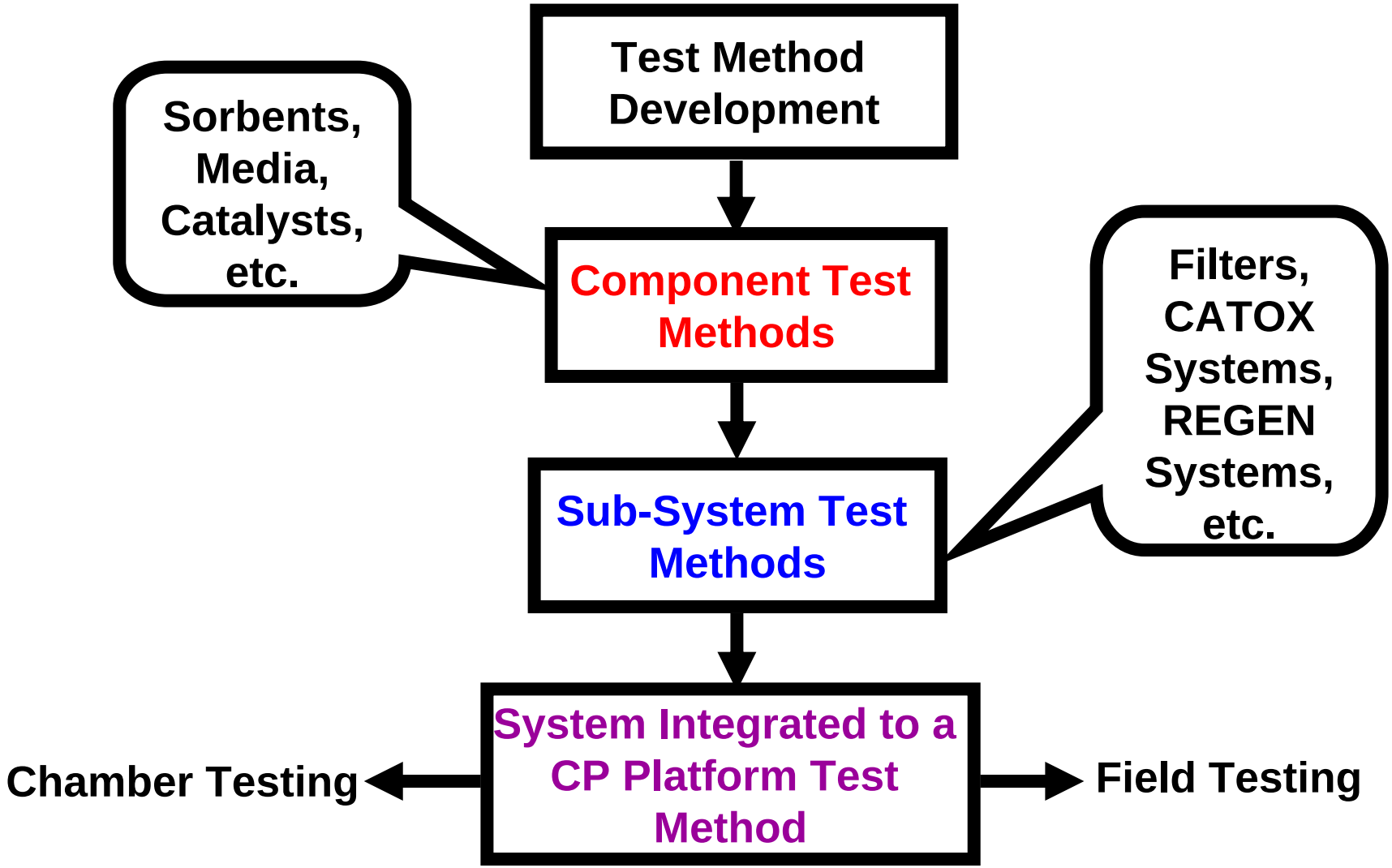
- **Novel Closures**
  - Hydrostatic Test (FY08)
  - Tensile Test (FY08)
  - Peel Strength (FY08)
  - Chemical Resistance (FY09-FY10)
  - Liner Section Frame Design (FY08)
  - Closure Function Frame Design (FY08)

Extension to IP: Single Pass sorbent methodology applicable to IP and adaptable to single pass IP filter methodology (planned)

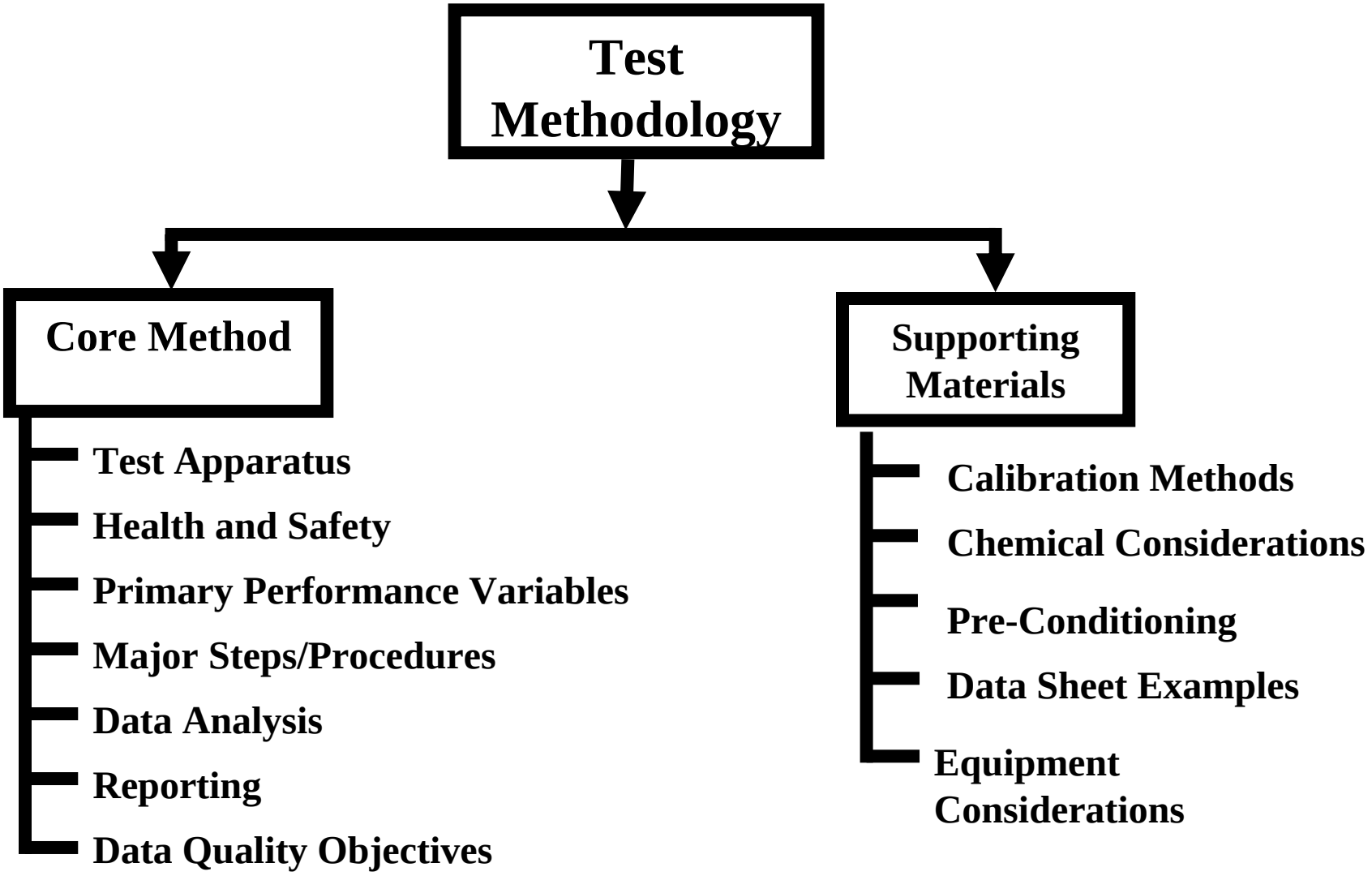
Overview – Test Methodologies

- **Full Scale ColPro Field**
  - Static Chemical (FY08)
  - Dynamic Chemical Entry/Exit (FY08)
  - Dynamic Chemical Mobile Platform (FY08)
- **Full Scale ColPro Chamber**
  - Static Chemical (FY08)
  - Dynamic Chemical Entry/Exit (FY08)
  - Dynamic Wind Driven (FY08)
  - Static Inert Aerosol (FY09)
  - Sub Tests (Pressurization, Leakage, and Purge) (FY08)

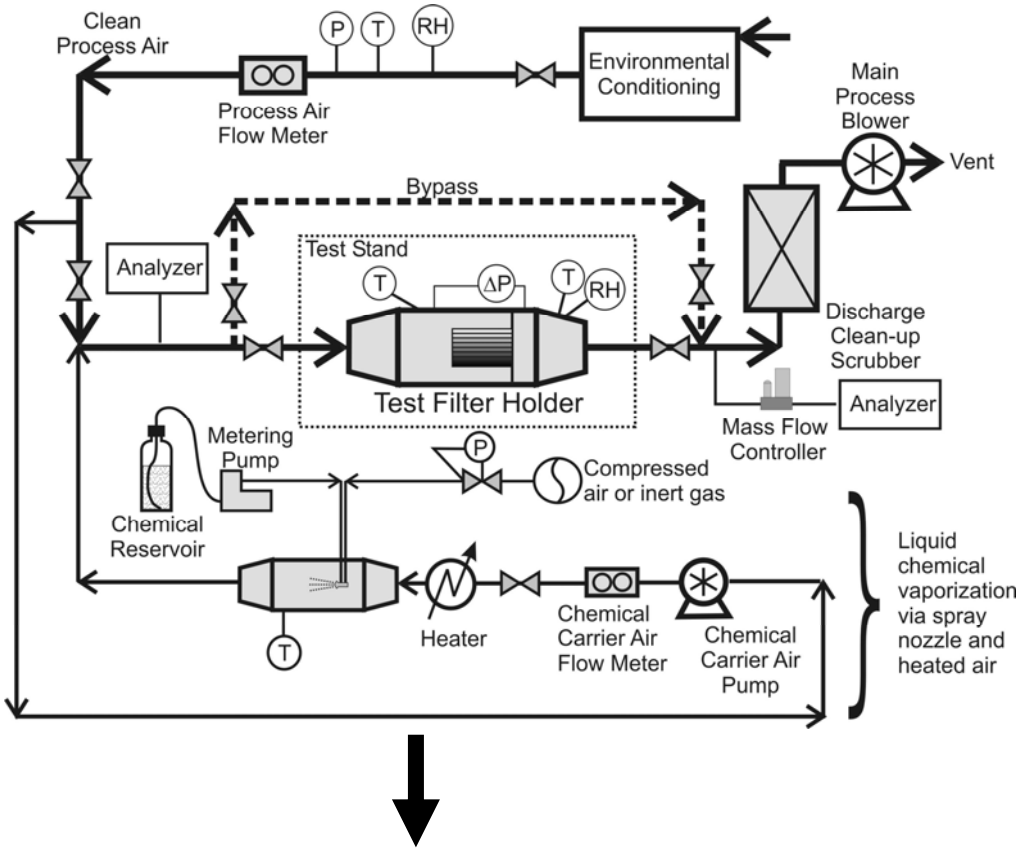
Approach


Test Method Development
Sorbents, Media, Catalysts, etc.
Component Test Methods
Filters, CATOX Systems, REGEN Systems, etc.
Sub-System Test Methods
System Integrated to a CP Platform Test Method
Chamber Testing
Field Testing

Approach


Test Methodology
Core Method
Test Apparatus
Health and Safety
Primary Performance Variables
Major Steps/Procedures
Data Analysis
Reporting
Data Quality Objectives
Supporting Materials
Calibration Methods
Chemical Considerations
Pre-Conditioning
Data Sheet Examples
Equipment Considerations

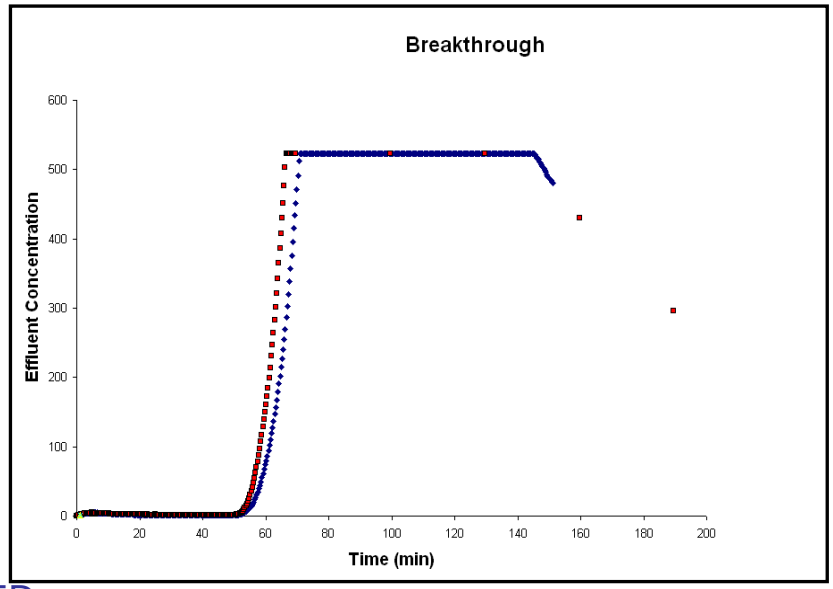
Single Pass Filtration



Mechanism

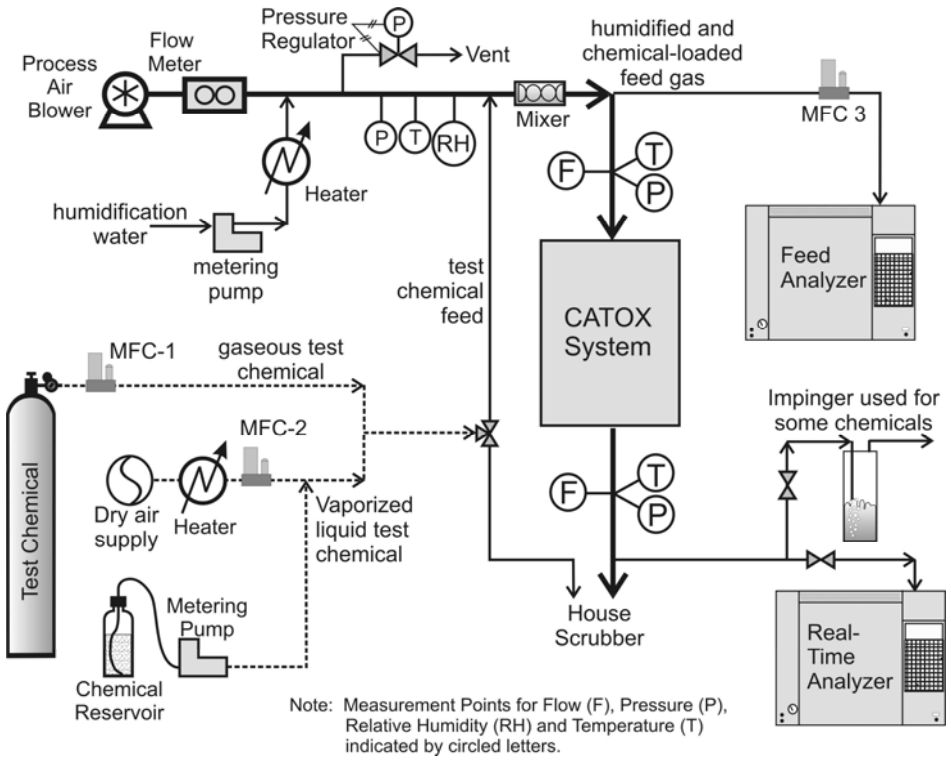
Removal Via Physical Adsorption or Chemical Reaction

Output



Similar Setup for IP Filter Evaluation (Proposed Activity under PRO411)

Catalytic Oxidation



Mechanism

Removal Via chemical reaction to destroy contaminants and threats to produce CO2, water, and haloacids

Output

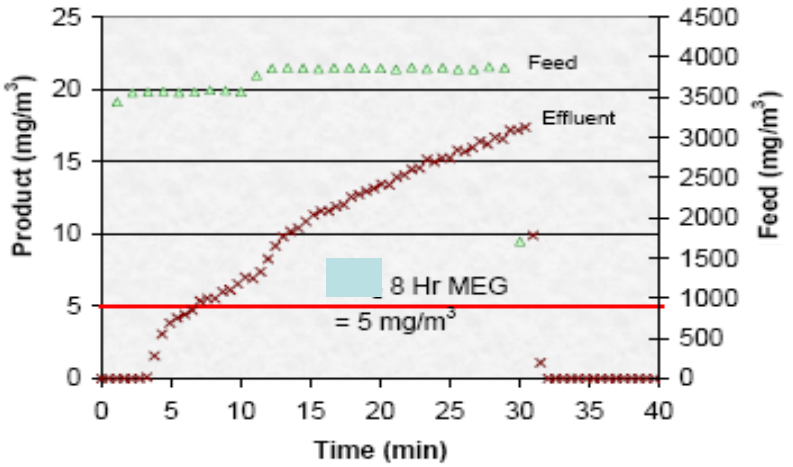
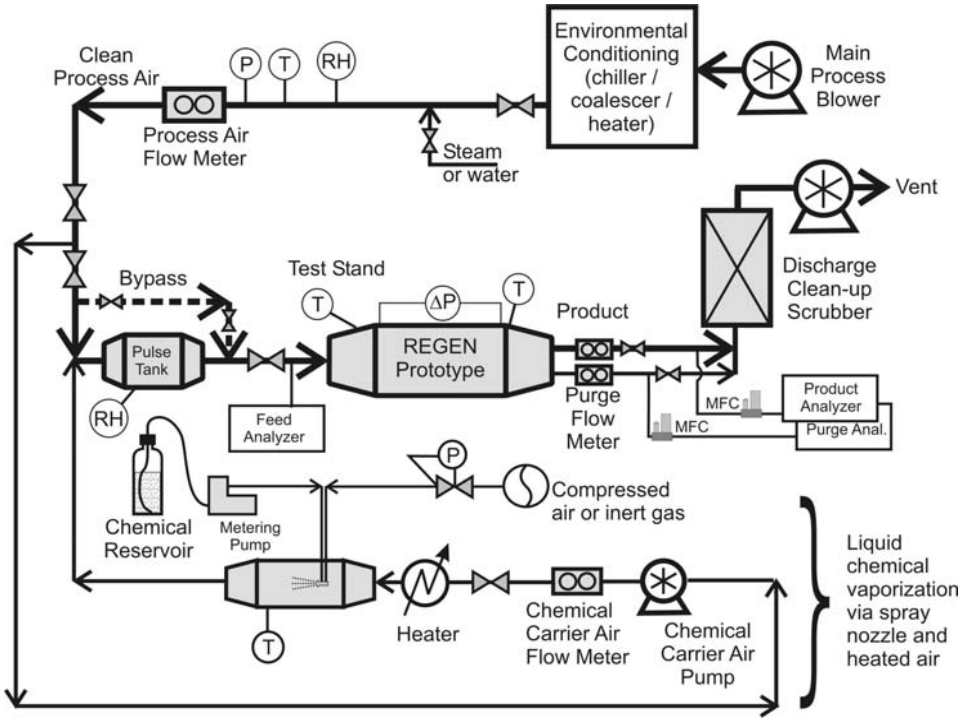


Figure 1. Scenario 2, the short, intense pulse, reveals concentrations above the 8-hr and below 1-hr MEG's

Regenerative Filtration



Mechanism

Same as Single Pass, except that REGEN provides regeneration of the bed for additional physical adsorption capacity

Output

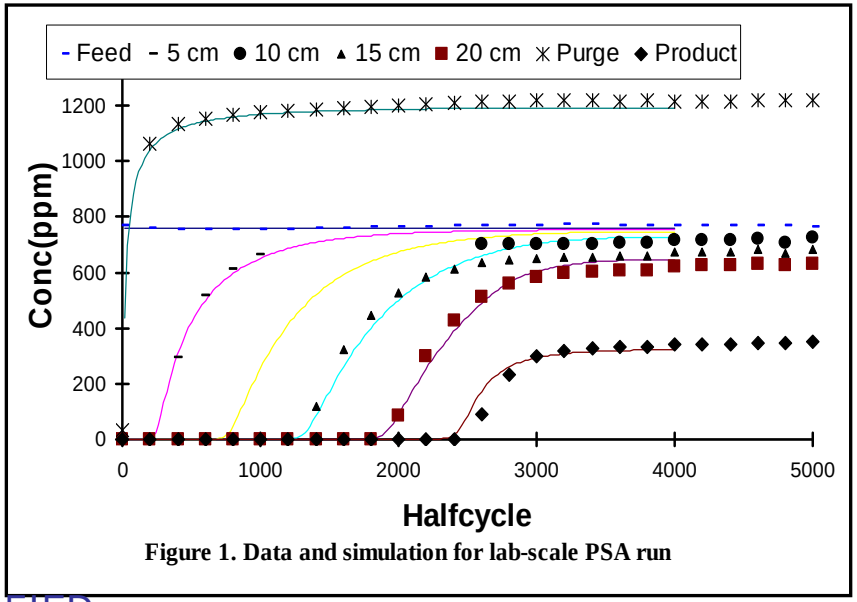
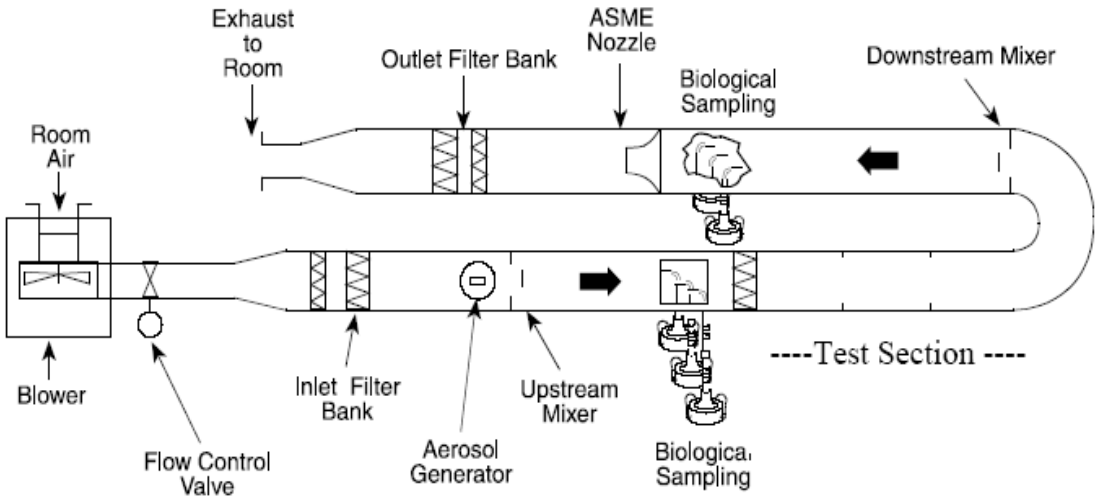


Figure 1. Data and simulation for lab-scale PSA run

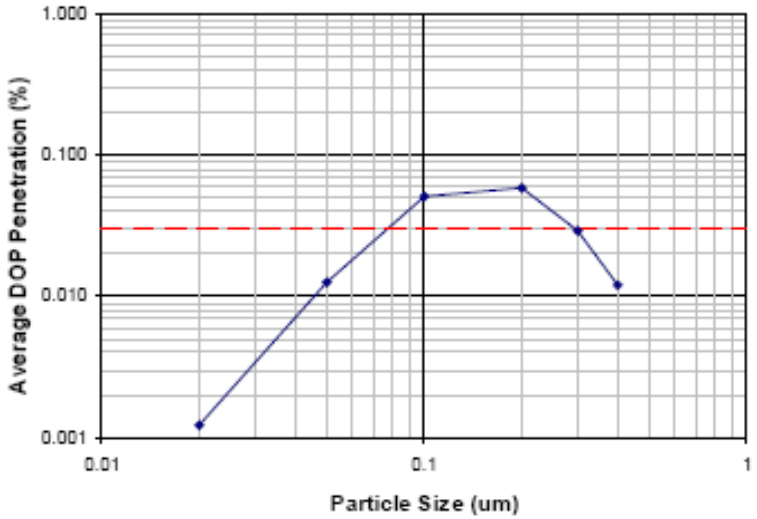
Particulate Removal/Biological Neutralization



Mechanism

Capture and/or Kill/Inactivation

Output

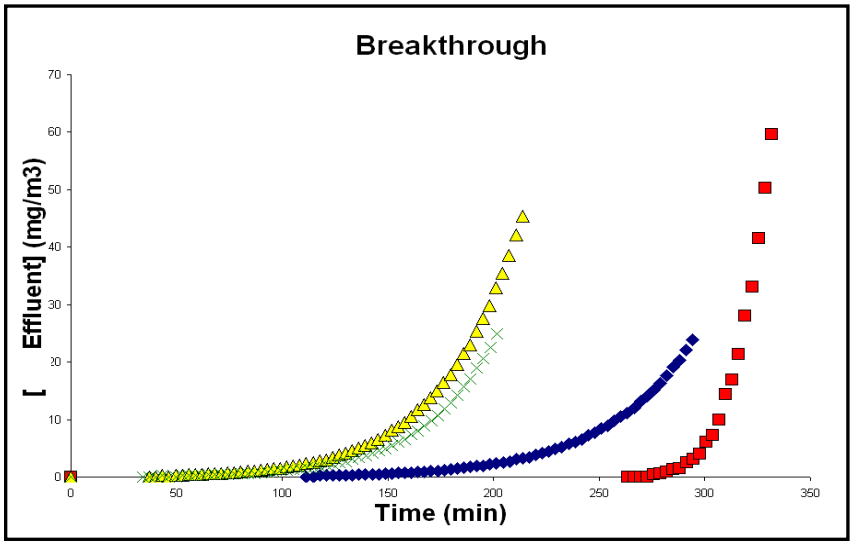


TICs/Battlefield Contaminants

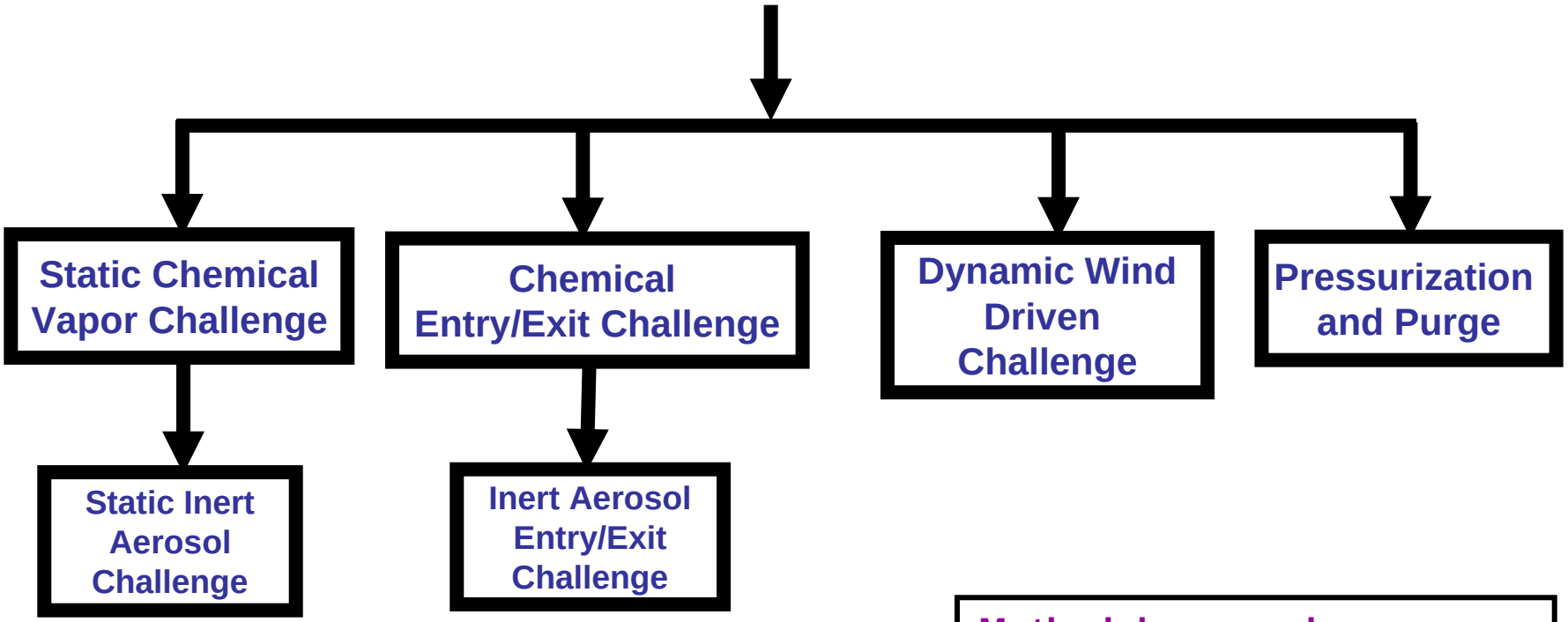
Full List of TICs or BFCs → Down Selection Process (Under Development) → Shortened List of TICs or BFCs → Chemical Protection Evaluation of Air Purification Device

Examples of TICs:
- Ammonia
- Chlorine
- Nitrogen Dioxide (Fuming Nitric Acid)
- Sulfur Dioxide

Examples of BFCs:
- Fuels
- Oils/Lubricants
- Insect Repellent
- Decon Materials



Overview of Full Scale ColPro Chamber Testing



Methodology employs simulants to measure the protective capability of complete systems, addressing all potential mechanisms of intrusion and types of toxic agents.

Overview of Full Scale ColPro Field Testing

Full Scale CP System (Static)

- Static Chemical Challenge
- Chemical Entry/Exit Challenge

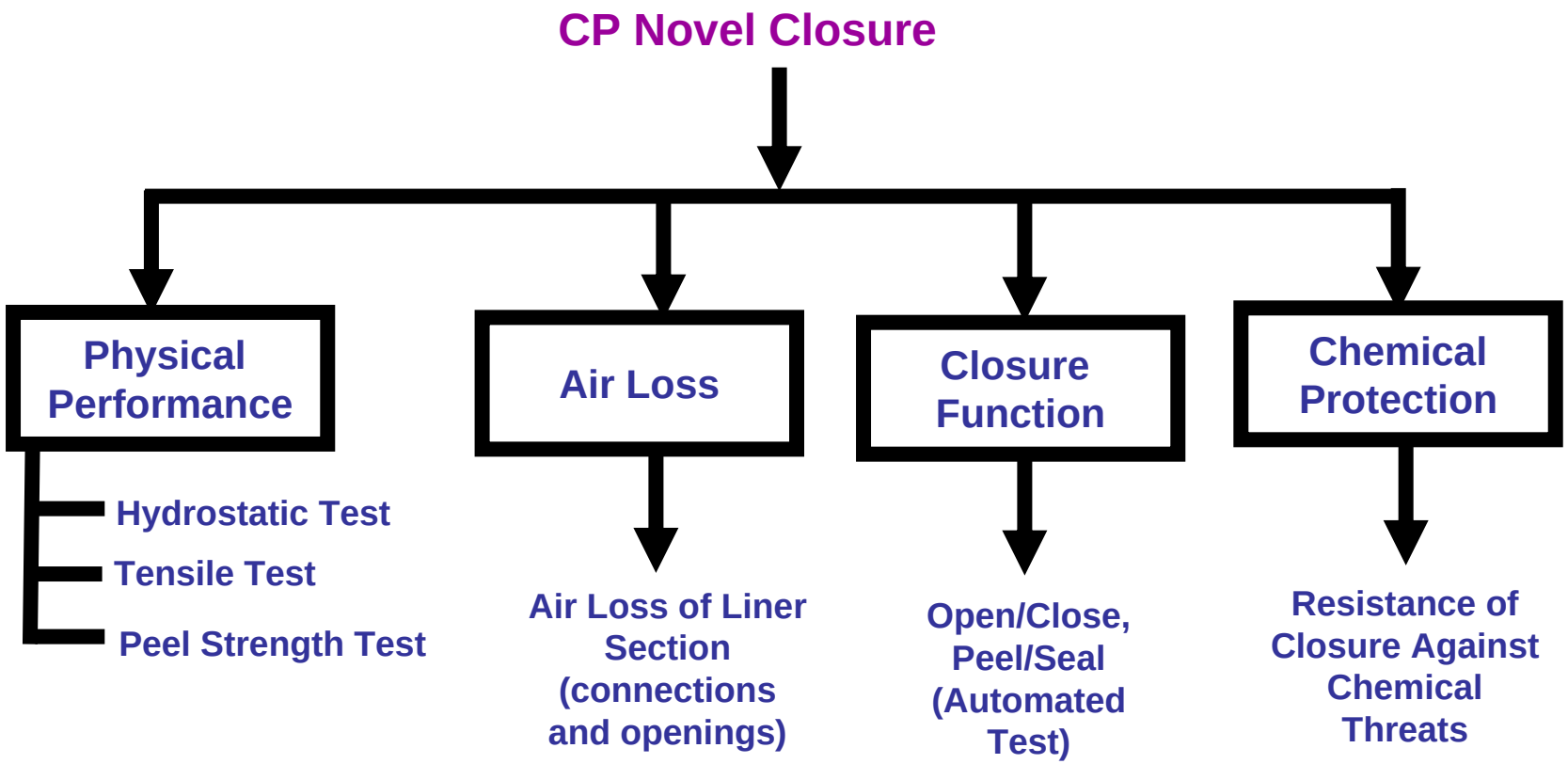
Full Scale CP System (Mobile)

- Dynamic Chemical Challenge of Mobile Platform

Similar to Chamber Testing, But out in the Field Environment, Less Controlled (Operational Type of Test)

Methodology measures the protective capability of a CP system in the field while its users employ the system in a simulated tactical environment (simulant only).

Overview of Novel Closures



Summary

- **Who can use the methodology**
  - **Government**
  - **Contractors**
  - **Academia**
- **Benefits**
  - **Provides Standard Approach to Evaluating the Protection Provided by an Air Purification Device**
  - **Enables Efficient Transition and Fielding of ColPro Systems to the Warfighter**
  - **Allows for Comparison of Data among ColPro Systems**