



NAVAL SURFACE WARFARE CENTER
DAHLGREN DIVISION

SCIENCE AND TECHNOLOGY - RESEARCH AND DEVELOPMENT - TEST AND EVALUATION



ELECTROMAGNETIC & SENSOR SYSTEMS
DEPARTMENT



NSWCDD CBR Defense Division

Briefing to:
National Defense Industrial Association

2 August 2016

Presented by

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U.S. Navy CBRD Policy

OPNAVINST 3400.10G (2012) – CBRN-D REQUIREMENTS SUPPORTING OPERATIONAL FLEET READINESS

Consistent with the national strategy, the Navy shall maintain those CBRND capabilities required to support deterrence and enhance conventional warfighting through defensive means. The goal is to ensure that the **use or threat of use of chemical or biological weapons or radiological contamination against a naval force will be a non-decisive factor in the outcome of any operation.**

OPNAVINST 9070.1A (2012) – SURVIVABILITY POLICY AND STANDARDS FOR SURFACE SHIPS AND CRAFT OF THE U.S. NAVY

Naval surface ships and craft are required to perform missions; **avoid and withstand battle damage and chemical, biological, radiological and nuclear (CBRN) exposure**; avoid and recover from accidents; and survive either when operating alone or as part of a strike group. The total ship comprised of ship's crew, combat warfare systems, hull structure, mechanical systems, electrical systems, networks, and components **must be sufficiently protected or hardened to withstand damaging effects from designated threats**, within program objectives.



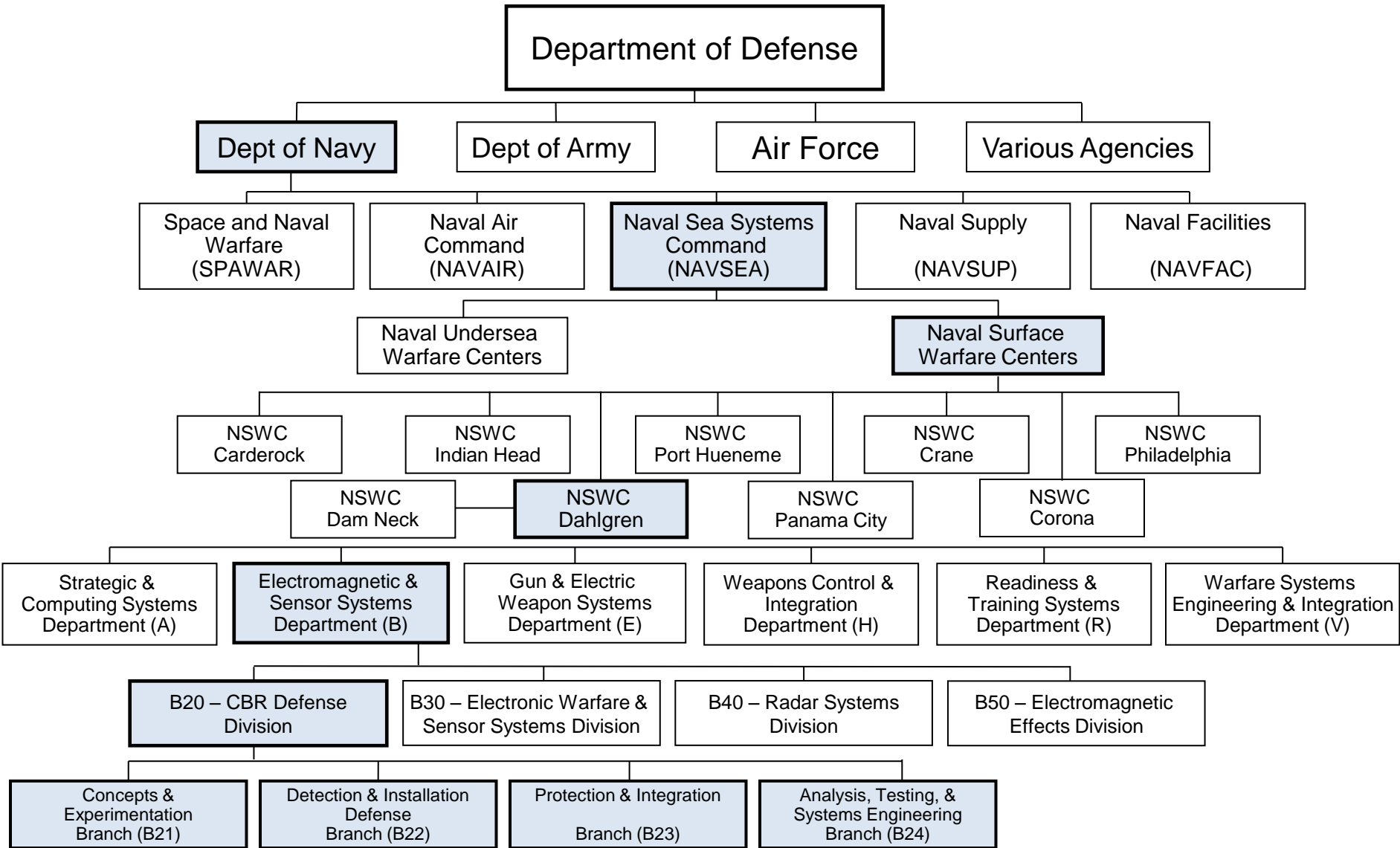
Navy CBR Defense

- Unlike those faced by land-based organizations, the maritime environment provides unique challenges to CBR Defense
 - Naval Vessels are “Floating cities” (strict logistical limitations)
 - Shipboard systems must withstand the weathering and corrosive effects of the maritime environment
 - CBR threats manifest themselves differently in the maritime environment than on land
- CBRD integration is required with other complex ship functions in order to limit the size and logistic burdens
- Ship costs factor into how survivability is defined for the U.S. Navy





Naval Surface Warfare Center Dahlgren Division Chemical Biological Radiological Defense Division





Naval Surface Warfare Center Dahlgren Division Chemical Biological Radiological Defense Division

Mission:

Serve as the Nation's Technical Expert and Systems Engineer for Navy CBR Defense

Vision:

Be the leading organization ensuring the Navy's mission is never compromised by CBR threats



Dahlgren is the “technical voice” of the Navy for CBR Defense

CBR Defense Division (B20) Operations Strategy



DIRECT FLEET
SUPPORT: 10%

SYSTEMS
ENGINEERING:
70%

SCIENCE & TECHNOLOGY: 20%

Balanced,
Full Spectrum
Support





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NSWCDD B20 Fielded Products

CPS Casualty
Decontamination Station

Visit, Board, Search, and
Seizure (VBSS) Hazardous
Atmosphere Kits

Long Life CPS Prefilters

*Joint Biological Point
Detection System
(JBPDS)*

Long Life 200cfm
CBR Filters

Personnel
Decontamination Stations

Prefilter Adapter Ring

CMWD Effectiveness

*Joint Warning and Reporting
Network (JWARN) Block I*

Shipboard Chemical Hazard
Assessment Guide (C-HAG)

CBR Collective Protection System (CPS)



CBR Decontamination Guidelines

VLSTRACK Hazard
Prediction Model

Chemical Agent
Monitor (CAM)

*Joint Biological Agent Identification
and Diagnostic System (JBAIDS)
JBAIDS Hardware Upgrades*

CPS Backfit

Technical and Operational
Guidance to 7th Fleet in Support of
Operation Tomodachi

*Joint Effects Model
(JEM)*

Improved (Chemical) Point
Detection Systems (IPDS)/
IPDS – Life-Cycle Replacement

Dry Filter Unit (DFU)
Biological Warfare
Detector

CPS High Pressure/High
Efficiency Fan

Shipboard CBR Procedure
Manuals (NSTMs)

*Joint Chemical Agent
Detector (JCAD)*

Shipboard CBRD
Training Modules

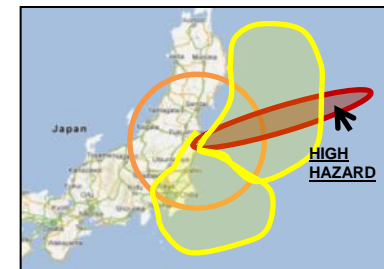
LEGEND:

Ongoing Installations

Joint Funded Products

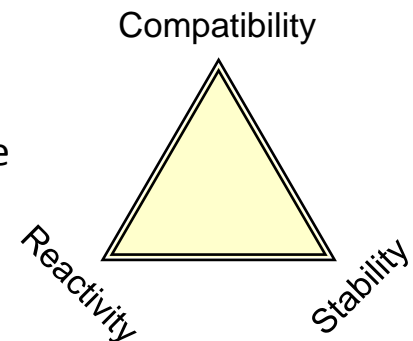
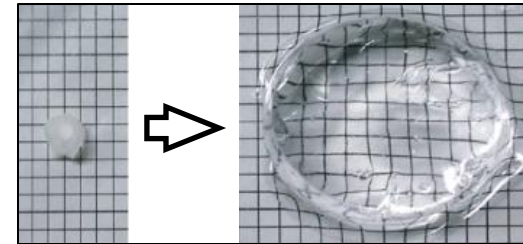
Accomplishments

- Syrian Chemical Weapons Destruction Support
 - Collective Protection System (CPS) installed on MV CAPE RAY (T-AKR 9679)
 - Protects Command/Control, berthing, mess, and living areas of ship
 - 30 days to design, fabricate, install, and test these systems
 - Close collaboration with DTRA, JPM-P, JPM-E, MARAD, MSC, ECBC, Port Engineer, and ship's crew
- Aeromedical Biological Containment System (ABCS)
 - Led initial development efforts
 - Maintains infection control during aeromedical evacuation of patients who have been exposed to serious communicable diseases or unknown infectious agents
 - Provides the CDC and/or their affiliates a means to safely transport Ebola-infected patients
- Fukushima Nuclear Power Plant Disaster Response
 - Performance of equipment designed/tested by NSWCCD
 - CPS prevented contamination of equipment and personnel within protected spaces
 - Countermeasure Washdown System reduced radiological material contamination on ships' exterior
 - Technical Support Provided
 - B20 personnel were in Japan within 96 hours - Developed technical guidance for the fleet
 - Established Dahlgren RADCON Data Center at NSWCCD
 - Maintains on-site support to Radiation Control Forward Repairable Inspection Activity in Japan



Accomplishments

- Joint Biological Agent Decontamination System Development
 - Hot, Humid Air Biological Decontamination Technology
 - Basis of the JBADS JCTD and operational demo on a C-130 interior
 - Assessed by technology readiness panel as TRL 7
 - Transitioned to JPEO CBD (JPM Protection)
- Superabsorbent Polymer Development
 - Interfere with the production of chemical warfare agents
 - Absorb over a hundred times its own weight in liquid
 - Scaled up through industrial collaboration and available for field use
 - Transitioned to JPEO CBD (JPM Elimination)
- Dahlgren Decon (soon to be named Peratect) Development
 - Surfactant Based Decontamination Technology
 - Developed a dry/concentrate formulation for broad spectrum CBR Decon
 - Rapidly destroys traditional threat CB agents
 - Mild chemistry and pH leads to low corrosivity
 - Selected as the Centerpiece Technology (general purpose decon) for the Hazard Mitigation, Material and Equipment Restoration (HaMMER) ATD
 - Assessed by technology readiness panel as TRL 6
 - Patented formula licensed by First Line Technologies
 - Transitioned to the JPEO CBD (JPM Protection)



Facilities

- Material RDT&E Lab
- Instrumental Lab
- Synthetic Chemistry Lab
- BSL-1, 2, and 3 Labs
- Toxic Chemical and Biotoxin Lab
- Computer Labs
- Standoff Detection Lab
- Potomac River Test Range
- CPS Long Term Test Lab
- Filtration Test Lab
- CPS Lab
- Modeling and Simulation Lab
- Systems Engineering Lab
- Radiological Lab
- Detector Lab
- SCIF
- Imaging Lab



NSWCDD Potomac River Test Range (PRTR)

- Unique U.S. Navy Labs test capability
 - CBRD testing in maritime environment from a land-based facility
 - 169-square-mile river range (up to six miles wide)
 - Connected to 2,354 acres of land-based ranges
 - Controlled air space up to 60,000 feet
 - Environmental permits
 - Allow for the release of simulants over water
 - Approved Environmental Impact Statement
 - Authority to release CB warfare simulants within scope of EIS without additional approvals
 - Boat mounted “Stack and Blower” system
 - Projects simulant aerosol up to 100 feet
 - Aerosolizing nozzle generates small droplets (vapor cloud) to prevent surface deposition (rain out)
 - Complements CBRD M&S capability
 - M&S tools set initial conditions and predict cloud track
 - Test data and meteorological readings shared with M&S community





Naval Surface Warfare Center Dahlgren Division

Chemical Biological Radiological Defense Division

Collaborative Relationships

- NAVSEA
 - NAVSEA05P5
 - NAVSEA04N
 - PEO Ships
 - NSWC (NSWCPCD, NSWC IHEODTD, NSWCCD, NSWCPCD)
- JPEO-CBD
 - JPM-P, JPM-CA, JPM-MCS, JPM-G, JPM-IS
- Joint Forces Partners
 - US Army
 - US Marine Corps
 - US Air Force
- Department of Defense
 - DTRA/JSTO
 - DARPA
 - Pentagon Force Protection Agency (PFPA)
 - Pentagon Building Management Office (PBMO)
 - USSOCOM
 - Defense Logistics Agency (DLA)
- Homeland Defense
 - Department of Homeland Security (DHS)
 - US Coast Guard
- US Navy Commands and Organizations
 - US Fleet Forces Command (USFFC)
 - OPNAV N96
 - COMPACFLT
 - SURFPAC/SURFLANT
 - COMOPTEVFOR
 - Surface Warfare Officers School Command
 - Center for Security Forces (CENSECFOR)
 - Regional Maintenance Centers (RMCs)
 - Ship Repair Facility (SRF) Yokosuka
 - NAVFAC
 - US Navy Military Sealift Command (MSC)
 - BUMED/MEDIG
- Service Laboratories
 - Edgewood Chemical Biological Center (ECBC)
 - Air Force Research Laboratory (AFRL)
 - Naval Research Laboratory (NRL)
- OGAs and Federal Labs
 - Lawrence Livermore National Laboratory
 - Los Alamos National Laboratory
 - MIT Lincoln Labs
- Academia
 - George Mason University, Loyola, VA Tech, University of Virginia, Vanderbilt





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NSWCDD Future Technical Focus Areas

- **Biosurveillance Efforts**
 - Earlier exposure indicators
- **Biological Detection**
 - New candidate technologies
- **CBRD R&D**
 - Decontamination formulations
 - Collective Protection systems
 - Spore preparation and testing methodologies
 - Materials Science Research
- **CBR Modeling Capabilities**
 - CBR shipboard simulation database
- **RADCON efforts**
 - Dahlgren RADCON Data Center

Providing a Balance of Science, Engineering, and
Real Time Support to the War Fighter



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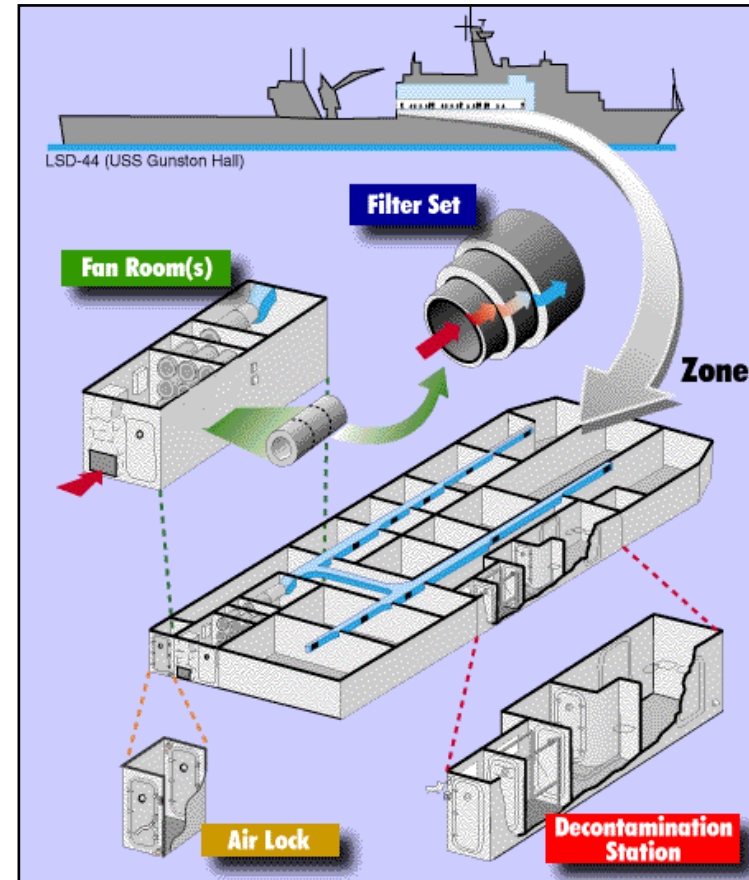
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Collective Protection System (CPS)

- Protects zone from CBR contamination
 - Removes CBR contamination from air entering the zone through the CPS
 - Over-pressurization prevents contamination from entering the zone through openings or leak paths
- Provides clean operating environment for personnel and equipment
 - Normal ship operations
 - Increased crew health and comfort
 - Increased electronics reliability
 - Reduced shipboard maintenance
 - Reduced general and ductwork cleaning
 - Protection from dust storms
 - Operations in CBR environment
 - No need for Individual Protective Equipment (mask, suits, boots, gloves)
 - Reduced decontamination
- Provides rapid de-smoking and smoke control during and after fires



Technical POC:
NSWCDD B20, CBR Defense Division

Countermeasure Washdown (CMWD) System

- Shipboard system that pumps seawater through spray nozzles located throughout the topside of a ship.
- Quickly (15 min) and effectively (85%-100%) removes chemical, biological, or radiological (CBR) contamination from the ship with little or no manpower.
- Also used to pre-wet decks to prevent CBR agents from adhering to deck surfaces.
- Prevents extensive, time consuming, and very dangerous manual decontamination efforts by ship's crew.
- Installed on most major surface ship classes.



Technical POC:
NSWCDD B20, CBR Defense Division