

ECBC TESTING CAPABILITIES & SERVICES



EDGEWOOD CHEMICAL BIOLOGICAL CENTER ECBC



RDECOM



ECBC OVERVIEW

The U.S. Army Edgewood Chemical Biological Center (ECBC) is the nation's principal research and development center for chemical and biological defense. **As a critical national asset in the chemical biological (CB) defense community**, ECBC supports all phases of the acquisition cycle:

- ▶ Basic and applied research on new and emerging threats
- ▶ Research and development to provide systems for protection, detection and decontamination
- ▶ Production and sustainment of fielded items
- ▶ Development of CB solutions to address customers' unique requirements

As a research development and engineering center (RDEC) under the U.S. Army Research, Development and Engineering Command (RDECOM), ECBC is unique in its ability to utilize expertise and capabilities that span the entire chemical biological acquisition lifecycle. Over the years, ECBC's reputation and proven track record have produced invaluable relationships with other federal agencies and earned it a spot as a key organization within the Department of Defense's (DoD) Chemical Biological Defense Program to combat chemical, biological, radiological, nuclear and explosives (CBRNE) threats.

People are ECBC's most valuable resource with a mix of government employees and on-site contractors — working together to support the warfighter and the homeland. ECBC has full-time employees located at three different places in the United States: Edgewood Area of Aberdeen Proving Ground (APG), Md., Pine Bluff, Ark. and Rock Island, Ill.

ECBC personnel have the knowledge and training to work safely with the most dangerous compounds in the world in order to build or create chemical biological defense solutions. The expertise of its staff — a varied mix of scientists, technicians, engineers, support personnel, government employees, soldiers

and contract personnel — offer a wide array of specialties and abilities that allow the Center to cover the full spectrum of CB research, engineering and operational support for the homeland and the warfighter.

The Center employs people with diverse technical backgrounds including 250 field-deployable scientists, engineers, technicians and field operations personnel. In addition, 10 personnel trained in explosive ordnance disposal are part of the team. **ECBC's innovative workforce evolves CBRNE defense technologies and capabilities worldwide.**

ECBC has matrixed approximately 200 acquisition professionals in support of the Joint Program Executive Office for Chemical and Biological Defense program areas. Employees at Rock Island focus on materiel sustainment while ECBC personnel at Pine Bluff Arsenal support the U.S. Army Chemical Materials Agency's disposal mission for non-stockpile munitions.

ECBC offers unique expertise, several state-of-the-art facilities and equipment to meet CBRNE defense needs worldwide. The Center's facilities are designed to protect workers, the local population and the environment from the hazardous compounds employees work with on a daily basis. **The nature of the work ECBC performs requires it to maintain a high standard of safety and quality as well as the expertise to operate in a surety environment.** The Center's employees execute CB surety work in hoods and glove boxes for small- to mid-scale operations. For large operations, ECBC has chambers that serve as the containment for complex, explosively configured agent operations.

ECBC consistently demonstrates its commitment to being a good neighbor to the surrounding community and has actively worked with partners to support BRAC advance parties. After nearly 100 years, ECBC continues a tradition of loyalty to responsive service and feedback, striving to consistently exceed stakeholder expectations.

CONTENTS

TABLE OF CONTENTS

INTRODUCTION TO TESTING CAPABILITIES	3
CAPABILITIES	4
Initial Compound Properties	4
Requirements Definition	5
Technology Readiness Assessments and Evaluations	6
Evaluating Capabilities of COTS items	7
Assist Developer in Defining Item's Performance Parameters	8
Develop, Validate & Transition Test Methods, Procedures & Fixtures	9
Execute Testing Based on Requests by ATEC/DTC for Formal Evaluation Purposes	10
Conduct First Article and Production Lot Acceptance Testing	11
Conduct Surveillance and Shelf-life Testing	12
Development of CB Solutions to Address Customers' Unique CB Requirements	13
Conduct Exploitation and Characterization of CBrne Unknown Items and Devices	14
Conduct Risk Management and Mitigation for Testing Activities	15
Environmental Remediation and Restoration Testing and Support	16
INTRODUCTION TO SERVICE OFFERINGS	17
SERVICES	18
Adsorbent and Filter Charcoal Testing	18
Analytical Capabilities	19
Applied Detection Technology	20
Biodefense/Biosciences	21
Biophysical Chemistry/Biosciences	22
Biosensors/Biosciences	23
Chemical Biological Radiological Filtration	24
Chemical Biological Applications and Risk Reduction (CBARR)	25
Chemical Sciences	26
Chemical Transfer Facility (CTF)	27
Collective Protection Evaluation	28
Environmental, Climatic Harsh Environment Testing	29
Environmental Monitoring Laboratory (EML)	30
Fixed Site & Filter-in-Place Systems Performance	31
Hazardous & Non-Hazardous Package Testing	32
Human Performance Test Facility	33
Large-Scale Agent & Explosive Chambers	34
Large-Scale Simulant Chamber	35
Large-Scale Water Test Loop System	36
Man In Simulant Testing (MIST)	37
Mobile Laboratories & Kits	38
Molecular Engineering/Biosciences	39
Motion Capture Facility	40
Munitions Assessment and Processing System (MAPS)	41
Particulate Filtration and Protection Factor Research Facility	42
Physical Properties Testing	43
Product Evaluation	44
Prototype Detonation Test and Destruction Facility (PDTDF)	45
Qualitative Permeation Testing	46
Quantitative Permeation Testing	47
Respirator & Ensemble Fit	48
Respirator Testing	49
Sample Receipt Facility (SRF)	50
Shock, Vibration & Rough Handling	51
Simulant Agent Resistant Test Manikin (SMARTMAN) Agent Testing	52
Standoff Detection Technology Evaluation	53
Toxicology	54
Toxicology-Environmental	55
WORKING WITH ECBC	56
ECBC QUALITY STATEMENT	56
DIRECTORATE OVERVIEWS	57



INTRODUCTION TO TESTING CAPABILITIES

As an RDEC, ECBC provides acquisition support across the lifecycle and can investigate and analyze various materiel solutions to support program managers and programs of record. This support is available to other government agencies (OGA) and commercial entities as they address the challenges of defending and securing the homeland. The Center maintains a broad portfolio across the lifecycle, mainly in the CBRne arena; however, due to its close proximity to the test activities at Aberdeen Proving Ground, ECBC actively assists in other areas.

ECBC prides itself on the ability to partner with other organizations to facilitate the design, development and prove-out of systems to address Warfighter and homeland needs. The Center's capabilities in the testing area — its testing and evaluation (T&E) niche — is one of the key features in these partnerships. ECBC's T&E niche complements other critical capabilities such as intellectual capital, equipment and infrastructure that reside within the Center.

CRITICAL RESEARCH CAPABILITIES

- ▶ Chemistry and Bioscience of CB Warfare
- ▶ Inhalation Toxicology
- ▶ Aerosol Physics
- ▶ Filtration Sciences
- ▶ Agent Spectroscopy/Algorithm Development
- ▶ Select Agent Referee Sets
- ▶ Organization for the Prohibition of Chemical Weapons (OPCW) Laboratory
- ▶ Non-Traditional Agent (NTA) Science & Technology

CRITICAL OPERATIONS CAPABILITIES

- ▶ Live Agent Handling and Surety
- ▶ Environmental Analytical Testing and Validation Services
- ▶ High Throughput CWA/BWA and Inorganic Chemical Analysis
- ▶ Deployable Mobile Lab Services
- ▶ Chemical Munitions Field Operations
- ▶ Field Remediation and Demilitarization Operations
- ▶ Integration

CB DEFENSE MATERIEL TESTING

- ▶ CB Testing & Evaluation
- ▶ Lifecycle CB Materiel Acquisition
- ▶ Rapid Prototyping

- ▶ Systems Engineering
- ▶ NTA Test & Evaluation
- ▶ U.S. Army Research, Development and Engineering Command (RDECOM) lead for Defense Logistics Agency (DLA) Consumable Item Transfer

ECBC maintains several one-of-a-kind facilities that are critical to the Center's testing niche. ECBC's workforce possesses expertise in chemical and biological surety and is able to conduct operations in the lab and test chambers as well as in the field. Testing can be conducted with a variety of compounds — chemical and biological surety agents, toxic industrial materials and compounds, simulants and numerous interferent compounds. Additionally, ECBC has been working with emerging threat materials since the early 1990s. ECBC has been declared by the US as the single small scale facility for the country as described by the Chemical Weapons Convention Treaty. In that capacity, ECBC is required to produce all schedule 1 chemicals that are used for research, medical, pharmaceutical or protective purposes in the United States. The Center provides chemical agents to the Army, to approved contractors and OGA.

ECBC'S T&E CAPABILITIES SUPPORT ALL PHASES OF THE ACQUISITION LIFECYCLE:

- ▶ Basic and applied research on new and emerging threats
- ▶ Research and development to provide CB "non-medical" systems of protection, detection and decontamination
- ▶ Complement/support ATEC/DPG capabilities
- ▶ Production and sustainment of fielded items
- ▶ Development of CB solutions to address customers' unique CB requirements

The subsequent pages will provide more detail on ECBC's specific test capabilities and services as applied across the lifecycle. This information is based on efforts executed to date and is not meant to indicate that new efforts cannot be executed. As a fee-for-service organization, approximately 80 to 90 percent of ECBC's funding comes from customers outside of the U.S. Army to include a variety of DoD and non-DoD organizations. The information contained in this booklet serves as a baseline for the variations and/or adaptations that can be made to support customers' unique requirements and needs.

CAPABILITIES

INITIAL COMPOUND PROPERTIES



As new compounds are identified, some key information needs to be obtained immediately. ECBC conducts testing to determine the compound's physical properties and to establish processes and protocols to safely work with the compound. As required, ECBC collaborates with the medical community (the U.S. Army Medical Command) to

initiate studies for medical treatment or prophylaxis.

ECBC has been requested to evaluate various methods and procedures to determine if hazardous compounds could be produced. Follow-on testing is then conducted to determine how extensive that hazard is — how long will it last under various environmental conditions and what impact is it expected to have on the human body and the environment.

This information, combined with potential use concepts, can indicate if there could be undesirable consequences should this material be used. The outcome of that analysis would cause the revision to existing equipment requirements or requirements for new systems to be developed.

For more details, reference the following ECBC service offering pages:

- ▶ Chemical Sciences Division
- ▶ Toxicology and Obscurants Division

ECBC Supports the Acquisition Lifecycle





REQUIREMENTS DEFINITION

As the *Overseas Contingency Operation* (formerly known as the Global War on Terror) continues, situations arise that can place the Warfighter and domestic responders in harm's way on a daily basis. With its capability to assess various scenarios to define the resulting hazard, ECBC has the ability to determine the effectiveness of existing equipment against new scenarios or threat compounds.

REQUIREMENTS DEFINITION IN PRACTICE



The photo depicts an exercise designed by ECBC to determine the amount of contamination transferred to a responder's clothing when rescuing individuals from an area in which an improvised explosive

device (IED) was detonated. Testing was initially conducted with a simulant mixed with a purple jelly. The rescuers entered the chamber following the detonation of the IED and extracted the 'living' mannequins using their routine procedures. The purple jelly was transferred to their clothing and helped to identify the locations that require the most protection. This information was used by the responders to evaluate the safety of their

procedures and by the material developers to assess if the clothing provided sufficient protection. The chamber was also instrumented to determine the characteristics of the hazard resulting from the IED detonation. Follow-up testing was conducted with surety compounds to correlate the simulant data with agent data.

For more details, reference the following ECBC service offering pages:

- ▶ Analytical Capabilities
- ▶ Applied Detection Technology
- ▶ Collective Protection Evaluation
- ▶ Environmental, Climatic & Harsh Environmental Testing
- ▶ Large-Scale Agent & Explosive Chambers
- ▶ Large-Scale Simulant Chamber
- ▶ Large-Scale Water Test Loop System
- ▶ Man-In-Simulant Testing (MIST)
- ▶ Motion Capture Facility
- ▶ Particulate Filtration and Protection Factor Research Facility
- ▶ Physical Properties Testing
- ▶ Qualitative Permeation Testing
- ▶ Quantitative Permeation Testing
- ▶ Respirator and Ensemble Fit
- ▶ SMARTMAN Agent Testing

ECBC Supports the Acquisition Lifecycle



CAPABILITIES

TECHNOLOGY READINESS ASSESSMENTS AND EVALUATIONS

ECBC conducts Technology Readiness Assessments (TRA) to determine the Technology Readiness Level (TRL) of a technology or piece of equipment. TRAs are used to provide a “snapshot” of the maturity level of the technology and/or equipment based on requirements, concept of operations (CONOPS) and key technical criteria. A TRA’s end product is a final report detailing technical maturity and the identification of possible risks in the development of the technology.



As acquisition budgets become tighter, only those items of sufficient TRL will transition to the next phase of development. Those deemed not ready may receive additional investment to mature the technology and/or equipment, be put on the shelf until the need is revalidated or deferred until the concept of use becomes more robust.

For more details, reference the following ECBC service offering pages:

- ▶ Applied Detection Technology
- ▶ BioDefense/BioSciences
- ▶ Collective Protection Evaluation
- ▶ Environmental, Climatic & Harsh Environmental Testing
- ▶ Large-Scale Agent & Explosive Chambers
- ▶ Large-Scale Simulant Chamber
- ▶ Large-Scale Water Loop System
- ▶ Man-In-Simulant Testing (MIST)
- ▶ Product Evaluation
- ▶ Qualitative Permeation Testing
- ▶ Quantitative Permeation Testing
- ▶ Stand-Off Detection Technology Evaluation
- ▶ SMARTMAN Agent Testing

ECBC Supports the Acquisition Lifecycle





EVALUATING CAPABILITIES OF COTS ITEMS



Using Commercial Off-the-Shelf (COTS) equipment is a fairly rapid solution to satisfy an operational requirement. ECBC conducts testing on COTS items to assist the program manager and user/

operator in determining if the item can be used as purchased. This testing can define the item's performance envelope and forces ECBC's experienced staff to ask:

- What are the product's limits?
- How does it perform in certain environments?
- Can the operator easily use the item or material?

The data may indicate that the item is suitable as produced, but most likely the operator must modify the operating procedures in order to get maximum benefit.

ECBC conducts this type of testing throughout the acquisition lifecycle and for a variety of customers. Commercial contractors — the item's developer —

often request testing to determine if or how closely they have met the government's performance requirements. ECBC frequently conducts testing with surety compounds for these development contractors and in many cases the contractors are able to make adjustments to their items, during the testing, to optimize performance.

For more details, reference the following ECBC service offering pages:

- ▶ Adsorbent and Filter Charcoal Testing
- ▶ Analytical Capabilities
- ▶ Applied Detection Technology
- ▶ BioDefense/BioSciences
- ▶ BioSensors/BioSciences
- ▶ Collective Protection Evaluation
- ▶ Environmental Monitoring Laboratory (EML)
- ▶ Environmental, Climatic & Harsh Environment Testing
- ▶ Hazardous & Non-Hazardous Package Testing
- ▶ Large-Scale Agent & Explosive Chambers
- ▶ Large-Scale Water Test Loop System
- ▶ Man-In-Simulant Testing (MIST)
- ▶ Product Evaluation
- ▶ Qualitative Permeation Testing
- ▶ Quantitative Permeation Testing
- ▶ Respirator and Ensemble Fit
- ▶ Shock, Vibration & Rough Handling
- ▶ SMARTMAN Agent Testing

ECBC Supports the Acquisition Lifecycle



CAPABILITIES

ASSIST DEVELOPER IN DEFINING ITEM'S PERFORMANCE PARAMETERS



As described in the previous section, ECBC has the capability to define an item's performance envelope. As the materiel developer prepares for the program of record official testing, ECBC may be asked to conduct testing using the same procedures to provide some degree of comfort that the item is ready to proceed to formal testing. Many program managers



build their program schedules with early testing of critical or sensitive components as a means to manage risk and build confidence in their design. They are able to identify transportation challenges early so the design may be modified to reduce problem areas.

Early testing can also be executed for commercial customers, under a technology support agreement. The item's performance and its manufacturing processes can be enhanced based on data obtained throughout the acquisition lifecycle. Testing can be conducted to determine how an item will respond to new threat compounds or in a new operational environment.



For more details, reference the following ECBC service offering pages:

- ▶ Applied Detection Technology
- ▶ BioDefense/BioSciences
- ▶ BioSensors/BioSciences
- ▶ Collective Protection Evaluation
- ▶ Environmental Monitoring Laboratory (EML)
- ▶ Environmental, Climatic & Harsh Environment Testing
- ▶ Hazardous & Non-Hazardous Package Testing
- ▶ Large-Scale Agent & Explosive Chambers
- ▶ Large-Scale Simulant Chamber
- ▶ Large-Scale Water Test Loop System
- ▶ MIST
- ▶ Quantitative Permeation Testing
- ▶ Respirator & Ensemble Fit
- ▶ Shock, Vibration & Rough Handling
- ▶ SMARTMAN Agent Testing

ECBC Supports the Acquisition Lifecycle





DEVELOP, VALIDATE & TRANSITION TEST METHODS, PROCEDURES & FIXTURES



ECBC's scientists and engineers establish test methods, procedures and fixtures as they work with items in the early phases of the acquisition process. As the item matures, so must the methods, procedures

and fixtures. The methods and fixtures used early in the development process tend to focus on testing a single item to learn everything about the item and its performance.



As the item completes the development phase and is considered for production, key performance parameters are the focus of testing and the quantity of items has increased.

Testing associated with acceptance of items from a production line is focused on ensuring these items meet the government's key criteria. Testing at this phase is on a significant number of items and the costs of these

tests are included in the cost of the end item, so procedures and fixtures are focused at high throughput and relatively low costs.

ECBC develops test methods and procedures in collaboration with the program managers and major range and test facilities to ensure critical test parameters/conditions are identified and maintained throughout lifecycle testing. ECBC also designs and fabricates the associated test fixtures which are documented and held under configuration control. Test methods and fixtures are scaled and validated to handle high through-put required at the later stages of the acquisition lifecycle.

For more details, reference the following ECBC service offering pages:

- ▶ Analytical Capabilities
- ▶ Applied Detection Technology
- ▶ BioDefense/BioSciences
- ▶ BioSensors/BioSciences
- ▶ Biophysical Chemistry/BioSciences
- ▶ Collective Protection Evaluation
- ▶ Large-Scale Agent & Explosive Chambers
- ▶ Large-Scale Simulant Chamber
- ▶ Molecular Engineering/Biosciences
- ▶ Product Evaluation
- ▶ Quantitative Permeation Testing
- ▶ Respirator and Ensemble Fit
- ▶ SMARTMAN Agent Testing

ECBC Supports the Acquisition Lifecycle



CAPABILITIES

EXECUTE TESTING BASED ON REQUESTS BY ATEC/DTC FOR FORMAL EVALUATION PURPOSES



ECBC's testing resources can be used to support program/milestone decisions. Coordination and concurrence is obtained in advance from the test working group, ATEC and milestone decision authority for programs of record. With proper coordination, this can result in reducing the total scope of required testing and therefore, reduce development cost and schedule.

ECBC has some unique environmental capabilities that are not readily available at the Aberdeen Test

Center. Additionally, ECBC capabilities can be used if a major range and test facility has issues with their infrastructure or meeting the program's schedule requirements.

The Chemical Biological Defense Program is establishing a more comprehensive non-traditional agent (NTA) test capability at ECBC. This new test capability will be used to support all phases of the acquisition lifecycle. ECBC currently is executing tests with NTAs, but this new test capability will provide the ability to challenge larger components or systems.

For more details, reference the following ECBC service offering pages:

- ▶ Applied Detection Technology
- ▶ Collective Protection Evaluation
- ▶ Environmental Monitoring Laboratory (EML)
- ▶ Environmental, Climatic & Harsh Environment Testing
- ▶ Large-Scale Agent & Explosive Chambers
- ▶ Large-Scale Simulant Chamber
- ▶ Man-In-Simulant Testing (MIST)
- ▶ Respirator & Ensemble Fit
- ▶ Shock, Vibration & Rough Handling
- ▶ SMARTMAN Agent Testing

ECBC Supports the Acquisition Lifecycle





CONDUCT FIRST ARTICLE AND PRODUCTION LOT ACCEPTANCE TESTING



ECBC supports the production phase of the acquisition process by executing tests to verify that items produced by the production contractor meet the government's requirements. Many production contractors do not have the ability to use chemical or biological surety compounds, so they must work with organizations like ECBC to conduct production lot acceptance testing. ECBC can execute this work under a technology support agreement between the production contractor and ECBC. ECBC can also be funded directly by the government procurement agency to execute these production tests.



First article testing is conducted to verify that a new contractor or new production line is capable of producing items that meet key performance parameters that have been identified by the government.



Once the first article tests have been passed successfully, similar testing is conducted on a specified quantity of each production lot. The performance parameters, for first article testing tend to be more extensive than those parameters verified on each production lot.

ECBC has traditionally conducted first article and production lot acceptance testing in the protection area — validation of barrier materials, filtration media and end items — filters and respirators. The test methods and fixtures, used to execute these tests, were established and validated to meet the need of a high quantity of test items and the desire to control costs of individual tests. ECBC's environmental and rough handling test capabilities are also used to execute the production phase tests.



For more details, reference the following ECBC service offering pages:

- ▶ Adsorbent & Filter Charcoal Testing
- ▶ Applied Detection Team
- ▶ Collective Protection Evaluation
- ▶ Decon Testing
- ▶ Environment, Rough Handling & Packaging
- ▶ Hazardous & Non-Hazardous Package Testing
- ▶ MIST
- ▶ Quantitative Permeation Testing
- ▶ Qualitative Permeation Testing
- ▶ Respirator & Ensemble Fit
- ▶ SMARTMAN Agent Testing

ECBC Supports the Acquisition Lifecycle



CAPABILITIES

CONDUCT SURVEILLANCE AND SHELF-LIFE TESTING

Surveillance testing is conducted to determine if items on the shelf (waiting to be issued) still meet the government's key performance requirements. A sample of items is pulled and provided to the appropriate laboratory for testing. Passing these tests provides confidence that the lots associated with the items tested still meet the government's requirements.

Shelf-life testing is conducted to determine if the assigned shelf-life can be extended without impacting the quality of the items provided to the field. This testing, like surveillance testing, is planned for as the item is developed and the methods and fixtures are developed and validated.

ECBC conducts both these kinds of testing on the end items as well as the packing associated with the end items and spare/repair parts.

For more details, reference the following ECBC service offering pages:

- ▶ Adsorbent & Filter Charcoal Testing
- ▶ Collective Protection Evaluation
- ▶ Decon Testing
- ▶ Environment, Rough Handling & Packaging
- ▶ MIST
- ▶ Quantitative Permeation Testing
- ▶ Qualitative Permeation Testing
- ▶ Respirator & Ensemble Fit
- ▶ SMARTMAN Agent Testing



ECBC Supports the Acquisition Lifecycle





DEVELOPMENT OF CB SOLUTIONS TO ADDRESS CUSTOMERS' UNIQUE REQUIREMENTS



This capability can be tailored to meet the requirements of the customer and the item under test. ECBC will test an item and recommend modifications to enable that item to expand its operating

parameters. Usually these one-of-a-kind items are employed by ECBC personnel or serve as a prototype to evaluate their mission effectiveness.

Following the events of Sept. 11, 2001, ECBC was called upon to provide the U.S. Postal Service with techniques and solutions for the safe handling of mail. Efforts continue to understand the hazards associated with potentially contaminated mail streams and how to safely handle potentially contaminated mail. ECBC has also been requested to provide solutions for the handling and elimination of chemical-filled munitions.

In addition, ECBC's expertise has been called upon to design and fabricate mobile analytical laboratory platforms for military units, and federal, state and local agencies. These platforms are designed to meet specific customer requirements and include the associated test procedures and analytical methods.



For more details, reference the following ECBC service offering pages:

- ▶ Applied Detection Technology
- ▶ BioDefense/BioSciences
- ▶ BioPhysical Chemistry/BioSciences
- ▶ BioSensors/BioSciences
- ▶ Environmental Monitoring Laboratory (EML)
- ▶ Hazardous & Non-Hazardous Package Testing
- ▶ Munitions Assessment and Processing System
- ▶ Mobile Labs and Kits
- ▶ Prototype Detonation Test and Destruction Facility
- ▶ Sample Receipt Facility

ECBC Supports the Acquisition Lifecycle



CAPABILITIES

CONDUCT EXPLOITATION AND CHARACTERIZATION OF CBrne UNKNOWN ITEMS AND DEVICES



ECBC is a national resource for the receipt, synthesis and characterization of novel CBrne compounds and CBrne unknowns. These activities require effective coordination of operations within ECBC. An experienced staff with a wide variety of scientific, engineering and technical support backgrounds operates ECBC's facilities to ensure national defense needs are met in a safe

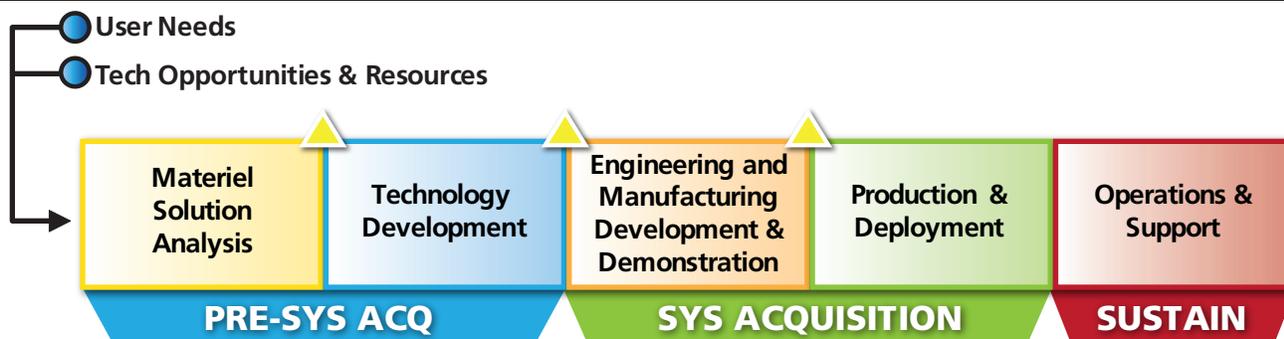
and environmentally responsible manner. ECBC maintains a vast array of test facilities including chambers designed to contain chemical equipment and explosive/toxic munitions as well as Biological Safety Level 1, 2, and 3 laboratories. A typical operation includes initial risk assessment, sample characterization and triage, comprehensive biological and/or chemical analysis of forensically sound samples, toxicology, disposal and Standard Operating Procedure (SOP) publication.



For more details, reference the following ECBC service offering pages:

- ▶ BioDefense/BioSciences
- ▶ Biological Applications and Risk Reduction (CBARR)
- ▶ Chemical Sciences
- ▶ Chemical Transfer Facility
- ▶ Environmental Monitoring Laboratory (EML)
- ▶ Munitions Assessment and Processing System
- ▶ Prototype Detonation Test and Destruction Facility
- ▶ Sample Receipt Facility

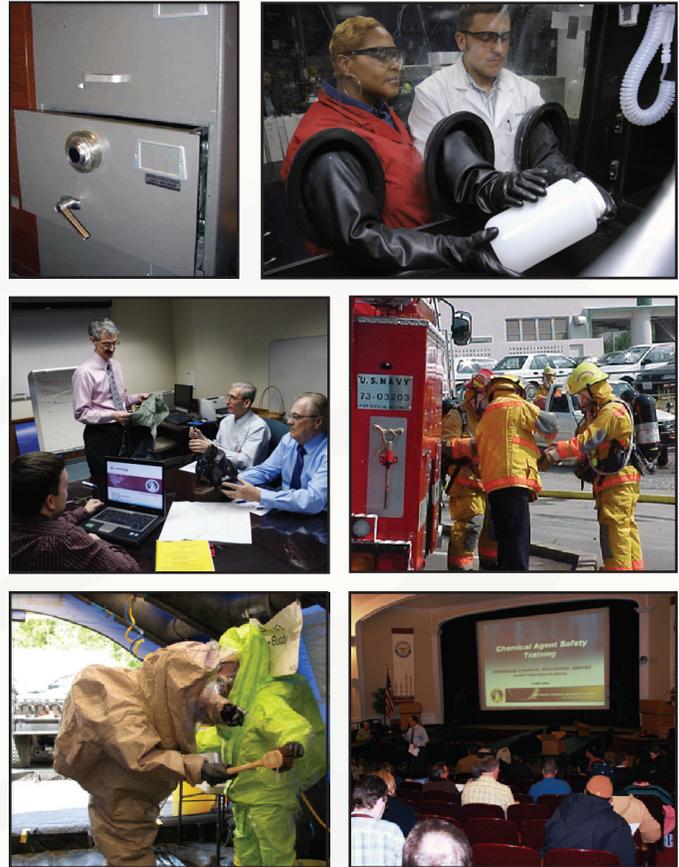
ECBC Supports the Acquisition Lifecycle





CONDUCT RISK MANAGEMENT AND MITIGATION FOR TESTING ACTIVITIES

ECBC personnel work with the world's most toxic chemical and biological materials and a safe work environment is essential to ECBC's mission accomplishment. The ECBC Risk Management (RM) program is comprised of professionals in safety, industrial hygiene, environmental protection, security, and surety. The RM program has extensive experience in ensuring that all ECBC chemical and biological research using surety materials complies with Department of Defense, Army and Army Materiel Command (AMC) directives and regulations. Personnel expertise has also been exported to assist organizations in managing CB surety, safety and security programs. ECBC manages the AMC Contractor Owned, Contractor Operated chemical agent laboratory program; the Joint Program Executive Office's joint vaccine acquisition program; and assists the Department of Homeland Security in management of their chemical training site - Chemical, Ordnance, Biological, Radiological Training Facility (COBRATF).



ECBC Supports the Acquisition Lifecycle



CAPABILITIES

ENVIRONMENTAL REMEDiation AND RESTORATION TESTING AND SUPPORT

Remediation of CB agents and other surety materials from stockpiles and the environment are key issues for DoD and other federal agencies. ECBC has the capability to test various technologies and solution sets for the remediation, demilitarization and demobilization of munitions and bulk containers.

These technologies are tested to determine how effectively they eliminated the item and what by-products remain. The characteristics of these by-products are analyzed to determine their environmental fate and toxicity, and toxicology of any soil and water contaminants. Since remediation operations can occur anywhere in the world, ECBC can establish appropriate monitoring techniques protocols for the materials and their by-products. Some technology solutions include containment and filtration systems which capture and treat the resulting by-products, therefore returning the environment to a better condition.

ECBC's expertise has been called upon to design, assemble, validate and operate systems to satisfy site-specific requirements. ECBC has supported customers worldwide by providing both stationary and deployable lab services and operations for the remediation of CB agents and other surety materials.



For more details, reference the following ECBC service offering pages:

- ▶ Chemical Biological Applications and Risk Reduction (CBARR)
- ▶ Chemical Transfer Facility
- ▶ Environmental Monitoring Laboratory (EML)
- ▶ Prototype Detonation Test and Destruction Facility
- ▶ Sample Receipt Facility
- ▶ Toxicology and Toxicology-Environmental

ECBC Supports the Acquisition Lifecycle



INTRODUCTION TO SERVICE OFFERINGS

ECBC'S TESTING SERVICES

With a wealth of experience executing testing in support of the capabilities previously discussed, ECBC is unique in having both the technical expertise of its subject matter experts and the state-of-the-art equipment readily available to handle any problem at any time. Testing conducted by ECBC supports both the Warfighter and the homeland.

A large portion of ECBC's workforce supporting its testing capabilities and services are members of the Personnel Reliability Program and are certified for working with chemical warfare and/or biological select agents.

The subsequent pages address the various testing services offered by ECBC. An overview of each service is provided that describes the testing, the equipment used, and any specific requirements associated with this type of testing. ECBC executes all testing under its Quality Management System; however, many teams and laboratories also have ISO certifications. ECBC executes testing using military, federal and commercial test standards.

These testing services have been listed on the bottom of the pages that describe ECBC's overall testing capabilities. This information is based on efforts executed to date and on equipment currently on hand and is not meant to indicate that new efforts cannot be executed. As a fee-for-service organization, approximately 80 to 90 percent of ECBC's funding comes from customers outside of the U.S. Army. This information serves as a baseline for the variations and/or adaptations that can be made to support customers' unique requirements and needs.

SERVICES

SERVICE OFFERINGS

ADSORBENT AND FILTER CHARCOAL TESTING



ECBC has been conducting charcoal testing at ECBC for over 75 years. Testing the integrity of charcoal for protective materials and filters has remained one of the primary missions of this center since the threat and use of chemical agents debuted. The testing capabilities at ECBC have been expanded and renewed with the threat of global terrorism.



Charcoal samples and filters are analyzed

using a variety of analytical techniques including: gas chromatography, infrared spectroscopy and inductively coupled argon plasma emission spectrometry. ASZM-TEDA carbon is regularly tested against military specifications and American Society for Testing of Materials Test Standards for the acceptance of product quality using toxic chemicals, chemical warfare agents and physical challenges. ECBC works jointly with other government agencies and contractors that produce charcoal filters for the United States military to certify the production process and end item integrity.

ECBC is also capable of providing production lot acceptance and service life surveillance of fielded items. Team members can support various Joint Service program and developmental program needs. First article testing and canister certification are among ECBC's diversified capabilities. ECBC supports most of the nation's manufactured charcoal, protective materials and filter products for issuance to United States soldiers and civilian personnel for protection against chemical threats. ECBC is an active and integral part of the U.S. military's protective equipment program and contributes to performance and specification publications and standards.

FEATURES

CAPABILITIES

- Gas life charcoal adsorbent & respirator canister/filter penetration testing
- Challenge materials - Dimethylmethylphosphate (DMMP), hydrogen cyanide (AC), phosgene (CG), and cyanogen chloride (CK)
- Physical property testing (density, moisture, particle size, hardness)
- Production lot acceptance and military specification testing
- Certification, first article, and developmental testing
- Surveillance testing of in-service items

EQUIPMENT

- Gas Chromatographs with FID and FPD
- IR and ICP spectrometers

REQUIREMENTS

- ISO/IEC 17025 Accredited
- Military Certification Testing



ANALYTICAL CAPABILITIES



Some ECBC laboratories are ISO 17025 accredited to perform trace analyses in complex matrices. Analytes include chemical agents and toxic industrial compounds. Team members have performed trace-level analyses in caustic process residue samples, landfill leachate samples, fuel oil, gas bag samples and soil samples. A team of chemists, engineers and technicians with over



20 years of experience routinely work with clients to develop and implement testing requirements for effective and efficient project execution. Project planning includes identifying and mitigating technical, schedule and cost risk elements early in the project. When applicable, test requirements are based upon or extrapolated from existing program requirements. This is prudent in order to foster defensibility and acceptance of project data that has unprecedented test requirements. Analytical equipment is capable of measuring compounds of interest to pictogram levels with a variety of detectors. Robust sampling, sample clean-up, extraction and analytical protocols minimize sample matrix effects and result in accurate, precise and defensible data.

FEATURES

CAPABILITIES

- Chemical surety and non-surety agent analysis
- Chemical compound rapid screening
- Sampling & analytical method development
- Near-real-time and offline analyses under challenging test conditions
- Quality control procedures and systems

EQUIPMENT

- LC-MS, gas chromatograph (GC), DFPD, automatic continuous environmental monitoring, and a mass selective detector
- Research grade Varian GC with four detectors
- Gas, liquid and ion chromatographs and mass spectrometers
- 50 sample autosample
- Sorbent sampling tubes and flame ionization detector
- Thermal desorption system
- Tenax TA 60/80 absorbent
- Perkin Elmer automatic thermal desorption systems
- Perkin Elmer autosystem gas chromatographs
- Zebron ZB-1 capillary column
- Parker-Hannifin nitrogen, hydrogen, and zero air generators

SERVICES

SERVICE OFFERINGS

APPLIED DETECTION TECHNOLOGY

Some ECBC laboratories are ISO 17025 accredited to perform detector evaluations using Chemical Warfare Agents (CWAs), Toxic Industrial Chemicals (TICs) and other hazardous chemicals over a wide range of environmental conditions. ECBC is also certified by ECBC Rock Island to perform Lot Acceptance Testing (LAT) of M256A1, M18 and M34 detector kits.

Subject matter experts at ECBC have over 30 years experience with diverse chemical and surety testing in support of operational and developmental testing of military, commercial off-the-shelf and prototype detector systems. ECBC supports the national chemical defense mission by providing research and evaluation testing in our laboratory test facility to successfully complete programs and projects for the Army, Navy, Air Force and Marines individually as well as Joint Service Operational Requirements, the Department of Homeland Security, Domestic Preparedness and first responder requirements, U.S. Customs and Border Protection, Department of Justice, Defense Threat Reduction Agency (DTRA), NGIC, TSWG, PD-TESS, JPEO and other government agencies.

Our work is accomplished with a team of scientists, engineers and technicians who are focused on mission completion and customer satisfaction. ECBC holds patents for the Vapor Generation System (VGS) and various sampling techniques. Gas chromatographs and MINICAMS® are used to analyze and monitor vapor concentrations as part of vapor detector testing. Improvements to ECBC's vapor generation technology have produced its Chemical Agent Distribution Device Incorporating Electronics (CADDIE), which enables automated control of key parameters, computer generated changes to concentrations and continuous data storage of generator parameters. Liquid, vapor and aerosol testing have been explored, as requested, using CWAs, EAs and/or TICs to perform evaluations on portable and lab-based detection systems capable of ultra-trace to high level detections.

Testing can either be conducted in surety laboratory hoods or in 100 ft³ environmental chambers. The three environmental chambers enable performance of testing under various environmental conditions such as high and low temperatures. As required to meet different specifications, percent relative humidity (%RH) is a controlled parameter that can be changed at ambient,

FEATURES

CAPABILITIES

- Lab-based, portable and/or kits detection systems evaluations
- Liquid, aerosol, vapor & solids testing using chemical warfare agents, novel threat compounds, toxic industrial chemicals
- Military Lifecycle, COTS & prototype detection
- Environmental conditions -temperature and relative humidity
- Lab and field testing using various interferents
- Ultra-trace to high level concentrations
- Analytical Detection Methodology Development
- Approved Customers may be present during testing for real-time adjustments to detector parameters

EQUIPMENT

- Gas Chromatographs (FPD, FID, PFPD & XSD) including MINICAMS®
- UV/Vis Spectrophotometer
- Patented Vapor Generation System
- (3) 100-ft³ environmental chambers
- (16) surety-approved fume hoods, walk-in hoods and glove boxes

high or low temperatures. ECBC's facilities also permit laboratory evaluations of detection systems against common battlefield, building and environmental interferences by blending agent with a potential interference under controlled conditions to observe the reactions. This allows evaluation of both false negative and false positive results. This unique feature is extremely valuable due to the restriction on open air testing of surety materials in the United States, since the ability of a detection item to perform under field operational conditions is vital to detection success. ECBC can also arrange to evaluate detectors in actual open air field tests within ECBC to supplement the laboratory findings.

Customers who conform to ECBC's visitor policy and lab requirements are permitted to witness testing during developmental evaluations of their detection systems, which can allow real-time adjustments to detector parameters and test conditions for a more flexible and beneficial test evaluation.



BIODEFENSE/BIOSCIENCES



ECBC performs R&D and technology evaluation in the areas of virology, microbiology, molecular biology, enzymology, immunology, and biochemical engineering with a focus on the detection and destruction of chemical and biological warfare agents and other potential threat materials.



Preparation and verification of panels containing standardized biological samples is routinely performed in support of developmental technologies, such as detectors or decontaminants. The BioDefense test bed enables organizations to put their systems through end-to-end component testing for their aerosol handling characteristics or responses to biological challenges. The test bed provides refereed

samples, with or without custom-blended interfering compounds, and can handle multiple clients concurrently. Equipment tests are also handled outside of the test bed. ECBC has, for example, evaluated shelter systems for their ability to exclude microbial challenges.

The number of samples processed by the team requires high accuracy as well as efficient processing, so spiral platers with Q-counters are used to address each challenge. MIDI analyses are routinely performed as back-up confirmation to polymerase chain reaction (PCR) methodologies and biochemical tests.

Our capabilities are used by a number of different government agencies and private firms. Decontamination testing is routinely performed with fumigants and liquid-based compounds using standard

FEATURES

CAPABILITIES

- Handling, sampling, detection, and decontamination of moderate to highly pathogenic microorganisms
- Non-medical countermeasures, gene regulation studies, and pathogenicity assessments
- Production of biological materials, such as genomic DNA
- Preparation and evaluation of standardized biological agents and/or simulants
- Biosafety level (BSL)-3 test capabilities, including electrochemiluminescence (ECL) assays, handheld detection assays, decontamination capabilities

EQUIPMENT

- 1,900 square feet of enhanced BSL-3 space, which is structured into four functional suites
- Class 3 Glove box
- PR2 ECL Machine
- Aporous Hydrogen Peroxide & Cloridox-GMP generators
- Fourier Transform Infrared (FTIR) Instrument
- Real time temperature monitoring system with alert notification response included
- Virus/cell culture capability
- Spiral plater with Q-counter
- BioLog
- PCR platforms: Light Cycler, RAPID, JBADS

REQUIREMENTS

- Centers for Disease Control (CDC) and U.S. Department of Agriculture (USDA) permitted for select agents
- Environmental Quality Standard E-4

military surfaces or customized coupons prepared from building materials or other surfaces. Some programs require entire floors of buildings, which are available for large-scale tests.

SERVICES

SERVICE OFFERINGS

BIOPHYSICAL CHEMISTRY/BIOSCIENCES

ECBC works with both chemical and biological threat material and their simulants, and has capability and expertise in developing and evaluating methods for the biological production of hydrogen from biomass and wastewater.

Our chemical agent threshold facility enables work with chemical warfare agents and other threat materials. Capabilities include enzymatic detoxification studies, decontaminant formulation evaluation, and biodegradation of agent products and toxic industrial chemicals (e.g., pesticides, explosives, and propellants). Large scale and sensitive equipment assessments can also be accommodated.

In our biological labs, we employ a bioinformatics approach using combinatorial libraries to select specific immunogens and develop highly targeted antibodies for our clients. These antibodies are characterized to determine limits of antigen detection, cross-reactivity to homologous antigens, shelf-life stability, and IC50. Precise binding kinetics between the antibodies and their antigens are measured using isothermal titration calorimetry and surface plasmon resonance.

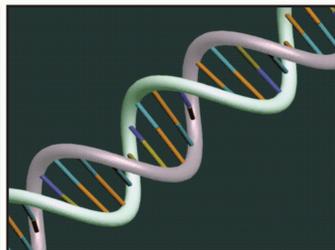


75L FERMENTATION SYSTEM, COMPLETE WITH DOWNSTREAM CEPA CONTINUOUS-FLOW CENTRIFUGATION, AND TANGENTIAL-FLOW FILTRATION SYSTEM

ECBC also identifies biological agents in unknown test samples. Test methodologies include PCR, ELISA, handheld assays, and BioLog identification using a "metabolic fingerprint." ECBC subject matter experts have been called upon to work out testing procedures for the FBI and for NATO proficiency testing.



HIGH-THROUGHPUT GENOMIC SEQUENCING



FEATURES

CAPABILITIES

- Chemical agent threshold facility for biotechnology-based (enzymatic) decontamination and biodegradation studies
- Building scale and sensitive equipment decon evaluations
- Bioinformatics approach to designing and generating monoclonal antibodies
- Antibody/antigen characterization and binding kinetics
- BioLog identification of unknown biological samples
- Small scale anaerobic fermentation with gas monitoring
- Recombinant protein expression and purification

EQUIPMENT

- 2.5 to 75 liter fermentors
- CO₂ anaerobic chamber with various gas probes
- Environmental chamber
- Colorimetric and fluorescent plate readers
- Surface plasmon resonance, ELISA, Western blot
- Protein G and chromatographic purification
- Thermocyclers
- Cryopreservation equipment
- BioLog MicroStation
- High throughput automated fluorescent flow cytometer
- Isothermal titration calorimeter

REQUIREMENTS

- CDC certified laboratories for work with pathogens
- U.S. Army, USDA, and EPA laboratory regulations

New assays can be developed or evaluated, based on client needs. Our focus is on creating new types of assays for use with equipment already in place at sample testing facilities and first responder teams, thereby facilitating their acceptance and usefulness.



BIOSENSORS/BIOSCIENCES

ECBC specializes in research, testing, development and evaluation of immunological and nucleic acid-based chemistries for fielded, commercial, developmental, and prototype biosensors. ECBC strives to be a national resource for biosensor technology and threat detection science.

ECBC subject matter experts (SMEs) maintain:

- ▶ Accreditation to ISO/IEC 17025 (A2LA Certificate #2359.01)
- ▶ ISO Guide 34, ISO/IEC 17025 and ISO 9001 compliance
- ▶ Trained Internal Auditors for ISO 9001 and 17025
- ▶ Department of Defense (DoD) and Centers for Disease Control (CDC) Select Agent Cleared Personnel

Having established a distinguished reputation over the years in the development and evaluation of sensor, assay, and sample processing technologies in support of the DoD Biodefense Program, ECBC SMEs are recognized in the United States and internationally for its expertise in the design of experimental parameters for evaluation of prototype biosensors, sample preparation, and assay technologies.

Past clients include Defense Advanced Research Projects Agency (DARPA), JPEO-CBD, DTRA, Environmental Protection Agency (EPA), USDA, DHS, United States Postal Service (USPS), Critical Reagents Program (CRP) and Association of Official Analytical Chemists (AOAC), among other government and commercial organizations.

ECBC has received the recipient of the Department of the Army Research and Development Achievement Award in recognition of its achievements in nucleic acid-based assay development.

FEATURES

CAPABILITIES

- Nucleic Acid & Antibody-based Analysis
- Analytical Equipment & Prototype Testing
- Assay Development & Optimization
- Conformance & Validation Testing
- DoD and DHS Test Bed Assessments
- Pathogen and Simulant Preparation
- Agent and Reagent Lyophilization
- Customized Antibodies and Reagents
- Customer Training & Technical Consulting

EQUIPMENT

- Over 5,000 sq. ft. of Biosafety Level (BSL) 2 Laboratory Space
- BSL3 Laboratory Access
- SIPRNet/JWICS Access
- Polymerase Chain Reaction (PCR) platforms (RAPID, JBAIDS, ABI 7900, SmartCycler)
- Immunodetection platforms (M1M, Luminex, SECTOR PR100, SECTOR Imager 6000, SECTOR PR2)
- Environmental Control Chambers

REQUIREMENTS

- DoD and CDC Select Agent Cleared Personnel
- American Association for Laboratory Accreditation (A2LA) Accredited to ISO/IEC 17025 for Specific Tests Listed in A2LA Certificate #2359.01



IDAHO TECHNOLOGY JBAIDS



BIOVERIS M1M

SERVICES

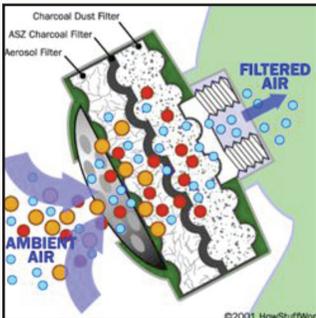
SERVICE OFFERINGS

CHEMICAL BIOLOGICAL RADIOLOGICAL FILTRATION



ECBC's Chemical Biological Radiological (CBR) Filtration Branch provides scientific expertise and a full range of testing capabilities to evaluate, design, develop and validate air purification

technologies. Chemical, biological, radiological and nuclear (CBRN) air filtration is the process of removing nuclear, biological and chemical vapors, liquid droplets and solid particulate from the air.



Current U.S. military CBRN filters use a high efficiency particulate assembly (HEPA) to remove liquid droplets and solid particulate and ASZM-TEDA carbon (impregnated with salts of copper, zinc, silver and molybdenum and with triethylenediamine) to capture agent vapors or gases.

These filters provide good protection from classical chemical warfare agents, but have only limited capability against toxic industrial chemicals (TIC), and require continual replacement.

The CBR Filtration Branch has been investigating new adsorbents for current single pass filters, and has been maturing new air purification technologies, such as temperature/pressure swing adsorption and catalytic oxidation, for CBRN applications.

Through in-house research and collaborations with academia, industry and other government agencies, the CBR Filtration Branch identifies and matures air purification technologies that will provide the Joint



FEATURES

CAPABILITIES

- Research and development of new air purification technologies
- Sorbent characterization, including isotherms and chemical/physical properties
- Breakthrough testing of sorbents and filters with chemical warfare agents (CWA), TICs, and other compounds at wide range of environmental conditions
- Generation/detection of CWA/TIC/non-traditional agent (NTA) vapor challenges
- Evaluation of novel air purification technologies
- Testing of air purification hardware, from laboratory scale to full-scale prototypes

EQUIPMENT

- Low flow (0-10 cfm), mid-range flow (10-200 cfm), and full-scale high flow (80-2000 cfm) air purification test facilities
- Surety test facility for evaluation of materials and prototypes
- Simulant and TIC test facilities for evaluation of materials, prototypes and full-scale production hardware
- Multiple filter breakthrough test systems
- Vapor pressure measurement system
- Nuclear magnetic resonance (NMR) spectroscopy
- Multinuclear NMR (liquids and solids)

REQUIREMENTS

- Quality assurance (QA) certified laboratory
- U.S. Army, USDA, and EPA laboratory regulations

Service with clean breathable air, while operating in contaminated environments. These air purification technologies are provided to the Joint Program Managers for Individual and Collective Protection for development of new CBRN protective equipment. The CBR Filtration Team also supports other government agencies seeking air filtration expertise and testing services. Technology Support Agreement (TSA) and cooperative research and development agreements (CRADA) are also available to private industry.



CHEMICAL BIOLOGICAL APPLICATIONS AND RISK REDUCTION (CBARR)

ECBC performs global CB operations in a safe, secure and environmentally sound manner by providing a broad range of field deployable operations for the remediation of CB agents and other sensitive materials. ECBC's deployable lab services provide near real-time detection of airborne contaminants using automated continuous monitoring systems that satisfy site-specific requirements. Fully functional, transportable laboratories provide critical on-site analysis of air, water and soil samples utilizing state-of-the-art analytical instrumentation to monitor for chemical and biological warfare agents as well as their breakdown products. In addition, ECBC installs, operates and maintains a broad range of CBR engineering controlled vapor containment shelters, as well as decontamination, neutralization and destruction systems. ECBC's subject matter experts also sustain fixed and mobile CBR filtration systems used in surety laboratories and field operations. Filters are tested and replaced on a routine basis. ECBC has provided remediation, demilitarization and demolition support to DTRA, the Assembled Chemical Weapons Alternative (ACWA), the Chemical Materials Agency (CMA), and the U.S. Army Corps of Engineers.

FEATURES

CAPABILITIES

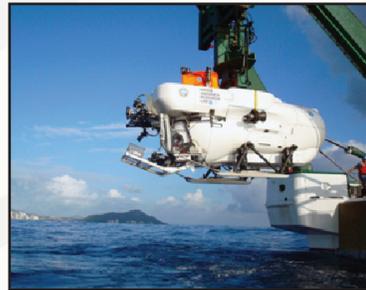
- Deployable Lab Services
- Laboratory Support
- Field Operations
- Live Agent Operations
- Risk Management & Training

EQUIPMENT

- Long haul trucks
- Air Filtration Systems
- Electrical distribution equipment
- Material handling equipment
- Trailers

REQUIREMENTS

- ISO/IEC 2005:17025 Accreditation (Environmental BioMonitoring Laboratory)
- CDC and USDA permitted for Select Agent
- Compliant with Chemical Material Agency's (CMA) Laboratory and Monitoring Quality Assurance Plan (LMQAP) and Chemical Agent Standard Analytical Reference Material (CASARM) QAP
- Membership in EPA Environmental Response Laboratory Network and Water Laboratory Alliance
- DoD Chemical Personnel Reliability Program (CPRP) and Biological Personnel Reliability Program (BPRP)



CHEMICAL SCIENCES

ECBC conducts chemistry-related research and is responsible for synthesis, chemical and physical properties testing, development of analytical methodologies, and analysis of unknown chemical samples.

ECBC chemical sciences subject matter experts (SMEs) have the capability to meet all chemistry requirements associated with the synthesis, characterization and analysis of chemical agents and other highly hazardous materials. The synthesis is done in accordance with the Chemical Weapons Convention to meet the requirements of the U.S. chemical weapons defense mission.

ECBC SMEs also have the capability to test and analyze chemical agents and other highly hazardous materials under a wide variety of environmental conditions and in varying matrices. Tests and analytical techniques can be designed to deliver highly precise and accurate results regardless of sample background or interference. Test capabilities range from simulants and highly dilute solutions to neat chemical agents.

The characterization of chemical agents and other materials could include properties, reaction pathways, reaction rates, materials compatibility, etc. We offer proven experience and validated protocols to solve chemistry-related problems associated with the Army's chemical weapons defense mission. Many of these capabilities can be applied to Homeland Defense requirements as well.

FEATURES

CAPABILITIES

- Synthesis
- Analysis to meet State, Federal, or International regulatory requirements
- Chemical and physical property testing of materials
- Development of analytical techniques in widely varying matrices

EQUIPMENT

- GC/MS and GC/MS/MS (high res available)
- LC/MS and LC/MS/MS (high res available)
- DART (Direct Analysis in Real Time)
- MALDI TOF/MS
- Multinuclear NMR (liquids and solids)
- FTIR and GC/FTIR
- Synthesis capability to 8 liters
- Agent fate wind tunnels

REQUIREMENTS

- ISO 9001 and 17025 Accreditation
- FBI Partner Laboratory
- Organization for the Prohibition of Chemical Weapons (OPCW) Designated Laboratory
- DoD CPRP and BPRP



CHEMIST DISCUSSES A HOOD



500-MHZ NUCLEAR MAGNETIC RESONANCE



CHEMICAL TRANSFER FACILITY (CTF)



The Chemical Transfer Facility (CTF) is the single repository for the Army's research and development stocks of toxic chemical agents. The CTF was designated as the only United States declared Single Small Scale Facility (SSSF) under the Chemical Weapons Convention (CWC) and as a Chemical Weapons Storage Facility (CWSF) and Chemical Weapons Destruction Facility. Chemical agent stored at the CTF is used to conduct defensive research and development throughout the DoD and is imperative to maintaining an effective defensive posture against the new world chemical

threat. In support of this mission, personnel are responsible for agent preparation through synthesis or purification, packaging and shipment of neat and dilute agent throughout the DoD as well as supporting contractors. Dilute agent is provided to all stockpile sites for use in their low-level monitoring programs. The CTF has the capability to analyze agent for purity and identifying impurities utilizing analytical instrumentation such as Gas Chromatography (GC) and Nuclear Magnetic Resonance (NMR).

The CTF is also permitted by the Maryland Department of the Environment (MDE) for the storage and treatment of hazardous substances. The team is also a major contributor to the U.S. chemical agent disposal program. All chemical agent used in these studies is prepared and shipped from the CTF.

FEATURES

CAPABILITIES

- Single repository for the Army's research and development stocks of toxic chemical agents
- Single Small Scale Facility (SSSF) under the Chemical Weapons Convention (CWC)
- Chemical Weapons Storage Facility (CWSF) and Chemical Weapons Destruction Facility

EQUIPMENT

- Four fume hoods
- CHATS glovebox
- Custom mix tank
- NMR, GC-TCD
- Small glovebox
- Class III glovebox
- Irradiator
- Autoclave

REQUIREMENTS

- DoD Chemical Personnel Reliability Program (CPRP)
- CWC Treaty Compliance

Bench scale as well as large volume neutralization experiments can be conducted by team personnel at the CTF. In support of the Project Manager, Non-Stockpile Chemical Materiel and the Installation Restoration Program (IRP) at APG, the team has conducted drill and drain operations on non-explosively configured munitions currently stored at APG. Personnel are extensively trained in areas such as safety and health, proper use and application of personal protective equipment, hazardous materials packaging/transportation laws and regulations, ammunition safety, storage and handling, environmental compliance (State and Federal), CWC Treaty Compliance, surety and security management and toxic/first aid.

SERVICES

SERVICE OFFERINGS

COLLECTIVE PROTECTION EVALUATION



Full system collective protection testing is performed at ECBC's test facility. This facility is used to perform full system tests including: static challenge, purge, leakage, pressurization and entry/exit testing on collective protection equipment.

Throughout the development cycle, shelters, vehicles, heating, ventilation and air conditioning systems must meet several test requirements.

Static challenge, entry/exit and pressurization testing is performed in the static challenge test chamber. Once an item is set up in the chamber, a pressurization test is performed to ensure the shelter maintains proper overpressure. The item would then be exposed to three static challenge trials to determine its protection factor. Finally, an entry/exit test would be performed to determine the maximum number of people that could be processed into a shelter or vehicle within an hour.

Purge testing is performed to determine how long it takes for an airlock, shelter or vehicle to clear itself of a particulate cloud. The ATI Aerosol Generator TDA-4B uses Emory oil and compressed air to create a particulate cloud within the interior of an airlock, shelter or vehicle. The ATI Particulate Detector TDA-2EL provides real time monitoring of the system's concentration levels while recording purge log reduction levels.

Leakage testing of a vehicle or shelter is performed to identify and correct possible leakage points. The Improved Mobile Airflow Tester (IMAT) is used to isolate and quantify airflow leakage rates at various system operating pressures on vehicles and shelters. The IMAT operates at 0 - 3000 cubic feet per minute and 0 - 5 inches water gauge.

FEATURES

CAPABILITIES

- Static challenge testing
- Entry/exit testing
- Pressurization testing
- Purge testing
- Leakage testing
- Simulant Concentration: 1 - 100 mg/m³
- Chamber Pressure: 0 to -0.5 inches water gauge (iwg)
- Air Flow: 0 - 1200 cfm Negative Pressure
- 0 - 5000 CFM Purge fan

EQUIPMENT

- Chamber - 11,000 ft³ test volume; 40' x 20' x 14' height
- Chamber - 48' L x 32' W x 20'
- 5-Ton capacity A/C unit
- ATI aerosol generator TDA-4B
- ATI particulate detector TDA-2EL
- Air flow instrumentation & data acquisition





ENVIRONMENTAL, CLIMATIC & HARSH ENVIRONMENT TESTING



RESPIRATOR DUST TEST

ECBC can determine how products and materials perform under extreme environmental conditions. Team members can simulate any environmental stress condition that a Warfighter might experience in the field using laboratory test methods in accordance with the Military Standard 810G Test Standards. These methods include: low pressure (altitude), high and low temperatures, temperature shock, solar radiation, rain, icing/freezing rain, humidity, salt fog (corrosion), sand and dust and immersion. Testing conditions include: temperatures from minus 80 degrees Fahrenheit to 350 degrees Fahrenheit, humidity from 2 percent to 98 percent, blowing rain up to 6 inches of rain per hour with wind speeds up to 45 miles per hour, blowing sand at air velocities of 18 to 29 meters/second (3,540 to 5,700 feet/minute or 40.2 to 64.7 miles/hour), blowing dust at air velocities of 1.5 to 8.9 meters/second (300 to 1,750 feet/minute or 3.4 to 19.9 miles/hour), low pressure altitudes up to 30,480 meters (100,000 feet) and rapid decompression within 15 seconds. Personnel can perform on-line data acquisition and analysis of tested components using the Agilent VEE Pro® Graphical Instrumentation Programmer and Data Acquisition Program or National Instruments LabView Program. Products can be manipulated to operate while exposed to a threat representative test environment. Instrumentation

and data acquisition equipment are used to control the product and capture data on its performance during environmental stress in a safe and environmentally friendly atmosphere. Design defects can



SALT FOG TEST

FEATURES

CAPABILITIES

- Extreme climatic and environmental condition simulation; MIL STD 810G
- Perform lifecycle environmental tests
- Perform accelerated aging tests
- Specialized test setups; video and test documentation
- Computerized analog and digital data acquisition and control development
- Data acquisition and analysis of environmental factors

EQUIPMENT

- Chambers – temperature/humidity, salt fog, sand/dust, solar radiation, altitude, hot environmental, cold environmental & rain
- Walk-in Chambers – (6) temperature/humidity
- Mobile Chambers - (4) mobile trailers/climatic

REQUIREMENTS

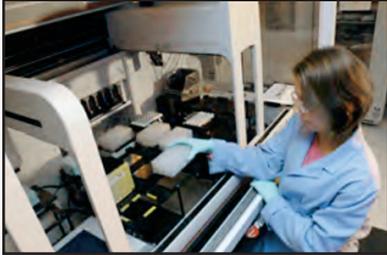
- American Society for Testing of Materials Test Standards
- Military Standard 810G Test Standards
- ISO/IEC 17025 Accreditation

be identified early, which results in robust designs and reliable products.

SERVICES

SERVICE OFFERINGS

ENVIRONMENTAL MONITORING LABORATORY (EML)



ECBC's Environmental Monitoring Laboratory (EML) occupies 5,185 square feet of laboratory space providing high throughput CWA/BWA and inorganic chemical analysis of

environmental samples using robotics in both mobile and stationary analytical lab constructs. The EML conducts air monitoring for chemical warfare materiel during tests involving neat agents, as well as field remediation and demilitarization operations in an effort to protect the health and safety of ECBC's workers and the environment.



The EML also conducts method development and investigates emerging technologies to stay abreast of the latest developments in chemical agent

detection. The EML, with eight fixed laboratories and 16 mobile platforms, is unique in that it has cutting-edge equipment capable of detecting inorganic and organic chemicals and biological agents within one team. EML's mobile platforms and analytical systems have been deployed to many of the contiguous 48 states, as well as Hawaii, Guam, Virgin Islands, England, Belgium and Albania. Very few laboratories offer this type of diversity and ability to deploy to remote locations with customized analytical configurations and minimal advance notice. The EML has 20 years of experience in rapid field deployments for both chemical agent and biological detection with hands-on experience with a variety of challenging environmental sample matrices, such as, air, water, soil, paint chips, wipes, organic solids and liquids, marine tissue, demolition debris and unknowns.

The Environmental BioMonitoring Laboratory (EBML), which is part of the EML, is accredited by the American Association for Laboratory Accreditation for ISO/IEC 2005:17025 and offers unique biological threat agent identification for high-throughput biological monitoring of environmental samples.

FEATURES

CAPABILITIES

- High throughput lab that provides CWA/BWA and inorganic chemical analysis in several matrices(air, water, soil, paint chips, wipes, organic solids & liquids, marine tissue, demolition debris and unknowns)
- Robotic-assisted analysis used for high-throughput sample analysis for biological agent screening using polymerase chain reaction (PCR) and electrochemiluminescent (ECL) assays

EQUIPMENT

- BIOMEK FX and NX Robotic lab Automation
- ABI 7900 HT (PCR Analysis with Fast Block Upgrade)
- M8 and M1M (Field Deployable ECL Analyzer)
- MSD Sector Imager and PR2
- MIDI Sherlock Microbial Identification System
- Gas chromatography (GC) based coupled with flame photometric or halogen specific detectors

REQUIREMENTS

- ISO/IEC 2005:17025 Accreditation
- CDC and USDA permitted for Select Agent
- EPA Environmental Response Laboratory Network (ERLN) membership
- Water Lab Alliance (WLA)
- FDA Food Emergency Response Network (FERN) membership
- Compliant with Chemical Material Agency's (CMA) Laboratory and Monitoring Quality Assurance Plan (LMQAP) and Chemical Agent Standard Analytical Reference Material (CASARM) QAP
- DoD Chemical Personnel Reliability Program (CPRP) and Biological Personnel Reliability Program (BPRP)

With experience developing unique and client-specific biological monitoring for individual client programs, EBML provides a full range of analyses for monitoring and routinely screens samples for eight biological warfare agents. Using robotics and high-speed analytical instrumentation, the laboratory has the capacity to analyze 96 samples in an eight-hour timeframe for seven targets using electrochemiluminescence (ECL) detection and polymerase chain reaction (PCR) technology.



FIXED SITE & FILTER-IN-PLACE SYSTEMS PERFORMANCE



MOBILE LABORATORY

ECBC has the ability to design CBRN filtration systems for fixed sites, operations buildings, vehicular platforms and facilities including: military dorms and chemistry labs both domestic and overseas. From systems initial design

and development to systems sustainment, ECBC offers a “cradle to grave” solution for the armed forces against CBRN attacks. Systems sustainment includes development of system/design requirements, SOPs and protocols, process validation, in-place certification testing and filter monitoring for CBRN filtration systems.

ECBC can perform in-place certification testing of installed CBRN filters for government laboratories, vehicles and fixed sites both home and abroad. This testing certifies that the entire filtration system is capable of protecting against a CBRN attack. These systems are evaluated in accordance with the American Society of Mechanical Engineers (ASME) N510 procedures for mechanical leaks using portable polydispersed polyalphaolefin aerosol generators/ detectors, nondestructive gas simulants (non-ozone depleting fluorocarbons) and electron capture chromatographic detection methods. The in-place leak test is a leak test, not a life test, and is required to evaluate the CBRN filtration system for proper filter installation and carbon/particulate damage.

FEATURES

CAPABILITIES

- Facility and laboratory in-place CBRN filtration systems
- Facility/system certification and airlock tests
- Filtration systems performance requirements development
- Filtration systems concept development, design, prototype, integration, production, installation, testing
- Test protocol and standard operating procedure development

EQUIPMENT

- Mobile testing platform
- Aerosol generators and detectors
- Tracer gas monitor and CAD/SolidWorks

REQUIREMENTS

- ASME N510
- ASME AG-1 Requirements
- DOE-STD-3020-97 Requirements



FIXED SITE



FACILITY DESIGN



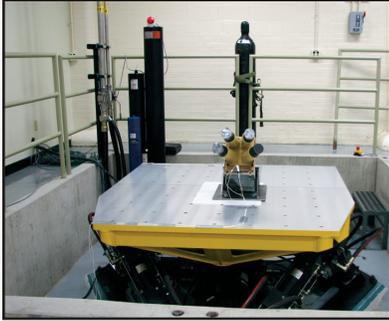
SHIPBOARD



CP MOBILE SYSTEMS

SERVICES

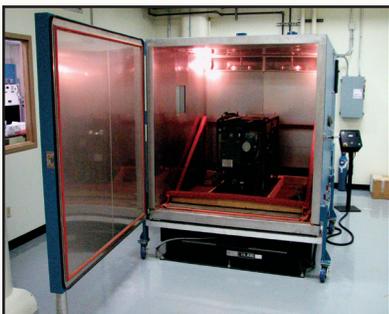
HAZARDOUS & NON-HAZARDOUS PACKAGE TESTING



HIGH FREQUENCY VIBRATION TABLE

ECBC conducts testing of packaging configurations for both hazardous and nonhazardous materials at ECBC and Rock Island. The testing facilities are capable of testing for a large variety of packaging concerns and tests

are designed to subject packages to a sequence of anticipated hazard elements experienced during a military distribution cycle. ECBC test facility is an ISO 9001-2000 registered state-of-the-art test facility capable of simulating all forms of air and surface transport through the use of three distinctively different vibration systems. In addition, the facility performs packaging testing, environmental testing and non-destructive testing. Tests are performed to customer specifications such as UN POP, Title 49, ASTM, MIL STD, ISTA, ISO, FED and DOT test requirements for the transportation of hazardous materials. ECBC laboratory personnel perform prototype, and pre- and post-production testing such as recertification inspection and testing of containers used in transport of lethal chemical agents. ECBC laboratory personnel can also assist in developing test plans to include specific testing requirements. Currently, ECBC-RI engineers are developing surveillance and re-design specifications to address the impact of harsh environment on a wide range of equipment. All team members have experience and the ability to provide innovative solutions to solve customer specific needs.



TEST CHAMBER

ECBC laboratory equipment is state-of-the-art and maintained in accordance with ISO 9001-2000 standards, which assures that all tests are performed on calibrated equipment to exact standards and specifications.

FEATURES

CAPABILITIES

- Air and surface transport simulation
- Prototype and pre- and post-production testing
- Surveillance and re-design specification development
- Specialized test plan development
- Packaging, shock, manual/mechanical handling, and warehouse and vehicle stacking tests
- Loose and secured load transportation vibration
- Video for test documentation
- Temperature conditioning
- Package conformance testing

EQUIPMENT

- Low and high frequency vibration and multiple axis simulation tables
- Tension compression, hydrostatic, compression, helium mass spectrometer leak, package leak, and USON vacuum leak testers
- Incline plane
- A-frame hoist with drop test release mechanism
- 6' and 5' drop tester and side impact and compression testers
- Temperature, rain and humidity environmental chambers
- Loose cargo transportation simulator



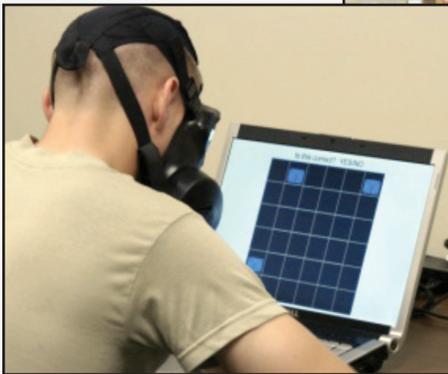
HUMAN PERFORMANCE TEST FACILITY



INSPIRED CARBON DIOXIDE TEST APPARATUS

The Sheffield head and torso simulator and breathing pump may be used to measure the carbon dioxide concentration in the breathing zone of a respirator as part of the EN136 standard.

ECBC Respiratory Protection subject matter experts have a fully instrumented human performance test facility that includes heart rate monitoring capabilities (both on-line and telemetrically), medical gas analyzers, treadmills, and airflow and pressure measurement devices along with other equipment for quantifying physiological responses to work tasks with and without respirator wear. The laboratory provides an extensive range of specialized respirator research and test services to suit customer needs.



PHYSICAL AND COGNITIVE PERFORMANCE STUDIES

The human performance laboratory can set up customized physical and cognitive tasks.

FEATURES

CAPABILITIES

- Manned & unmanned testing of respirator human factor parameters
- Customized physical & cognitive task performance assessments
- Testing to U.S. Military, NIOSH & European industrial standards
- Breathing/metabolic factors, speech intelligibility, vision, anthropometrics, subjective acceptance

EQUIPMENT

- Programmable breathing simulators
- Sheffield Head/Torso simulator – unmanned CO₂ retention test bed
- UK Porton Head – articulating headform
- NIOSH Automated Breathing Metabolic Simulator (ABMS)
- Field of Vision apertometer
- Fully equipped exercise performance lab with online data acquisition

REQUIREMENTS

- TOP 8-2-110
- NIOSH CET-APRS-STP-CBRN-0454
- NIOSH CET-APRS-STP-CBRN-0312
- NIOSH CET-APRS-STP-CBRN-0314
- NIOSH TEB-CBRN-APR-STP-0313
- EN 136

SERVICES

SERVICE OFFERINGS

LARGE-SCALE AGENT & EXPLOSIVE CHAMBERS

ECBC maintains two explosive hazardous material test facilities, which house chambers uniquely designed for total containment in the testing of chemical (military and industrial) related equipment and explosive/toxic munitions/materials. The chambers have the capability for simultaneous tests of chemical warfare agents and explosives under various climatic conditions.

Each facility is equipped with an elementary neutralization system that can process up to 10,000 gallons of hazardous waste generated from testing. The facilities are currently approved to handle 170 gallons (equivalent to one-ton container) of military unique chemical material and industrial material. The facilities are also certified for one pound of explosives when combined with chemical material and two pounds of explosives without chemical material.

Explosive tests reveal the blast resistance of models and components such as motors, shields and other equipment. Tests also reveal the environmental impact of fuels and plastics should they explode, as well as the physical behavior of materials when they interact with and penetrate other objects. The on-site surety laboratory is equipped to handle all sample analysis generated from the testing. Personnel experience includes handling military unique chemicals, military munitions, hazardous industrial chemicals and hazardous waste.

FEATURES

CAPABILITIES

- Chemical agent (CA) liquid, aerosol & vapor
- Explosively dissemination of CA; CONUS unique
- (2) cylindrical (32' diameter x 20'), 16,000 cubic foot test volume
- Vehicle access door and (19) access ports
- Multiple sampling and control systems
- Personnel Reliability Program (PRP) Category I trained in chemical agent handling, explosives, and hazardous operations
- Supporting sample preparation and analytical laboratory

EQUIPMENT

- 5,000 cubic feet per minute (cfm) CBR filtration systems
- 10,000 gallon hazardous waste storage
- 500 gallon decontamination solution storage
- Operations control room
- Cadre controlled egress





LARGE-SCALE SIMULANT CHAMBER

ECBC designed and built a large-scale aerosol and vapor chamber and supporting systems to meet diverse testing requirements. The flexibility of the chamber design accommodates modification to accept various generation, dissemination and sampling systems, and to optimize the test volume within any desired range up to 14,800 cubic feet.

Chamber exhaust-air filtration provides a high efficiency particulate and gas 3,000 cubic feet per minute (cfm) system, controlled by a variable frequency drive. Ten mixing fans and a plenum system act as a simulant aerosol mixing box or baffle. Liquid decontamination waste is collected through a sump and piping system in a 2,500 gallon polyethylene holding tank. Multiple concentration and particle size measuring devices can be employed in accordance with the challenge specifications. Chamber conditions can be monitored in real-time to include temperature, humidity, air-flow and pressure. The aerosol chamber operates at ambient temperatures and humidity.

Features such as a large facility access door, operations control room, the availability of a hydraulic scissor lift and adequate working space surrounding the chamber provide for ease of operations and necessary infrastructure alterations.

FEATURES

CAPABILITIES

- CB agent simulant aerosol and aerosol countermeasure testing
- DMMP/*Bacillus globigii*
- Secondary contaminant

EQUIPMENT

- Chamber - 14,800 ft³ test volume; 20' x 20' x 36' height
- Control system and high output simulant aerosol generation system
- 3,000 cfm filtration system and sampling system
- Turbulent mixing fans
- Wash down capable with bleach and/or water
- 2,500 gallon holding tank and sump



FILTRATION SYSTEM



CHAMBER



WASH DOWN SYSTEM

SERVICES

SERVICE OFFERINGS

LARGE-SCALE WATER TEST LOOP SYSTEM

The Water Test Loop System (WTLS), maintained by ECBC, is the result of a partnership between the EPA National Homeland Security Research Center and the Army Corps of Engineers Construction Engineering Research Laboratory. Concerned with water safety for civilians and military populations, they have been working to develop models and sensors to predict the behavior of and detect chemical and biological agents in various water systems.



SMALL LOOP

The WTLS consists of a large (approximately 1,300 gallons) and a small (approximately 250 gallons) recirculating chlorinated polyvinyl chloride pipe loop with sample sensor and injection ports. The large WTLS was designed for experiments using non-hazardous or simulant compounds. The small WTLS was designed to conduct experiments with chemical warfare agents, toxic industrial chemicals and toxins.

The water loop's intricate conduit is intended to mimic the dynamics of a home or business water utility delivery system. One portion of the loop network is comprised of over 2,000 feet of piping. The entire loop network is constructed to allow for the replacement of individual or modular sections of pipe. This allows pipes of various material and age to be inserted into the test loop during studies. This, coupled with the system's ability to manipulate residence timing, lends itself to replicating a wide variety of water transport scenarios.

FEATURES

CAPABILITIES

- Testing of CB agents and simulants in a simulated water distribution system
- Real-time monitoring of water quality parameters

EQUIPMENT

- 1,300-gallon large loop
- 250-gallon small loop
- Commercially-available water sensors
- Analytical lab for results analysis



LARGE LOOP



MAN IN SIMULANT TESTING (MIST)

ECBC is capable of MIST, which is the preferred method of determining the overall Protection Factor (PF) of Chemical, Biological, Radiological and Nuclear (CBRN) protection equipment to be used for protection against Chemical Warfare Agents (CWA). The results of these tests are evaluated with the Body Region Hazard Analysis (BRHA) to determine the overall PF of the suit. This method uses actual skin adsorption data on agents and simulants to predict the Medium Required Exposure Dosage (MRED) an individual must be exposed to while wearing the suit in order to produce end-point reactions in the body for systemic (nerve agent) and localized (mustard) exposure to agents.

MIST is performed by:

- ▶ Placing Passive Sampling Devices (PSDs) on the skin of test participants and donning a protective suit ensemble.
- ▶ Exposing the test participant to a high concentration of a non-toxic CWA simulant while performing routine exercise movements.
- ▶ Removing and analyzing the PSDs for simulant vapor that was adsorbed at the skin.
- ▶ Analyzing the PSD data with the BRHA to determine performance characteristics of the suit ensemble.
- ▶ Obtaining data through analysis at the laboratory.

FEATURES

CAPABILITIES

- Perform MIST Protection Factor technology development & performance screening MIST Protection Factor of suit ensemble
- Vapor challenge testing with Methyl Salicylate (MeS)
- Approved Human Use Protocol and Standing Operating Procedure

EQUIPMENT

- Chamber - 40' L x 20' W x 14' H
- Five-stage clean room with overpressure
- Automated vapor generation system
- Foxboro miniature infra-red gas analyzer (MIRAN®)
- Automated gas chromatograph monitoring system (MINICAMS®)
- Data acquisition system
- Analytical lab utilizing gas chromatography (GC) systems



WALKING PORTION OF MIST EXERCISE



MD STATE POLICE SWAT TEAM MIST



FIREFIGHTER IN SIMULANT TESTING

SERVICES

SERVICE OFFERINGS

MOBILE LABORATORIES & KITS



ECBC partners with lead federal agencies and selected customers to design, fabricate, integrate and validate modular, mobile and semi-permanent analytical capabilities to meet customer needs.



The development of transportable laboratories requires the evaluation of state-of-the-art, highly technical, emerging technological trends and the selection

of appropriate novel technologies based on a variety of criteria such as engineering controls, technical risk assessments and logistical burdens.

These platforms are developed under the stringent requirements of ISO 9001:2000 registration.

ECBC has developed several comprehensive — chemistry, biology, radiology and high explosive residue — transportable laboratories for customers with national and international missions that include the verification of the Chemical Weapons Convention and Weapons of Mass Destruction countermeasures.



The team works with customers to provide everything from field hardware and methodology to training. ECBC relies on its expertise to create analytical processes that integrate different

FEATURES

CAPABILITIES

- Laboratories that vary in size from:
 - ▶ Suitcase
 - ▶ Van/Truck
 - ▶ Mobile
 - Trailers
 - Conex
 - ▶ Semi permanent Modular

EQUIPMENT

- LC/MS
- GC/MS
- TravellR
- RAPID
- M1R
- Glovebox
- Fume Hood
- BioSafety Cabinets

REQUIREMENTS

- ISO 9001 Accreditation



disciplines into comprehensive, turn-key packages that can be deployed to remote regions with little or no logistical support while producing data

that withstands the most intensive and critical review. ECBC staff specializes in the development of robust engineering controls for chemical and biological threat materials; and as a team, holds four patents in this area for novel developments that meet customers' needs.



MOLECULAR ENGINEERING/BIOSCIENCES



DYNAMIC LIGHT SCATTERING FOR PROTEIN CHARACTERIZATION/STABILITY IN SOLUTION

ECBC provides expertise in cell-based manufacturing processes for producing enzymes, antibodies and proteins in prokaryotic expression vectors and performing quality control analyses of the resulting protein products.

ECBC molecular engineering subject matter experts (SMEs) use state-of-the-art equipment to perform

scale-up process development for cell fermentation, downstream filtration or purification of target protein, and milling, drying, and preservation of the final product. In addition to optimizing and validating fermentation processes from 5L to 1500L reactors, ECBC SMEs can evaluate process parameters for achieving optimal product quality within defined cost projections. ECBC also provides a complete cryogenic storage repository with archival storage and database management for receiving, storing, tracking and shipping customers' cell lines.

ECBC has also established full analytical capabilities for test and evaluation of a protein's biophysical characteristics and intermolecular interactions with other biological molecules. Whether a product of natural cell expression, genetic recombination or hybridoma fusions, ECBC SMEs can characterize the basic biophysical properties of a protein as well as its functional



SURFACE PLASMON RESONANCE FOR MEASURING INTERMOLECULAR INTERACTIONS

FEATURES

CAPABILITIES

- Biophysical Protein Characterization: Homogeneity, Size, Aggregation and Thermal Stability
- Protein/Antibody Characterization: Protein-Protein Interactions, Kinetic/Affinity binding, Epitope Mapping
- Recombinant Antibody/Antigen Engineering
- Bioprocess Scale-up Production and Downstream Processing
- In Vitro Whole Cell Toxicology
- Biorepository, Cell Banking

EQUIPMENT

- BioRad ProteOn XPR36 Protein Interaction Array System
- Wyatt Dynapro Plate Reader with temperature control
- MicroCal ITC200 Isothermal Titration Calorimeter
- New Brunswick 30L, 150L and 1500L reactors
- Micro- and ultra-filtration, protein purification
- Lyophilization, milling and spray drying
- Secure, fail-safe LN2 cryorepository

REQUIREMENTS

- International Organization for Standardization (ISO) 17025
- International Society for Biological and Environmental Repositories

properties in binding to other molecules. ECBC has extensive experience in development, testing and evaluation of antibodies and validating their affinity for binding to specific antigens.

We offer validated protocols for evaluating antibody affinity and specificity and can perform reagent stability testing under various controlled conditions. All protein characterization studies are performed under ISO/EIC 17025 standards for technical competence and data quality management.

SERVICES

SERVICE OFFERINGS

MOTION CAPTURE FACILITY

ECBC's Respiratory Protection subject matter experts have a dedicated laboratory for conducting human systems integration research and testing of respirators and individual protective clothing and equipment (IPE). Various ergonomic parameters that are associated with headborne protective gear (for example, helmets) can also be measured. The facility offers the following specialized capabilities:



MOTION TRACKING LABORATORY. This research facility utilizes Ascension Technology Corporation MotionStar™ Wireless magnetic motion tracking hardware — along with Innovative Sports Training, Inc. Motion Monitor software — as a means to assess the effect CB IPE has on active range of motion (AROM). Range of motion results are presented graphically on-screen immediately upon completion of data collection. Results are analyzed to determine AROM variables of interest dependent upon the body motions being performed.

MASS PROPERTIES MEASUREMENT DEVICES. The Space Electronics SE8913 and XR10 are used to accurately measure the mass properties of head-borne IPE items. The SE8913 instrument measures center-of-gravity location of objects weighing up to 33 pounds. The XR10 series instrument is designed to measure Moment of Inertia items up to 10 pounds in weight.

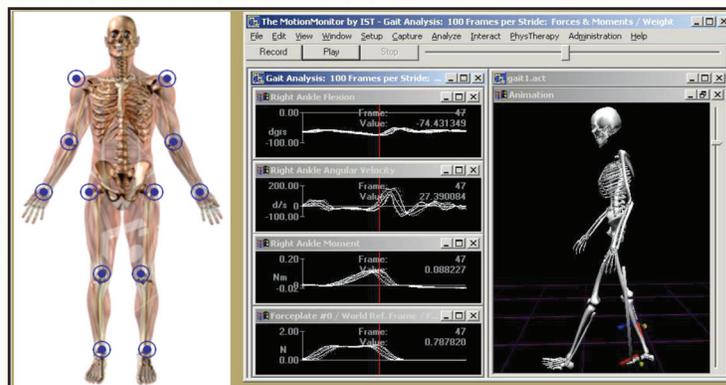
FEATURES

CAPABILITIES

- The Motion Capture Facility allows for the collection of numerous quantifiable measures such as:
 - Ranges of Motion
 - Positional Data/Displacement
 - Linear and Angular Velocities / Accelerations
- Subjects may don up to 19 sensors at one time
- Applicable joints are digitized to establish position relative to sensors
- Operationally relevant motion data is captured real time
- Data can be viewed immediately and exported for further analyses

EQUIPMENT

- Combines the MotionStar Wireless® 2 System (Ascension Technology Products) with the MotionMonitor™ Software Suite (Innovative Sports Training)





MUNITIONS ASSESSMENT AND PROCESSING SYSTEM (MAPS)



MAPS is a chemical weapons destruction facility occupying 9,000 sq ft composed of specialized glove boxes, drilling and cutting hardware, explosive containment chambers and negative pressure filtration systems.

The fixed facility is designed to receive and process a wide variety of stable, explosively and non-explosively configured chemical munitions and safely access and drain explosively configured chemical-filled munitions and detonate the empty munition bodies.



The design consists of two gloveboxes to unpack the munition and mount it on a drill assembly mounted on a trolley. The munition, secured to the drill

assembly, is moved on the trolley into a filtered drill box which is moved into an Explosive Containment Chamber (ECC). The munition is then drilled remotely using a computer controlled drilling system and CCTV. Once the munition is drilled, the contents are drained into a DOT bottle and transported to the CTF. The munition body is then decontaminated and, if explosively configured, destroyed in the Burster Detonation Vessel (BDV). The glove boxes, drill box, ECC, and process room are all under engineering controls supplied by two 7500 CAFFS. The building has a breathing air cascade system, control room, a three stage airlock personnel decontamination system, and a monitoring room consisting of 18 MINICAMS.

FEATURES

CAPABILITIES

- Fixed facility occupying 9000 sq ft composed of specialized glove boxes, drilling and cutting hardware, explosive containment chambers, and negative pressure filtration systems
- Designed to receive and process a wide variety of stable, explosively and non-explosively configured chemical munitions and safely access and drain explosively configured chemical-filled munitions and detonate the empty munition bodies

EQUIPMENT

- Two glove boxes
- Drilling assembly & cutting hardware
- Explosive containment chamber
- Filtration systems
- MINICAMS
- Blast Detonation Vessel
- Hazardous Waste storage
- Chemical Storage equipment

REQUIREMENTS

- DoD Chemical Personnel Reliability Program (CPRP)

SERVICES

SERVICE OFFERINGS

PARTICULATE FILTRATION AND PROTECTION FACTOR RESEARCH FACILITY

ECBC has a dedicated aerosol test laboratory for conducting particulate filter testing, respirator protection factor studies, and system and component leakage testing. The facility is equipped with state-of-the-art aerosol generating and measuring equipment that can be used for a variety of respiratory protection research, test, and evaluation projects. This equipment includes an aerodynamic particle sizer, a wide range particle spectrometer, and various polydisperse and monodisperse aerosol generators.

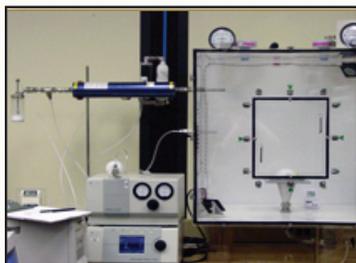


FRACTIONAL-EFFICIENCY PARTICULATE FILTER TESTER

PARTICULATE FILTRATION TESTING INSTRUMENTS:

Fractional-Efficiency Filter Tester (Model 3160, TSI). This instrument is a customized advanced automated tester that uses condensation particle counting technology to measure the fractional efficiency (efficiency versus particle size) of particulate filtration media and filters to over 99.99999 percent. The tester is capable of determining the most-penetrating particle size as well as measuring both flow and resistance through the filter.

Automated Filter Tester (Model 8130, TSI). This is a fully automated photometer-based instrument designed to measure particulate filtration media and filter efficiencies up to 99.999 percent using a salt or oil aerosol challenge. Along with measuring the percent penetration, the unit provides resistance and flow rate measurements.



CUSTOM AEROSOL TEST ENCLOSED

RESPIRATOR SYSTEM AND COMPONENT LEAKAGE TESTING EQUIPMENT:

Respirator Battlefield Evaluation System (RBES). The RBES is a man-wearable device intended to measure the protection factor performance of respirators while worn in field conditions. This system can be used as a tool for improving respirator design.

Advanced Mask Leakage Test System. This instrument is a customized automated tester capable of measuring

FEATURES

CAPABILITIES

- Testing to U.S. Military, NIOSH & European industrial standards
- Particulate filtration efficiency testing
- Respirator system and component leakage testing
- Aerosol generation and measurement used for a variety of research and evaluation applications

EQUIPMENT

- Aerodynamic Particle Sizer (Model 3321, TSI)
- Wide Range Particle Spectrometer (Model 1000XP, MSP)
- Fractional-Efficiency Filter Tester (Model 3160, TSI)
- Automated Filter Tester (Model 8130, TSI)
- Polydisperse and Monodisperse aerosol generators
- SMARTMAN Test Fixture
- Advanced Mask Leakage Test System

REQUIREMENTS

- Military Mask and Filter Performance Specifications
- NIOSH CFR 42 CFR Part 84 (Respirator Protective Devices)
- EN 143: 1991 (Particle Filters)
- EN 136: 1998 (Full Facepiece Masks)
- EN 140: 1989 (Half Masks)
- TOP 8-2-110

mask system penetration in both the eye and oro-nasal regions of any full facepiece respirator using a fully instrumented headform.

Computerized Breathing Simulators (CBSs). The CBSs are computer-controlled breathing machines capable of producing sinusoidal, trapezoidal, and exponential waveforms. One of these units is equipped to produce heated and humidified expired air and is programmable to replicate respired gas mixtures based on select metabolic parameters.



PHYSICAL PROPERTIES TESTING



ECBC maintains a physical properties laboratory for the determination of various properties of test materials and products. Mask programs at ECBC come to this laboratory to determine the effects of battlefield contaminants such as oils, fuels and decontaminants on mask materials. Mask lens characteristics, light transmission, haze and distortion, are measured in accordance with ASTM D1003 using hazemeters and optical testers.



The tensile compression tests on elastomers, plastics and metals are conducted with a tensile strength tester capable of performing tests with loads up to 44,000 pounds, and are performed in accordance with ASTM D412 and D624. Spindle type and Ford cup type viscometers offer a variety of methods to determine the viscosity of fluids. The

equipment can accurately weigh test samples from 0.0001 grams to 2,000 pounds with a variety of scales and balances. Accurate measurements can be taken with a collection of calipers, micrometers, veneer depth and bore gauges and gauge blocks.

FEATURES

CAPABILITIES

- Test types: tensile, compression, hardness, abrasion, ash content, burst strength, water repellency, stiffness, brittleness, puncture propagation, tear resistance, cold crack, hydrostatic resistance, precision weight, colorfastness, blocking, specific gravity and more
- First article, production and surveillance testing of materials and products
- Customized test plans and test reports

EQUIPMENT

- Instron tensile testers
- Q-Test equipment

REQUIREMENTS

- American Society for Testing of Materials Test Standards
- Military, Federal and Commercial Test Standards

SERVICES

SERVICE OFFERINGS

PRODUCT EVALUATION

ECBC destructively evaluates gas filters for nerve agent and mustard life using the simulant, dimethylmethylphosphonate (DMMP), as a challenge. Filters are tested according to the test plan and are accepted or rejected based upon the results. The use of DMMP simulant allows for expanded testing with little risk at a fraction of the cost associated with agent testing. Gas filter DMMP life values can be correlated to agent life.

High Efficiency Particulate Air (HEPA) filters are evaluated for aerosol efficiency by challenging them with a 0.3 micrometer polyalphaolefin (PAO) aerosol, Durasyn 164. Upstream and downstream particles are laser sized and counted to determine filter efficiency. This is a nondestructive test; therefore, a 100 percent inspection of filters is possible. The High Flow Alternative Test System (HFATS) is utilized for filters in the 100 to 2000 cfm range and is capable of measuring particle sizes down to 0.10 micrometers. In addition, the Test, Reliability & Evaluation Team has other equipment for testing lower flow HEPA filters.

The durability and design performance of the gas and HEPA filters in rough terrain and transportation is tested by the rough handle test (Q110) and environmental testing.

FEATURES

CAPABILITIES

- Perform gas filter life testing on: M12, M18, M48A1, M49, M98 filter set, HSFC, Type II Trays and Gas Phase Adsorber Cells using DMMP
- Perform HEPA filter aerosol penetration efficiency testing and resistance to pressure testing
- Perform ASME AG-1 Qualified Product List (QPL) qualification testing of HEPA filters and media
- Perform prototype evaluation, FAT, product lot acceptance and surveillance testing IAW DOD MIL-STDs and Commercial specifications.
- Manage the QPL database for DOD, DOE and Commercial Customers

EQUIPMENT

- Q262/Q223 DMMP Gas Life Tester
- Q242 DMMP Gas Life Tester for Recirculation Filters
- Q233 Low Flow HEPA Filter Efficiency Tester
- High Flow Alternate Test System (HFATS) HEPA Filter Efficiency Tester
- Q160 Wet Overpressure Tester
- Q110 Filter Rough Handler
- Environmental Chambers

REQUIREMENTS

- ASME N510
- MIL-STD Requirements
- ASME AG-1 Requirements



PROTOTYPE DETONATION TEST AND DESTRUCTION FACILITY (PDTDF)



VENTILATION SYSTEMS



2500 SQ. FT. CHAMBER

The PDTDF is a facility capable of testing technologies that require various site layouts. The facility is located at J-Field in the Edgewood area of Aberdeen Proving Ground, Md. The PDTDF can accommodate the heaviest of the transportable systems that are currently in use. Some previous systems that have been tested include Large Item Transportable Access and Neutralization System (LITANS), Explosive Destruction System (EDS), and the Transportable Detonation Chamber (TDC). The containment chamber is a 2500 sq. ft. chamber ventilated at 5000 CFM to ensure capture of contamination within. The chamber is monitored by an on site monitoring room and has the capability of providing supplied air and decontamination services if needed as well as being environmentally controlled. PPE storage rooms and changing rooms are connected to

the chamber to allow ease of egress and ingress. The PDTDF facility permits have been approved for up to 1 pounds TNT-equivalent. However, current destructions systems located at the site have been approved for 62.5 pounds TNT-equivalent explosives.



BLAST CHAMBER



FRAG CONTAINMENT

FEATURES

CAPABILITIES

- Test and demonstrate various technologies to destroy UXO.
- Exploitation of potential CW/BW explosively configured unknowns.
- Specially formulated black top can accommodate testing of the heaviest transportable systems.
- Previous systems tested have received approval for explosive testing up to 62.5 pounds TNT-equivalent explosives
- Day storage of up to 300 LBS pounds TNT-equivalent explosives.
- 2500 sq. ft. chamber.
- Trained Chemical, Biological and Explosives operators available.
- Self sufficient power.
- PDTDF building permit approval up to 1 LBS pounds TNT-equivalent explosives.

EQUIPMENT

- Material Handling Equipment Available.
- Multiple Vapor Containment Structures available on-site.
- Dedicated on-site monitoring support.
- 5000 CFM negative air ventilation on PDTDF chamber with acid gas scrubbers.
- PDTDF chamber is environmentally controlled.
- PPE storage and change room.
- Decontamination system.
- Breathing air supply.
- Covered storage of equipment available.
- Break and conference room available on site.

the chamber to allow ease of egress and ingress. The PDTDF facility permits have been approved for up to 1 pounds TNT-equivalent. However, current destructions systems located at the site have been approved for 62.5 pounds TNT-equivalent explosives.

QUALITATIVE PERMEATION TESTING

ECBC conducts first article and production acceptance testing of chemically protective permeable and impermeable materials. ECBC also supports the Joint Service General Purpose Mask (JSGPM) and Joint Service Aircrew Mask (JSAM) development programs by testing swatches according to the National Institute for Occupational Safety and Health (NIOSH) and Technical Support Working Group testing and acceptance criteria. Samples submitted are tested with adherence to standard methods, primarily military specifications, as defined in Test Operating Procedures, American Society for Testing of Materials Test Standards and military standards such as MIL-STD-282.

The protective materials used for testing are sampled from: butyl cloth, butyl gloves, footwear, hoses, lenses, rubber slabs, gas-mask components, coveralls, Improved Toxicological Agent Protective (ITAP) suits, and chemical resistant materials and liners.

FEATURES

CAPABILITIES

- Qualitative testing of chemical-protective materials against nerve & blister agent, liquid & vapor challenges
- First article and acceptance testing
- Individual and collective protection application

EQUIPMENT

- Q170 System – Congo red paper (blister agents); M8 Paper (nerve agents)
- Q171 System – Glass cups/fruit flies (nerve agents)
- AVLAG cells & glass cups

REQUIREMENTS

- Military Standards and Specifications
- ISO/IEC 17025 Accreditation



PROTECTIVE MATERIALS





QUANTITATIVE PERMEATION TESTING



12 PORT PERMEATION MANIFOLDS

ECBC is ISO 17025 accredited to perform permeation testing for chemical agents over a wide range of environmental conditions. Team members with over 20 years of experience conduct routine operational and developmental testing of commercial, military and unique protective materials. Operational testing is conducted in accordance with the TOP 8-2-501 and MIL-STD-282. Developmental testing includes more rigorous sensitivity limits, longer aspiration times, and elevated temperature and humidity. Near real-time detection of chemical agents is accomplished with a MINICAMS® or a gas chromatographic (GC) system. This unique capability minimizes agent carryover within the 12-port permeation manifold and the analytical system. The GC not only detects chemical agents in an accurate and precise manner, but it also automatically generates spreadsheet reports for easy archival and transmission to off-site customers. Temperature and humidity plots are monitored on the second scale with a computer and archived as part of the project's data package.



GAS CHROMATOGRAPH

FEATURES

CAPABILITIES

- Quantitative testing of materials against liquid & vapor challenges
- Permeating testing per TOPs 8-2-501, MIL-STD 282 and ASTM 739
- Novel method development to meet future/more stringent operational testing requirements
- Unique permeation test hardware design
- Near-real-time and offline analyses under challenging test conditions

EQUIPMENT

- AVLAG System
- DAWSON Cups System
- (3) 12-port permeation manifolds
- Gas chromatographs
- MINICAMS®

SERVICES

RESPIRATOR & ENSEMBLE FIT



The Protection Factor/ Toxic Chambers Testing Facility is designed to evaluate chemical protective capabilities of

MASK FITTING

respirator systems, such as masks and protective clothing. In order to simulate exposure to chemical agents, volunteers don test items and enter a test chamber containing a polydispersed corn oil aerosol challenge.

The corn oil aerosol is between 0.4 and 0.6 micron in diameter and has an air concentration of 20-40 mg/m³. The air inside the protective equipment is sampled for challenge aerosol particles while the subject undergoes a series of exercises intended to evaluate worst-case operational conditions. Human performance testing is conducted to ensure comfort, fit, breathing resistance, vision and communication aptitude. There is a standard set of exercises or the customer may specify exercises pending approval by the Human Use Committee. Sampling is accomplished through a length of silicon tubing that is connected from the mask and/



TEST CHAMBER

or suit to the laser photometers. The results are graphically displayed, real-time, on a computer monitor. The facility comprises an entrance airlock and aerosol exposure chamber that can



MASK AND FILTER FIT

FEATURES

CAPABILITIES

- Protection factor/fit CB simulant testing with corn oil aerosol
- Volunteer human subjects
- User performance testing (evaluations and obstacle courses)
- Typically 8 individuals; 10 exercises; 2 trials

EQUIPMENT

- 10' x 16' x 32' corn oil aerosol and environmental fogging chambers
- Laser photometers
- M41 PortaCounts
- Updated data acquisition system

REQUIREMENTS

- National Institute of Occupational Safety and Health—Chemical, Biological, Radiological and Nuclear Certification Testing
- Joint Service Standardization Agreement for Fit Factor Testing

accommodate up to sixteen volunteers and is designed for flexible protocol setup. Active vapor testing is used if additional testing is needed. Vapor testing, like aerosol testing, provides real-time active sampling. Methyl Salicylate is the primary substance used for vapor testing.



RESPIRATOR TESTING



MASK FILTER INSPECTION

Institute for Occupational Safety and Health Standards, as well as custom test plans. Test services include: Dimethylmethylphosphonate (DMMP) gas life testing, High Efficiency Particulate Air (HEPA) filter testing, mask and filter leakage and resistance testing. The team is also equipped to perform dimensional analysis and inspections related to craftsmanship.

ECBC maintains a respiratory mask and filter testing laboratory. The laboratory is equipped with government certified test equipment and GC analysis to perform a wide range of product qualification, first article and production lot testing. ECBC tests to common standards of product conformance such as military performance specifications, National

In order to determine the durability of masks, filters and related materials, the laboratory has the capability to expose these products to adverse environmental conditions such as hot and cold temperatures, accelerated aging and ozone.



JSGPM and the Joint Service Chemical Environment Survivability Mask (JSCESM).

ECBC conducts work for both commercial and government customers. Common test items include the C2A1 canister and the Army M40 field mask. Other government products recently tested include the JSAM,

FEATURES

CAPABILITIES

- Mask gas filter life testing with DMMP
- Mask filter aerosol penetration efficiency with PAO
- Mask leakage, breathing and drink resistance
- Dimensional inspection of craftsmanship
- Environmental and mechanical tests

EQUIPMENT

- Q223 DMMP gas life tester
- TDA 100P aerosol penetrometer
- Government approved mask leakage and Q-testers such as M14, Q179, & Q213
- Environmental chambers
- Ozone chamber
- Oxygen vessels

SERVICES

SERVICE OFFERINGS

SAMPLE RECEIPT FACILITY (SRF)



The SRF is the nation's premier facility for the receipt and exploitation of uncharacterized samples or items to be sampled ("unknowns") coming from the Department of Defense (DoD) theatres of operation, the Federal Bureau of Investigation (FBI), and other government sources.



The SRF is a unique 44,375 sq ft laboratory and intake facility that combines multi-agency expertise to receive, assess, and examine items for potentially hazardous chemical and biological agents. ECBC occupies a suite of specialized sample handling, screening and analytical laboratories in the SRF. An explosively hardened room is the point of entry for any munitions, IEDs or explosively configured items. Once received, operators perform critical operations to remotely disassemble the explosive and separate the unknown from the explosive, followed by analysis on the unknown under the latest engineering controls. Samples not explosively configured arrive in a triage



laboratory for exploratory research to determine what contaminants a sample contains. This is one of the only places in the nation where a complete "unknown" sample can be received and analyzed. Once the contaminant is determined, the sample is transferred to one of the chemical or biological laboratories for further study by DoD or FBI agents.

FEATURES

CAPABILITIES

- Nation's premier facility for the receipt and exploitation of uncharacterized samples
- Occupies 44,375 sq ft of analytical laboratories for chemical, biological and radiological assessment

EQUIPMENT

- Six fume hoods
- GC/MS
- Three Gloveboxes
- CHATS
- Two BioSafety Cabinets
- Autoclave
- Custom Mix Tank

REQUIREMENTS

- CDC and USDA permitted for Select Agent
- Compliant with Chemical Material Agency's (CMA) Laboratory and Monitoring Quality Assurance Plan (LMQAP) and Chemical Agent Standard Analytical Reference Material (CASARM) QAP
- DoD Chemical Personnel Reliability Program (CPRP) and Biological Personnel Reliability Program (BPRP)

Several of the areas of the SRF permit highly specialized work. A "high bay" hazardous materials room allows triage and handling of unusually sized evidence. A Biological Safety Level 3 laboratory is equipped with high-throughput sample processing equipment, which dramatically increases the number of samples that can be processed in a day. Other areas, such as monitoring and control rooms, house specialized equipment for continuous air monitoring and controls for exhaust and air supply systems.



SHOCK, VIBRATION, & ROUGH HANDLING



TRANSPORTATION SIMULATOR

ECBC operates specialized test equipment to perform shock, vibration and rough handling tests on military and commercial products in a safe and environmentally friendly atmosphere. A two building setup provides remote control capabilities that allow for a greater range of test items such as smoke and non-lethal riot control grenades. Team members can create simulated transportation test profiles for various modes of transportation including wheeled or track vehicles and helicopters. Test items are subjected to various temperature and humidity conditions during vibration simulations by utilizing two piggyback environmental chambers that provide a cost effective way to expose test items to most global transportation scenarios. Packaging tests are performed to ASTM D4169, Distribution Cycle 18. ECBC personnel use the Agilent VEE Pro® Graphical Instrumentation Programmer, National Instruments LabView Program and data acquisition equipment to develop specialized

test setups and capture required data. Test results are documented with photos and video tapes to enable identification of design defects early in development and ensure robust designs and reliable products.

A two building setup



ROUGH HANDLER

FEATURES

CAPABILITIES

- Secured steady state or transient vibration and loose cargo transportation vibration
- Shock and packaging tests
- Specialized test setup development
- Computerized analog/digital acquisition and control development
- Video for test documentation
- Temperature conditioning

EQUIPMENT

- Unholtz Dickie vibration control systems
- Loose cargo transportation simulator
- 40', 6', and 5' drop tester and compression and side impact testers

REQUIREMENTS

- American Society for Testing of Materials Test Standards
- Military, Federal and Commercial Test Standards
- ISO/IEC 17025 Accreditation

SERVICES SERVICE OFFERINGS

SIMULANT AGENT RESISTANT TEST MANIKIN (SMARTMAN) AGENT TESTING



SMARTMAN

ECBC conducts system chemical agent and toxic industrial chemical testing on complete mask systems utilizing the Simulant Agent Resistant Test Manikin (SMARTMAN®) headform. Items

tested include air purifying respirators, self-contained breathing apparatus, powered air purifying respirators and escape hoods, Joint Service General Purpose Masks (JSGPM) and other aircrew masks. The Mask Testing Group works closely with customers to design and validate the certification tests and finalize the standard test protocols. Team members conduct certification tests for the NIOSH such as NIOSH certification on commercial mask systems.

ECBC is able to simulate human breathing under a variety of environmental conditions, such as heat and humidity, at a variety of breathing rates. ECBC also certifies that both foreign and domestic mask systems comply with current U.S. standards.



SMARTMAN WITH MASK

FEATURES

CAPABILITIES

- Agent & industrial chemical testing of complete mask/respirator systems
- Targets system penetration & permeation
- Vapor and liquid challenge testing (sarin, GB; mustard, HD)
- Developmental testing
- First article performance testing
- Validation and certification testing

EQUIPMENT

- SMARTMAN® headform
- MINICAMS® detects breakthrough
- Photoacoustic
- MIRAN® challenge referee

REQUIREMENTS

- NIOSH/CDC Certification Testing
- Homeland Security Certification Testing
- NIST certification testing
- ISO 17025 Accreditation



STANDOFF DETECTION TECHNOLOGY EVALUATION

ECBC is home to a unique standoff detection technology evaluation facility that, for the first time ever, allows precise performance measurement of standoff detection systems at significant distances.

The only facility of its kind in the country, this facility is known as the Standoff Detection Technology Evaluation Facility and allows researchers to release a known amount of material and maintain a calibrated material scatter so that a standoff detector's ability to "see" can be accurately measured from up to several kilometers away. This increased precision reduces uncertainty about the potential field performance of standoff detectors.

The Standoff Detection Technology Evaluation Facility was designed for use in the Artemis Chemical Standoff Detection Program to allow aerosol backscatter and vapor measurements with a frequency-agile carbon dioxide (CO²) Light Detection and Ranging (LIDAR) standoff detector. The chamber utilizes curtains of air produced by an interior vortex and balanced by an exterior counter flow of air to contain the material cloud. This also prevents the backscatter off of conventional hard windows from corrupting the desired measurements on the cloud inside the chamber. The prevention of backscatter is critical because the CO² LIDAR has a long (1 microsecond) pulse and the backscatter off the window cannot be temporarily separated from the backscatter off of an aerosol in the chamber.

With known and modest modifications, this ECBC asset can be used with all passive and active, chemical and biological standoff technologies and systems at any stage of development. The chamber was designed for testing with a variety of CB simulants, interferents and selected toxic industrial chemicals in both vapor and aerosol form. ECBC is exploring the regulatory acceptability of extending the operations to include "kill" pathogens, which would produce a tremendous benefit for the CBDP if permitted. Using state-of-the-art ground truth instrumentation, the Standoff Detection Technology Evaluation Facility has been shown to successfully contain a homogenous aerosol cloud.

FEATURES

CAPABILITIES

- Up to 15 minutes of homogeneous aerosol suspension and up to 200 micrometers (diameter) of wet or dry aerosol generation
- Chambers capable of closed or open windows and aerosol clearing in minutes
- Ground Truth nephelometer data
- Homogeneous aerosol distribution
- Biological Level-2 upgrade-capable
- 20' path, isokinetic sampling, air curtain technology, and 4' x 4' aperture

EQUIPMENT

- Stainless steel lining, windowless vortex chamber, and aerodynamic particle sizers

SERVICES

SERVICE OFFERINGS

TOXICOLOGY



ECBC toxicology subject matter experts (SMEs) provide the research and development to determine the potential impact of chemical agents and other hazardous materials on U.S. Forces.

Using unique facilities and state-of-the-art equipment, Toxicology SMEs measure the effects of chemical agents and hazardous materials on animals to estimate the impact on humans. Those estimates are used to determine the degree to which our Soldiers, Marines, Sailors, and Airmen must be protected to allow them to continue to perform their mission. The human health estimates become the basis for individual and collective protection requirements, detection requirements, and decontamination requirements.



Toxicology testing is performed using different species and varying conditions to provide statistically sound data. Exposures can be done intravenously, percutaneously, or by inhalation.

All testing complies with Army and

Department of Defense regulations, and AAALAC standards for animal care.

We provide toxicology research and development to support requirements for JS Materiel Developers, PMs, OGA and CB defense customers, and we develop toxicology and CB threat databases for operational requirements.

FEATURES

CAPABILITIES

- Aerosol Collector Characterization
- CW Risk Assessment
- Toxic Agent Inhalation Glove Box
- Low Level CWA Effects
- Pyro/Explosive/Smoke/Obscurant Tox Evaluations
- Chemometrics/Computational Chemistry
- Environmental Toxicology
- Aquatic and Terrestrial Toxicology
- Trace CWA Metabolite/Dosemetric Analysis
- Conduct New Obscurant Materials Research

EQUIPMENT

- Animal holding facilities
- Vapor exposure chambers
- Aerosol exposure chambers
- Full analytical capabilities to support testing

REQUIREMENTS

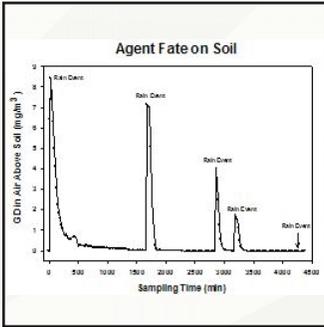
- AAALAC accredited



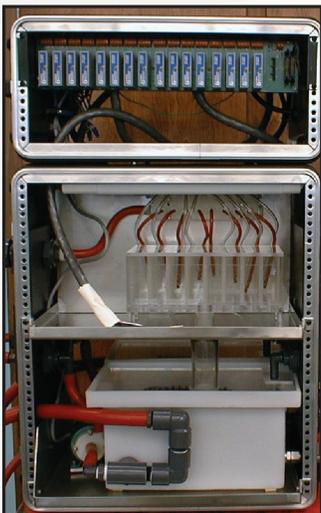
TOXICOLOGY-ENVIRONMENTAL



ECBC subject matter experts work in environmental toxicology laboratories equipped with state-of-the-art research facilities for performing both terrestrial and aquatic environmental fate and ecotoxicological investigations. Their research focuses on chemical agents, hazardous materials, decontamination formulations, transformation products and related compounds. These dedicated terrestrial and aquatic research facilities are specially designed to support



investigations with chemical warfare agents and hazardous materials. Unique capabilities include Soil System Units for determining the fate of highly toxic compounds in soil and the atmosphere above, including migration, transport, transformation/ degradation, partitioning and leaching potential; contact transfer from soil; and uptake by plants and corresponding phytotoxicity. Unique aquatic capabilities include the Fish Biomonitor Sensor System that utilizes sentinel species to detect the presence of toxic materials in aqueous systems.



FEATURES

CAPABILITIES

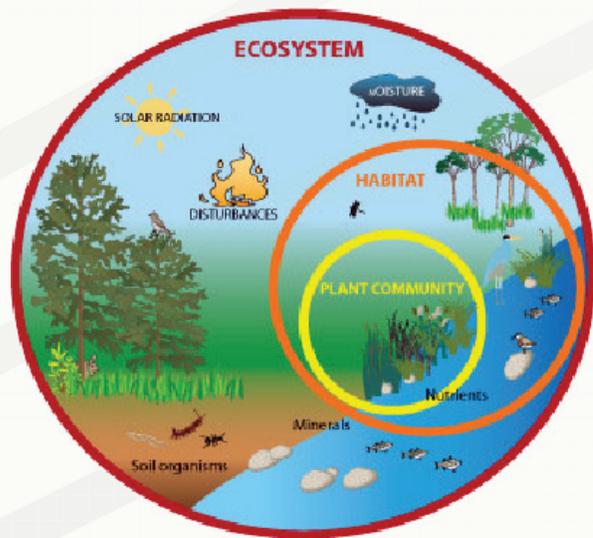
- Environmental fate and ecotoxicological effects research, for soil, water (fresh and marine) and air exposures
- Determining Contact Transfer of hazardous materials from soil
- Soil Invertebrate culture facilities
- Aquatic organism culture facilities
- Providing leadership and technical expertise to: Risk Managers for Ecological Risk Assessment; The Technical Cooperation Program (TTCP) Weapons Technical Panel (WTP-4); National Academy of Sciences U.S. National Committee for Soil Science (NAS-NCSS)

EQUIPMENT

- Soil System Units
- Soil Invertebrate Microcosms
- Soil organism extractors
- Aquatic Microcosms
- Computerized multichannel Fish Biomonitor Sensor System
- Analytical instrumentation, including GC, HPLC, MS

REQUIREMENTS

- Accredited by Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC)



WORKING WITH ECBC

The U.S. Army Edgewood Chemical Biological Center's (ECBC) team of experienced scientists, engineers and technicians routinely develop and refine new and innovative technologies, many of which may assist not only the Warfighter but also other government entities, industry and academia. As part of its mission, ECBC offers a broad range of chemical/biological (CB) services and the use of its cutting-edge facilities through its technology transfer program.

If you are in need of ECBC's services, doing business with us has never been easier. We have in place a variety of agreements and funding mechanisms that can be rapidly activated so you can readily access our expertise and facilities. These include the following:

- ▶ Patent License Agreement (PLA)
- ▶ Cooperative Research and Development Agreement (CRADA)

- ▶ Technology Support Agreement (TSA)
- ▶ Memorandum of Agreement (MOA)
- ▶ Memorandum of Understanding (MOU)
- ▶ Support Agreement (Interagency Agreement)
- ▶ Broad Agency Announcement (BAA)
- ▶ Small Business Innovative Research (SBIR)/Small Business Technology Transfer (STTR)

For information on any of these programs, please contact:

**The U.S. Army Edgewood Chemical Biological Center
Office of Research and Technology Applications (ORTA)**
E-mail: technical.outreach@apega.army.mil
P-(410) 436-4438

ECBC QUALITY STATEMENT

ECBC is committed to meeting or exceeding our customers' requirements and expectations with high quality and high value products. ECBC ensures the quality and value of our products through a Quality Management System (QMS) that emphasizes continuous improvement. This Quality Policy is communicated to all ECBC employees and made part of all ECBC business processes. The Quality Policy is reviewed for effectiveness within the organization to ensure that it continues to be applicable to the ECBC

mission. ECBC Executive Management is committed to a robust quality system and provides the resources needed for its implementation and improvement.

The Seal of Excellence quality management program is an effort that involves everyone at ECBC and requires all to weave quality and continuous improvement into their work. The system is modeled after the International Organization for Standardization (ISO) 9001:2008.

OVERVIEWS

DIRECTORATE OVERVIEWS

ECBC works safely with chemical, biological, radiological, nuclear and explosive agents at all stages of the materiel lifecycle and has three core competencies: research and technology support, engineering support, program and integration support.

RESEARCH AND TECHNOLOGY DIRECTORATE PROFILE

The Research and Technology (R&T) Directorate is the premier national resource for CB defense, providing integrated science and technology solutions that address CB vulnerabilities. R&T's core competencies include biosciences, CB detection, CB protection and decontamination, chemical sciences, physics and computational sciences, and toxicology and obscurants.

ENGINEERING DIRECTORATE PROFILE

The Engineering Directorate operates under the auspices of ECBC with a mission to "provide unique infrastructure, engineering expertise and lifecycle services to solve CB challenges for the Warfighter and the homeland." The Engineering Directorate drives technology transition from the tech base through engineering development to production, fielding and sustainment. The directorate's highly trained workforce is committed to responsive customer service and is knowledgeable about both current and evolving technology and capabilities worldwide.

Engineering uses unique infrastructure, engineering expertise and lifecycle services to solve CB defense challenges for the Warfighter and homeland and works every day to achieve the Engineering vision of being the "First Stop for CB Defense Solutions."

THE DIRECTORATE OF PROGRAM INTEGRATION PROFILE

The Directorate of Program Integration (DPI) provides specialized personnel renowned for their ability to safely handle the most dangerous substances on earth. In addition, DPI offers CB training and designs and builds CB mobile labs for its customers. DPI leads the integration and execution of comprehensive and dynamic global CB missions with a diverse workforce and the provision of world-class solutions for the Warfighter and homeland with cutting-edge technologies in a safe, secure and environmentally sound manner.

With the unique ability to reach back to the expertise, advanced equipment and facilities within the organization, ECBC enables client success for the Warfighter and the homeland.

For more information on ECBC's Test Capabilities and Services or for general inquiries, please contact:

**The U.S. Army Edgewood Chemical Biological Center
Public Affairs Officer**

E-mail: ecbc.pao@conus.army.mil

Phone: 410-436-7118

MISSION

Integrate lifecycle science, engineering and operations solutions to counter to CBrne threats to U.S. forces and the nation.



**ECBC'S SUPPORT SPANS
THE R&D LIFECYCLE**



RDECOM

For more information about the Edgewood Chemical Biological Center visit
www.ecbc.army.mil or email ecbc-communications@apgea.army.mil.

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

