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## CAPABILITIES & SERVICES AT-A-GLANCE

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<td><strong>Chemical Biological (CB) Surety</strong></td>
<td>Expert-level safety, industrial hygiene, security, surety and environmental protection professionals who safely handle the world’s most toxic CB materials</td>
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<td><strong>Strategic &amp; Technical Expertise</strong></td>
<td>Scientists, engineers, technicians and specialists who offer unparalleled expertise across the CB spectrum of research, engineering and operational support to the warfighter</td>
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<td><strong>Battlefield Integration</strong></td>
<td>CB warfare defense analyses to develop simulation technologies that answer a range of needs, from framing questions to data reduction for acquisition decisions</td>
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<td><strong>Systems Engineering</strong></td>
<td>Functional expertise and tools that support the entire chemical, biological, radiological and nuclear (CBRN) acquisition lifecycle and inform future investments</td>
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<td><strong>Lifecycle Engineering Support</strong></td>
<td>Proficiency and expertise in systems engineering, configuration management, quality management and industrial base support for the CB defense equipment lifecycle</td>
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<td><strong>Emerging Threats Testing</strong></td>
<td>One-of-a-kind capabilities that test CB defense equipment, from small to large, against emerging threats under operationally relevant battlefield conditions</td>
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<td><strong>Large-Scale Testing</strong></td>
<td>Total containment testing of CB systems under climatic conditions against chemical agents and explosives, biological agents, emerging threats and CB simulants</td>
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<td><strong>Outdoor Testing</strong></td>
<td>CB simulant field tests and aerosolized clouds (up to Biosafety Level (BSL) 2) in a semi-controlled outdoor environment to support research, development, test and evaluation (RDT&amp;E) activities across the acquisition lifecycle</td>
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<tr>
<td><strong>Analytical Services</strong></td>
<td>Development of robust sampling, sample clean-up, extraction and analytical protocols to minimize sample matrix effects, and result in accurate, precise and defensible data</td>
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<td><strong>Chemical Sciences</strong></td>
<td>Research, synthesis, chemical and physical properties testing, development of analytical methodologies, and analysis of unknown chemical samples</td>
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<td>Measure the effects of threats on animals to estimate human impacts as a basis for CB defense system requirements to enable U.S. forces to continue their mission</td>
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<td><strong>Biosciences</strong></td>
<td>Develop evaluation methods for biological production, and perform RDT&amp;E and technology evaluations for field, commercial, developmental and prototype biosensors</td>
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<td><strong>Point &amp; Standoff Detection Testing</strong></td>
<td>CB development and operational testing of military, commercial-off-the-shelf (COTS) and prototype detector systems for algorithm development, proof-of-concept demonstrations and performance tests</td>
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<tr>
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<td>Chemical permeation and durability testing of materials, masks, filters and protective systems, ensemble fit and fixed-site filtration systems under environmental conditions</td>
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<td>Environmental stress testing in accordance with MIL-STD-810 to assess systems against conditions experienced throughout service life</td>
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<tr>
<td><strong>Physical Properties Testing</strong></td>
<td>Measure critical properties, characteristics and physical attributes of raw materials, components and complete systems for selection, design, production or failure analysis</td>
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<tr>
<td><strong>Concept &amp; Prototype Development</strong></td>
<td>Integrated design, engineering and manufacturing to provide rapid-response, lifecycle solutions and proof-of-concept processes to optimize design, performance, cost and schedule</td>
</tr>
<tr>
<td><strong>Operations</strong></td>
<td>Global CB operations performed in safe, secure and environmentally sound manner, while offering an innovative, agile response to the dynamic global CB landscape</td>
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About CCDC Chemical Biological Center

The U.S. Army Combat Capabilities Development Command (CCDC) Chemical Biological Center is the primary Department of Defense (DoD) technical organization for non-medical CB defense.

For 100 years, CCDC Chemical Biological Center has been a unique national asset in the research, development, engineering and sustainment of the equipment and support our warfighters need to complete their missions and return home safe. We are a trusted leader in eliminating weapons of mass destruction to make our nation and world safer.

Since 1917, CCDC Chemical Biological Center has been at the forefront of protecting our warfighters and our nation from the potentially devastating effects of chemical or biological attack. Since its inception, the Center has made tremendous leaps in technology, from detectors the size of a small refrigerator to small plastic kits that identify potentially deadly agents, and from gas masks needing bulky external filters to integrated clothing items that enhance a Soldier’s capability. Our continuing mission is to support our nation through the innovative research and development which has made CCDC Chemical Biological Center the nation’s principal research and development (R&D) resource for non-medical CB defense.

Who We Are

Our workforce of some 1,400 scientists, engineers, technicians and specialists have the experience, knowledge and training to work safely and effectively with the most dangerous compounds in the world.

What We Do

We combine our unparalleled expertise, unique facilities and ability to collaborate effectively with government, industry and research organizations to provide innovative and cost-effective solutions to the Army and joint services, the warfighter, the nation and the world.

Why We Do It

We do all of this to ensure our military is ready to fight in the most dangerous situations, and our citizens are safe and protected from chemical or biological warfare.
Our People

The CCDC Chemical; Biological Center workforce includes scientists, engineers, technicians and specialists located at four locations in the U.S.: Edgewood Area of Aberdeen Proving Ground, Maryland (EA-APG); Pine Bluff Arsenal, Arkansas (PBA); Rock Island Arsenal, Illinois (ECBC-RI); and Dugway Proving Ground, Utah (DPG).

The expertise of our workforce—a diverse blend of scientists, technicians, engineers, support personnel, government employees, Soldiers and contractors—provide 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 warfighter and the homeland.

The breadth and depth of our institutional knowledge is unmatched, and our hiring and workforce development strategy is designed to bring the best technical talent and leadership to every project and program.

Our Laboratories & Facilities

CCDC Chemical Biological Center owns and operates more than one million square feet of laboratory, chamber and product development space, spanning 200 buildings with a total of $1.8 billion.

This one-of-a-kind scientific and engineering environment features most of the nation's chemical surety hoods; BSL-2 and BSL-3 laboratories; a unique collection of chambers that allows an entire system—rather than individual components—to be fully immersed in chemical agent while under test; and the only facility in the nation that enables large-scale tests of equipment and vehicles with chemical agent and explosives simultaneously.

The Center’s cache of facilities includes one-of-a-kind research and test facilities fit for any chemical, biological, radiological, nuclear and explosives (CBRNE) program.

$1.8 billion in facilities and equipment, located at EA-APG, PBA, ECBC-RI and DPG
More than 2 million square feet of space, including 1.5 million square feet of laboratory and chamber space at APG-EA
32,000 square feet of multifunctional laboratories, including 4,000 square foot BSL chamber at DPG
434 chemical surety hoods
68 BSL-2 and BSL-3 hoods
Toxic test chambers
Explosive containment chambers
Sophisticated environmental controls
Supporting the Acquisition Lifecycle

CCDC Chemical Biological Center’s unrivaled knowledge and capabilities have earned it a role as a key organization within the DoD Chemical and Biological Defense Program, and our technical expertise touches every phase of the acquisition lifecycle: from basic and applied research; to concept and product development; to CB surety and non-surety product testing; to system development and engineering; to production and sustainment of CBRNE items.

As an Army Research, Development and Engineering Center, we offer key strategic and technical support to our customers and partners in the areas of technical-cost trade space within early design and development, and can investigate and analyze various materiel solutions to support program managers and Programs of Record.

Our subject-matter experts and state-of-the-art facilities can be leveraged to provide Analysis of Alternatives (AoA), in-house prototyping, experimentation, scale-model testing, and risk reduction via subsystem development and test. These capabilities are critical for characterizing the impact of proposed design changes on warfighter mission effectiveness.

Our Technical & Strategic Expertise

- CBRNE Analysis & Testing
- CBRNE Agent Handling & Surety
- Science & Technology for Emerging Threats
- CBRNE Materiel Acquisition
- CBRNE Munitions Field Operations
- Strategic Test Planning & Optimization
- CBRNE Sustainment & Engineering Support
Partner with Us

CCDC Chemical Biological Center has cultivated invaluable relationships with other DoD and federal agencies, foreign governments, private industry and academia, with a common goal in mind: to prepare and protect our warfighters and nation.

By working with us, you get:

- Advantage of a century of institutional knowledge and expertise in the CB defense arena
- Advice and support from world-renowned scientists and researchers, highly skilled engineers, specialists and technicians, and acquisition-certified professionals
- Access to more than 200 laboratories and facilities, including one-of-kind chambers for testing live chemical and biological agents
- A steadfast partner that shares your mission to deliver the best products and solutions at the right time and the right cost

Partnering with the Center 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 experts and facilities.

TECHNOLOGY SUPPORT AGREEMENT (TSA)
Used for testing technologies and leveraging CCDC Chemical Biological Center services, facilities and equipment.

COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT (CRADA)
Parties may exchange intellectual property, expertise and data; they may also hire personnel or rent services, material, equipment and facilities.

PATENT LICENSE AGREEMENT (PLA)
Used to license CCDC Chemical Biological Center-patented intellectual property.

MEMORANDUM OF UNDERSTANDING (MOU)
Used when the products or services offered by CCDC Chemical Biological Center will depend upon the products and services provided by the other party or parties.

MEMORANDUM OF AGREEMENT (MOA)
Used to define an understanding between the Center and another party or parties which does not depend upon the products or services either party agrees to contribute.

INTERAGENCY AGREEMENT (IAA)
Provides recurring support to other government organizations; defines the support and reimbursement charges, if any, along with specific terms and conditions.
Critical Capabilities & Services

Unique Capabilities

- Lifecycle responsibilities for CB defense technology development; from the laboratory to sustainment of fielded items
- Serves as the single small-scale facility for the United States, a designation given to one organization in each Chemical Weapons Convention Treaty signatory country
- The only all-hazard laboratory in the nation capable of handling items potentially contaminated with chemical, biological and radiological materiel

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
- Emerging threats sciences and toxicology
- Industrial base research to strengthen supply chain

CB Defense Materiel Testing

- CB testing and evaluation
- Lifecycle CB materiel acquisition
- Rapid prototyping
- Systems engineering
- Emerging threats T&E
- U.S. Army Combat Capabilities Development Command (CCDC) Chemical Biological Center lead for Defense Logistics Agency (DLA) consumable-item transfer
- Major Range Test Facility Base (MRTFB) for biological T&E
- Laboratory certification, surveillance testing and production lot testing

Operations Capabilities

- Live agent handling and surety
- Environmental analytical testing and validation services
- High-throughput chemical warfare agent (CWA), biological warfare agent (BWA) and inorganic chemical analysis
- Deployable mobile lab services
- Chemical munitions field operations
- Field remediation and demilitarization operations
- Integration
- Sustainment engineering support
- Secure web-based applications and maintenance of knowledge portals
CCDC Chemical Biological Center’s highly skilled personnel combine their expertise with the capabilities of the Center’s test facilities to test CB defense products against a variety of dangerous agents and toxic compounds.

More than 400 CCDC Chemical Biological Center safety, industrial hygiene, security, surety and environmental protection professionals participate in the U.S. DoD Personnel Reliability Program (PRP), which permits only the most trustworthy individuals to perform surety operations with chemical and biological threats.

The Center’s risk management experts are routinely asked to assist other organizations manage their CB surety, safety and security programs.

Additionally, CCDC Chemical Biological Center manages the contractor-owned, contractor-operated chemical agent laboratory program, and the the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD) biosurety program for the acquisition of vaccines; and assists the Department of Homeland Security in managing their Chemical, Ordnance, Biological, Radiological Training Facility (COBRATF). CCDC Chemical Biological Center also ensures availability of an adequate agent supply for defensive R&D.
CCDC Chemical Biological Center performs studies and analyses in the area of CB warfare defense for R&D, engineering and operational customers. Our team researches novel simulation algorithms, applications and services, and develops simulations to answer a range of customer analytical needs, from framing the questions to providing data reduction and analysis support for acquisition decisions.

Key Capabilities

- Analytical planning and execution support, including study plans, design of experiments, conduct of simulation experiments, and statistical analysis for both internally generated and customer-provided data.
- Use simulation codes that portray CBRN operations, threats, sensors and limited protective equipment in a distributed environment (CB Sim Suite); and smoke and obscurants in standalone versions (Smoke System Performance Model (SSPM) and Sensor-Obscurant Engagement Simulation (SOES)).
- Perform simulations in a variety of in-house computing modes.
- Develop new or adapting existing M&S tools with in-house or support contractor personnel.
- Use Joint Modeling and Simulation Center for constant concentration, time-varying concentration, or spatially varying liquid contamination on the protective garment modeling for CWAs, BWAs and simulants.
- Use Individual Protection System Performance Model (IP SPM) to predict system performance from material and component testing against CWAs, BWAs and simulants.
CCDC Chemical Biological Center provides interdisciplinary teams with systems engineering functional area expertise across the CBRN acquisition lifecycle. Our experts offer a variety of support across systems engineering disciplines.

Key Capabilities

- Assistance with CBRN requirements engineering, performance envelope definition, reliability, logistics and testing for successful system development, design, implementation and sustainment.
- Assistance with risk management and mitigation activities such as diminishing manufacturing and materiel shortages and proactive obsolescence management.
- Performance of technology readiness assessments to assist with determination of technology readiness level.
- Ability to work on large and complex projects, with consideration for cost, schedule and performance.
CCDC Chemical Biological Center has teamed with the JPEO-CBD’s Analytical Framework (AF) to establish the AF Stakeholder Integration Laboratory (SIL) to provide a robust, quantitative and repeatable suite of engineering tradespace, combat simulation and portfolio analytics tools, allowing the comparison of concept and materiel trades during concept development and materiel solution analysis. The initiative supports strategic decision-making, portfolio analytics and enhanced capability-sets exploration in support of CBRN defense investments.

Using the AF SIL, future Programs of Record and CBRN defense acquisition-related efforts will be able to determine the impacts of design changes, tradeoffs and integrated capabilities on warfighter operational mission effectiveness.

The long-term goal of the initiative is to support iterative and cooperative solution analysis studies in collaboration with enterprise partners. Initial capabilities support model-based system engineering, parametric visualization of system requirements, and an initial operational effectiveness analytic toolset representing CBRN effects in a common combat analytics simulation environment.
CCDC Chemical Biological Center provides systems engineering, configuration management, quality management, industrial base support, and technical expertise to support CB defense equipment across the acquisition lifecycle. This includes collective protection, individual protection, biological and chemical detection, decontamination and smoke equipment.

**Standards, Accreditations & Certifications**

- ISO 9001:2008 certification to ensure customer satisfaction through conformance of products, services and processes, including metrics
- Transitioning to ISO 9001:2015 in FY18

**Key Capabilities**

- Configuration management of CB equipment
- Engineering acquisition support
  - Develop and update technical data
  - Compose statements of work and descriptions for purchase
  - Provide technical input for contracts and/or solicitations, including quality management sections
  - Perform engineering studies to address and/or prevent obsolescence issues
  - Conduct laboratory certification audits
  - Evaluate first article and production lot test data to maintain quality
  - Conduct industrial base sector studies and market research
- Surveillance engineering
- Provide systems engineering support to multiple customers, including government organizations and private industry
Unique Emerging Threats Facilities

Non-Traditional Agent Defense Test System (NTADTS)

CCDC Chemical Biological Center operates the Army’s one-of-a-kind NTADTS—a collection of specialized chambers designed to test chemical agent protection, detection and decontamination equipment, from small to large, under operational conditions most relevant to today’s warfighter. It is the only facility in the world that allows us to test entire systems against emerging threats.

Key Capabilities

- Chemical agent, toxic industrial chemicals (TICs) and emerging threats testing
- Solid, liquid, vapor and aerosol challenges
- Environmental controls for temperature and humidity
- Full-immersion chemical agent tests of individual components and systems
- Flexibility to address rapidly changing threat environment
CASTL, short for Chemical, Biological, Radiological and Explosive (CBRE) Assessment, Science and Technology Laboratory at Edgewood, supports the research, development, characterization and assessment of detection technologies in a state-of-the-art, adaptable surety laboratory.

Our configuration allows for everything from point (in-situ) to proximal working distances (tens of meters). CASTLE offers our customers and partners both the opportunity for unbiased assessment of system abilities, and more importantly, the opportunity to join in a collaborative development and evaluation spiral, leveraging the immense knowledge base and expertise available at the Center.

Key Capabilities

- One-of-a-kind, full-service laboratory that allows for all classes of CB warfare agents, toxic industrial chemicals, pharmaceuticals and energetics to be used behind one door
- In-house developed methods allow for low-volume deposition down to 0.2 picolitres, in precise locations, for liquids and solids on surfaces, as well as vapor and aerosol challenges
- Radiological permit
- The only four-sided hood in the country
Large-Scale Chambers

Chemical Agent & Explosives

CCDC Chemical Biological Center maintains two explosive, hazardous-material test facilities that house chambers designed for total containment testing of CB military and industrial related equipment and explosive and/or toxic munitions and materials. The chambers support simultaneous testing of CWAs and explosives under climatic conditions.

Key Capabilities

- Chemical agent liquid, aerosol and vapor challenges
- Explosive dissemination of chemical agents (CONUS unique)
- Two cylindrical, 32" diameter x 20' height, 16,000 cubic feet test volume
- Vehicle access door and 19 access ports
- Multiple sampling and control systems
- PRP trained in chemical agent handling, explosives and hazardous operations
- Supporting sample preparation and analytical laboratory
- 5,000-cfm CBR filtration systems
- 10,000-gallon hazardous waste storage
- 1,000-gallon decontamination solution storage
- Operations control room
CB Simulants

CCDC Chemical Biological Center designed and built a large-scale CB simulant aerosol and vapor chamber to meet diverse testing requirements. Modular flexibility accommodates various generation, dissemination and sampling systems. 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 and features a large facility access door, operations control room, a hydraulic scissor lift, and adequate working provide for ease of operations and necessary infrastructure alterations.

Key Capabilities

- Chemical simulants and up to BSL-2 aerosol and aerosol countermeasure tests
- Secondary contaminant
- 14,400 cubic feet test volume chamber (20’ x 20’ x 36’)
- 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
- 10,000-gallon holding tank and sump
Biological Agent Testing

CCDC Chemical Biological Center maintains the only DoD facility certified to test developmental equipment with aerosolized BLS-3 agents, including bacteria, viruses and biological toxins. Located at DPG, 33,150-square-foot facility features BSL-1, 2 and 3 laboratories, and houses the BSL-3 Containment Aerosol Chamber (CAC), BSL-2 Aerosol Simulant Exposure Chamber (ASEC) and the unmatched Whole System Live Agent (WSLAT) capability.

Key Capabilities

- Aerosol testing with pathogens, toxins and simulants
- Large-scale BSL-1, 2 and 3 capable test resources
- Two 75-cubic-meter BSL-1 chambers (ASEC1 and ASEC2) used to test biological point detectors and to perform contamination/decontamination survivability tests
- The WSLAT chamber is large enough to accommodate two Joint Biological Point Detection System (JBPDS) units in their as-fielded configuration.
- Inactivated agent-like organisms and killed biological simulant tests
- Chambers provide full temperature, humidity, pressure and wind-speed controls
Whole System Live Agent Test facility (WSLAT)

WSLAT is a 7,100-cubic-foot testing chamber with capability to fully immerse biological agent defense equipment, such as personal protective equipment, filters, detectors, identifiers and air filtration systems, in a live agent aerosol. It is the only chamber in the world capable of handling testing of two bio-detectors side by side.

Located at DPG, the chamber can mimic a wide range of atmospheric conditions including temperatures of up to 110 degrees Fahrenheit, and humidity up to 90 percent. It can also maintain aerosol at any concentration between 20 and 6,000 particles per liter of air.

WSLAT provides substantial instrumented test space to conduct controlled experiments for production-version biological defense system. The chamber can also be modified to accommodate other developmental point biological detection systems, or multiple systems for competitive performance testing.

Key Capabilities

- Approx. 7,100 cubic feet, with 2,400 cubic feet of instrumented test space.
- Capable of aerosolizing RG-1 agents, including natural background, and interferent aerosols (SOP pending) sequentially or simultaneously within a single trial.
- Adjustable temperature range of 40°F to 110°F (±4.5°F).
- Adjustable relative humidity range of ambient to 90% (±5%).
- Adjustable wind speed range of 1 to 6 m/s (±0.5).
- Customizable aerosol particle size range of 1 to 6 μm NMAD, and particle concentration from 20 to 10,000 ppl (wet release) and up to 100,000 ppL (powder release).
- Aerosol uniformity well-characterized of less than 20% variability at each test location for wet and dry aerosol generation methods.
- HEPA filtered supply and exhaust air.
- Fully-integrated computer monitoring and data logging.
The CCDC Chemical Biological Center ambient breeze tunnel is a unique space for safe, effective CB simulant testing of aerosolized clouds in a semi-controlled outdoor environment. Maintaining the same temperature and humidity as the outside temperature, the tunnel allows testing to take place in realistic conditions, and permits testing of equipment in a sophisticated, safe environment.

Key Capabilities

- Full-scale, full-immersion simulant tests
- 14’ x 14’ tunnel and 200’ long test section
- Chemical simulant and BSL-1 and 2 challenges
- Liquid aerosol, solid aerosol and dusty simulants and interferent testing
- Ambient environmental conditions for temperature and humidity
- Controllable wind conditions
- Control room and test control center
CCDC Chemical Biological Center test ranges at APG-EA can accommodate a variety of CB simulant field tests in support of RDT&E activities across the acquisition lifecycle for protection, detection and decontamination.

Key Capabilities

- CB simulant and interferent testing under ambient environmental conditions
- Down-range field with 300’ x 300’ concrete staging pad and test area with observation bunkers
- Down-range field with 400-acre open test field and 1-meter survey points
- On-site temperature chambers for test item preconditioning
- Developmental grenade tests
- Dissemination of smoke material
- Helicopter smoke and drop tests
- Laser technology/radar targets
- Engineering and investigative tests
CCDC Chemical Biological Center has several laboratories that are ISO 17025 accredited to perform CB trace analyses in complex matrices, such as caustic process residue samples, landfill leachate, fuel oil, gas bag and soil samples. Center experts routinely develop and implement testing requirements for effective and efficient project execution. Robust sampling, sample clean-up, extraction and analytical protocols minimize sample matrix effects and result in accurate, precise and defensible data.

**Standards, Accreditations & Certifications**

- Quality control procedures and systems
- 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

**Key Capabilities**

- Chemical surety and non-surety agent analysis
- Chemical-compound rapid-screening
- Sampling and analytical method development
- Near-real-time and offline analyses under challenging test conditions
- Quality control procedures and systems
- High-throughput labs for CWA/BWA analysis in varied matrices
- Robotic-assisted analysis used for high-throughput CB sample analysis
- Suites of state-of-the-art analytical equipment to support CB testing

- Compliant with U.S. Army Chemical Materials Activity Laboratory and Monitoring Quality Assurance Plan (LMQAP) and Chemical Agent Standard Analytical Reference Material (CASARM) QAP
- DoD CPRP and BPRP
Chemical Sciences

CCDC Chemical Biological Center conducts chemistry-related research, including synthesis, chemical and physical properties testing, development of analytical methodologies, and analysis of unknown chemical samples.

Tests and analytical techniques are designed to deliver highly precise and accurate results regardless of sample background or interference.

**Standards, Accreditations & Certifications**

- ISO 9001 and 17025 accreditations
- FBI partner laboratory
- OPCW-designated laboratory
- DoD CPRP and BPRP

**Key Capabilities**

- Synthesis capability to 8 liters
- Analysis to meet state, federal, or international regulatory requirements
- Chemical and physical property testing
- Development of analytical techniques in widely varying matrices
- Agent fate wind tunnels
- Simulants to highly dilute solutions to neat agents
- Characterize chemical properties, reaction pathways, reactions rates and material compatibility
- Proven experience and validated protocols to solve chemistry-related problems for the chemical weapons defense mission
Chemical Toxicology

CCDC Chemical Biological Center toxicology experts provide R&D expertise to determine the potential impact of chemical agents and other hazardous materials on U.S. forces. Our subject-matter experts measure the effects of chemical threats on animals to estimate the impact on humans which serve as a basis for protection, detection and decontamination requirements to enable our forces to continue their mission.

**Standards, Accreditations & Certifications**

- Accredited by Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC)
- Provides leadership and technical expertise to Risk Managers for Ecological Risk Assessment; the Technical Cooperation Program (TTCP) Weapons Technical Panel (WTP-4); and the National Academy of Sciences U.S. National Committee for Soil Science (NAS-NCSS)
Biosciences

ECBC develops evaluation methods for biological production, supports RDT&E for field, commercial, developmental and prototype biosensors, and conducts R&D and biodefense technology evaluations for detection and destruction of CB threats.

**Standards, Accreditations & Certifications**

- DoD- and CDC-certified laboratories
- U.S. Army, USDA and EPA laboratory regulations
- Environmental Quality Standard E-4
- American Association for Laboratory Accreditation (A2LA) accredited to ISO/IEC 17025 for Specific Tests Listed in A2LA Certificate #2359.01

**Key Capabilities**

- 1,900 square feet of enhanced BSL-3 space, structured into four functional suites with a Class 3 glovebox.
- More than 5,000 square feet of BSL-2 laboratory space. Small-scale anaerobic fermentation with gas monitoring (2.5 to 75 liters).
- Production of biological materials, such as genomic DNA.
- Recombinant protein expression and purification.
- Handling, sampling, detection and decontamination of moderate to highly pathogenic microorganisms.
- Pathogen and simulant preparation.
- Agent and reagent lyophilization.
- Customized antibodies and reagents.
- Chemical agent threshold facility for biotechnology-based (enzymatic) decontamination and biodegradation studies.
- Bioinformatics approach to designing and generating monoclonal antibodies/antigen characterization and binding kinetics.
- BioLog identification of unknown biological samples.
- Non-medical countermeasures, gene regulation studies and pathogenicity assessments.
- Nucleic acid and antibody-based analytical equipment and prototype testing.
- Assay development, and optimization conformance and validation testing DoD and Department of Homeland Security test-bed assessments.
- Customer training and technical consulting.
CCDC Chemical Biological Center performs CB operational and development testing of military, COTS and prototype detector systems using a team of scientists, engineers and technicians with diverse CB surety testing expertise located at APG-EA and DPG.

**Standards, Accreditations & Certifications**

- Accreditation to ISO/IEC 17025 (A2LA Certificate #2359.01)
- ISO Guide 34, ISO 9001 compliance
- ECBC-RI certified to perform lot acceptance testing (LAT) of M256A1, M18 and M34 detector kits

**Key Capabilities**

- Lab-based, portable and/or kits detection systems evaluations
- Patented vapor generation system
- Three 100-cubic-foot environmental chambers
- 16 surety-approved fume hoods, walk-in hoods and glove boxes
- Liquid, aerosol, vapor and solids testing using CWA, novel threat compounds and TICs
- Challenge material with aerosol, liquid or powder form BWAs and unconventional threats
- Military lifecycle, COTS and prototype detection
- Environmental conditions (temperature and 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
Standoff Detection

CCDC Chemical Biological Center is home to a unique standoff detection technology evaluation facility that allows precise performance measurement of standoff detection systems against a homogeneous cloud of CB simulants at significant distances.

The only one of its kind in the country, this facility 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.

With known and modest modifications, this asset can be used with all passive and active chemical and biological standoff technologies and systems at any stage of development.

Key Capabilities

- CB simulants, interferents and selected TICs in vapor and aerosol form
- Up to 15 minutes of homogeneous aerosol suspension and up to 200 micrometers in 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
- BSL-2 upgrade-capable
- 20’ path, isokinetic sampling, air curtain technology, and 4’ x 4’ aperture
Decontamination

CCDC Chemical Biological Center offers world-class expertise in CB contaminant-decontaminant-material interactions to perform applied research, engineering, prototype development, M&S and test services to support development and evaluation of decontamination systems.

Standards, Accreditations & Certifications

▶ Biological decontamination: TOP 8-2-065
▶ CBRCs: TOP 8-2-111, TOP 8-2-502

Key Capabilities

▶ Computational proficiency for modeling contamination, decontamination and post-decontamination processes and hazards
▶ Full suite of tests to characterize decontamination system performance:
  - Efficacy
  - Kinetics and by-products
  - Functionality under environmental and operational stressors
  - Chemical, biological, radiological contamination survivability (CBRCs)
  - Material, protection, and detector compatibility
  - Pot life and shelf life
▶ Research and testing with diverse array of decontaminants and CB contaminants across multiple states of matter (aerosol, vapor, liquid, solid)
▶ Small-scale and large-scale test facilities CB surety (BSL-1, 2, 3) with options for environmental controls
▶ Development and improvement of decontamination test equipment and methodologies.
CCDC Chemical Biological Center performs permeation qualitative and quantitative testing for chemical agents over a range of environmental conditions. Experts conduct routine operational and developmental testing of commercial, military and unique protective materials.

Standards, Accreditations & Certifications
► Military standards and specifications
► ISO/IEC 17025 accreditation
► MIL-STD-282, TOP 8-2-501, ASTM 739
► ECBC-RI certification

Key Capabilities
► Individual and collective protection application
► Testing of chemical-protective materials against CWAs, liquid and vapor challenges
► Evaluation of permeable and impermeable materials
► 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
► Air liquid vapor aerosol group (AVLAG) system
► Low-volatility agent permeation (LVAP) system
► DAWSON cups systems
► Q170/171 System: High-throughput qualitative analysis of material permeation for high-volume production lot acceptance testing
Chemical Agent Resistant Tests

CCDC Chemical Biological Center conducts system chemical agent testing on complete mask systems using Simulant Agent Resistant Test Manikin (SMARTMAN) head forms. We can simulate human breathing under a variety of environmental conditions, such as heat and humidity, at varying breathing rates. We conduct live agent testing for all National Institute of Occupational Safety and Health (NIOSH)-certified respirators in use in the U.S.

Standards, Accreditations & Certifications

- NIOSH certification testing
- ISO 17025 accreditation

Key Capabilities

- Chemical agent, TIC and simulant testing of complete mask/respirator systems
- Targets system penetration and permeation
- Vapor and liquid challenge testing
- Developmental and first article performance testing
- Validation and certification testing
Mask & Filter Durability System Tests

CCDC Chemical Biological Center performs tests to determine the durability of masks, filters and related materials using laboratory capabilities to expose these products to adverse environmental conditions, such as hot and cold temperatures, accelerated aging and ozone.

The Center maintains a respiratory mask and filter testing laboratory equipped with government-certified test equipment to perform a range of product qualification, shelf life extension, first article and production lot testing.

Key Capabilities

- Mask canister gas life testing with dimethyl methylphosphonate (DMMP)
- Mask filter aerosol penetration with polyalphaolfin (PAO)
- Mask leakage, breathing and drink resistance
- Dimensional inspection
- Environmental and performance verification tests
CCDC Chemical Biological Center provides CBR filtration expertise and a full range of test capabilities to evaluate, design, develop and validate air purification technologies used for individual protection development of new CBRN protective equipment.

Key Capabilities

- Research and development of new air purification technologies
- Sorbent characterization, including isotherms and chemical/physical properties
- Surety test facility for evaluation of materials, prototypes and novel air purification technologies
- Simulant and TIC facilities for testing of materials, prototypes and full-scale production hardware
- Breakthrough testing of sorbents and filters with chemical threats at environmental conditions
- Testing of air purification hardware, from laboratory-scale to full-scale prototypes
- Generation and detection of chemical and emerging threat vapor challenges
- Low flow (0–10 cfm), mid-range flow (10–200 cfm), and full-scale high flow (80-2000 cfm) air purification test facilities
- Multiple filter breakthrough test systems
CCDC Chemical Biological Center can test CBRN gas and particulate filters and paper media for DMMP gas life and filtration efficiency. Gas filters are destructively evaluated for nerve agent gas life using the simulant DMMP. HEPA filters are non-destructively evaluated for filtration efficiency by challenging with a 0.3 micrometer PAO aerosol.

**Standards, Accreditations & Certifications**

- USDA and EPA laboratory regulations
- ASME AG-1 requirements
- Rock Island laboratory certification
- A2LA accredited to ISO/IEC 17025 for specific tests listed in A2LA Certificate #0407.01

**Key Capabilities**

- Perform DMMP gas life testing on: M12, M18, M48A1, M49, M98 filter set, HSFC, Type II Trays and Gas Phase Adsorber Cells using DMMP
- Perform filtration efficiency testing on particulate filters
- Perform ASME AG-1 Qualified Product List (QPL) qualification testing of nuclear grade HEPA filters and media
- Perform prototype, first article, production lot acceptance and surveillance testing in accordance with DoD military standards and commercial specifications
- Manage the QPL database for DoD, Department of Energy and commercial customers
Fixed-Site Filtration Systems

CCDC Chemical Biological Center can design CBRN collective protection filtration systems for fixed sites, operations buildings, vehicular platforms and facilities, including military dorms and contamination containment for chemistry laboratories, both domestic and overseas. The Center offers solutions for the Armed Forces against CBRN attacks, from initial design and development to system sustainment.

Standards, Accreditations & Certifications

- ASME N510/N511
- ASME AG-1 requirements
- DOE-STD-3020-97 requirements

Key Capabilities

- In-place filter leakage tests for facility and laboratory CBRN filtration systems
- Facility/system certification and airlock tests
- Filtration systems performance requirements development
- Filtration systems concept development, design, prototype, integration, production, installation and testing
- Test protocol and standard operating procedure development
- Mobile testing platform
Respirator & Ensemble Fit
The CCDC Chemical Biological Center Protection Factor (PF) chamber test facility evaluates chemical protective capabilities of respirator systems, such as masks and protective clothing.

Standards, Accreditations & Certifications
► NIOSH CBRN certification testing
► 1992 Joint Service Standardization Agreement for Fit Factor Testing

Key Capabilities
► 16’ x 32’ x 12’ PF test chamber
► PF/fit chemical simulant testing with corn oil aerosol or Methyl Salicylate (MeS) for vapor tests
► Capable of testing six human participants simultaneously.
► User performance tests (evaluations and obstacle courses)
CCDC Chemical Biological Center performs tests to assess system design against conditions that will be experienced throughout its service life. We have the capability to simulate environmental stress conditions that a warfighter might experience in the field using laboratory test methods in accordance with the MIL-STD-810 and other equivalent test standards.

**Standards,Accreditations & Certifications**
- ASTM test standards (D4169)
- MIL-STD-810 test standards

**Key Capabilities**
- MIL-STD-810 extreme climatic and environmental condition simulation tests: low pressure (altitude), high and low temperatures, temperature shock, solar radiation, rain, icing/freezing rain, humidity, salt fog (corrosion), sand and dust, immersion, transit shock, vibration and loose load vibration
- Lifecycle environmental and accelerated aging tests
- Specialized test setups, and video and test documentation
- Computerized analog and digital data acquisition and control development
- Data acquisition and analysis of environmental factors
- High-Accelerated Life Testing (HALT)
- ASTM D4169 Packaging Testing: Complete DC-18 schedule, manual handling, mechanical handling, compression, altitude, environmental hazard, loose load and vibration
CCDC Chemical Biological Center performs physical properties testing on a wide variety of materials such as woven and knitted fabrics, non-woven and coated fabrics, plastic films, rubber sheeting, leather and many others using property specific equipment. We conduct mechanical analyses to assess physical attributes of materials for selection, design, production or failure analysis.

The CCDC Chemical Biological Center physical properties laboratory helps determine the critical properties and characteristics of raw material, components and complete systems, and well as the effects of battlefield contaminants such as oils, fuels, lubricants and decontaminants.

**Standards, Accreditations & Certifications**

- ASTM and TAPPI test standards
- Military, federal and commercial test standards
- A2LA accredited to ISO/IEC 17025 for specific tests listed in A2LA Certificate #0407.01

**Key Capabilities**

- Test types: tensile, compression, elongation, hardness, abrasion, torsion, ash content, burst strength, water repellency, stiffness, brittleness, puncture propagation, tear resistance, cold crack, hydrostatic resistance, precision weight, colorfastness, blocking, specific gravity and more
- Prototype, first article, production lot and surveillance testing of materials and products
- Customized test plans and test reports
- Instron tensile testers, ozone and xenon arc exposure chamber
- Customized test apparatus and Q-Test equipment such as Q113 rough handler, Q261 canister shaker and Q101 water repellency
CCDC Chemical Biological Center’s cutting-edge concept and product development capabilities can be found under one roof, with one mission: to provide accelerated product realization to the warfighter through integrated science, engineering and manufacturing expertise.

The CCDC Chemical Biological Center Advanced Design and Manufacturing team applies a multidisciplinary approach—including conceptual design, prototyping, manufacturing, mechanical and electrical design, and systems engineering—to provide robust CBRNE product development solutions for the DoD and other government agencies.

**Standards, Accreditations & Certifications**

- ISO 9001:2008 certification

**Key Capabilities**

- **Interactive Software & Visual Media**—Interactive and immersive software, concept renderings and computer animations to enhance product familiarization, training and maintenance.
- **Rapid Technologies**—3-D data-capture technologies and additive manufacturing processes paired with traditional plastics manufacturing to deliver fully functional components that reduce supply-chain burden and maintain mission readiness.
- **Systems Integration**—Robust system-of-systems processes to rapidly fulfill requirements through the combination of organic, multidisciplinary capabilities and procurement of commercial solutions.
- **Engineering Design & Manufacturing**—Seamless integration of advanced computer-aided design, manufacturing and engineering technologies to reduce acquisition timelines and increase operational effectiveness.
Operations

The CCDC Chemical Biological Center Chemical Biological Applications and Risk Reduction (CBARR) team performs global CB operations in safe, secure and environmentally sound manner. CBARR offers innovative, agile response to the dynamic global CB landscape by adapting expertise to provide solutions for customer needs.

With 200 field-deployable scientists, engineers, technicians and operators located at APG-EA and PBA, we offer a highly specialized, certified workforce with a level of expertise unmatched in the CB remediation space.

Standards, Accreditations & Certifications

- ISO 9001:2008 certification

Key Capabilities

- Test types: tensile, compression, elongation, hardness, abrasion, torsion, ash content, burst strength, water repellency, stiffness, brittleness, puncture propagation, tear resistance, cold crack, hydrostatic resistance, precision weight, colorfastness, blocking, specific gravity and more
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Partner with Us

To work with CCDC Chemical Biological Center on your next program, or for questions about our expertise, facilities or partnership mechanisms, please contact:

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