Dedicated to the Military Medical & VA Community

Military Medical/CBRN Technology

Annual Shelters Review
Special Section

Wellness Promoter

Brig. Gen. Joseph Caravalho Jr.

Commander
Northern
Regional Medical
Command

www.MMT-kmi.com
MMT
September 2011
Volume 15, Issue 6

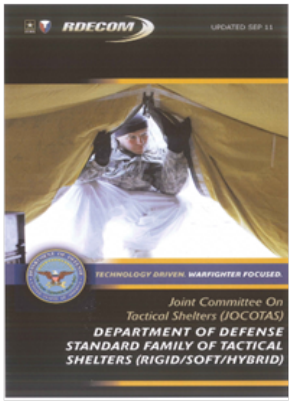
Director's Letter
Col. Earle Smith II
Director
DLA Troop Support
Medical Supply Chain

Saving Lives on the Battlefield ✯ DoD Medical Goes Green
Energy Conservation ✯ The Yellow Ribbon Program

Primer on the Development of Military Shelters

Only a Milestone Decision Authority can approve with a Milestone C decision the fielding of a new shelter that will ultimately appear in the JOCOTAS Standard Family of Tactical Shelters Brochure.

By Frank E. Kostka: Director of the Shelter Technology and Engineering Directorate at the U.S. Army Natick Soldier RDEC



The Players and the Supporting Cast

The US Army Natick Soldier Systems Center (NSSC) is located in Natick, MA approximately 26 miles west of Boston. Situated on the shores of Lake Cochituate, NSSC is the Army's one-stop Soldier-support organization responsible for researching, developing, fielding, and managing food, clothing, shelters, airdrop systems, and Soldier support items. NSSC is the home of the Natick Soldier Research Development and Engineering Center (NSRDEC), the Army Research Institute of Environmental Medicine, and a number of key Product Managers and multi service strategic partners who have formed a consortium focused on protecting the War Fighter. This novel interagency approach supports the current fight while transforming the future force with the Soldier as the decisive edge

NSRDEC is co-located with the Product Manager Force Sustainment Systems (PM FSS) and the TACOM Integrated Logistics Support Center (ILSC). NSRDEC focuses on the Soldier Domain developing and using the latest innovations in Science and Technology to maximize the American Warfighter's survivability, sustainability, mobility, combat effectiveness and field quality of life, treating the Warfighter as a system. PM FSS is the Materiel Developer for non chem/bio protective shelters and a wide array of combat services support equipment, including cargo air drop, laundries, showers, latrines, heaters, combat feeding food prep equipment and the Army's Force Provider base camp systems. Chemical and biological resistant shelters are developed by the Joint Project Manager for Protection (JPM-P) that is part of the Joint Program Office for Chemical and Biological Defense (JPEO-CBD) and is located in Stafford, VA. The JPM-P is also the Materiel Developer for Individual Protection clothing and equipment; Respirators, and Hazard Mitigation. Upon fielding the TACOM ILSC supports many of these capability areas, manages sustainment functions and oversees the War Reserve element of the

program with the exception of softwall shelters (tents). Softwall shelters are typically procured by the Defense Supply Center, Philadelphia a key element of the Defense Logistics Agency.

Industry and academia are critical strategic partners in the shelter development arena constantly improving materials, reducing costs through process controls, investigating emerging technologies and directly meeting niche requirements of field commanders. Many industry players have military backgrounds and some continue to interact with all echelons of leadership in their new roles. Diversified companies produce both military and high performance civilian shelter systems resulting in stability in a fluid market place. Academia provides technology support, students and graduates for our workforce and leadership assistance to the highest levels of the Government. The mix of knowledge, experience and insights compliments the military acquisition process.

Shelter Development by the Book - DoD Instruction 5000.02

If the military is unable to mitigate a threat and accomplish the mission, it employs a systemic process to identify and solve capability gaps associated with DOTMLPF (Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities). If a Combatant Commander requires a new capability an Urgent Need Statement is typically prepared identifying the problem. Depending on the time frame available solutions can range from an immediate action by the Rapid Equipping Force (REF) to the preparation of a formal requirement by one of the Training and Doctrine Command's (TRADOC) Centers of Excellence (COE). The military's Capabilities Based Assessment process identifies materiel and non-materiel solutions to fill a warfighting gap. Non materiel solutions tend to be the most cost effective and expeditious to implement. If a materiel (new hardware) approach is selected, clear criteria are developed by the COE, formally approved by the highest levels of the Army as a Program of Record and assigned to a Program or Product Manager for execution.

One of the first steps in the approach is to assess; commercial off- the-shelf items, existing military hardware employed by other services and maturing technologies, then compare the capabilities available to the formal program requirements. Market searches are conducted using a Request for Information (RFI) process that details the Army's requirements and formally requests input from the commercial market place. Many times requirements will include both threshold (minimum) and objective (desired) characteristics. If a number of promising candidates emerge a paper evaluation against scoring criteria may take place and the best candidates may be requested to provide a demonstration model for a form, fit and function evaluation.. The Joint Committee on Tactical Shelters (JOCOTAS) provides information on the Standard Family of Military Shelters. Shelters in the JOCOTAS family have been developed under a Program of Record and formally adopted by one or more of the military services through a Milestone C decision process. The NSRDEC and other RDECs such as the Edgewood Chemical and Biological Center work with the PM's to provide mature technologies. Technology solutions currently under development for shelters include barrier materials, filtration media, self erecting structures, energy management, illumination and power generation.

The PM's acquisition team compiles the input from the RFI, JOCOTAS Survey and emerging technology investigation and forms a consensus. Can the COE's requirements be met within the

industry's existing breadth of manufacturing expertise, intellectual capital resources and capacity for strategic alliances to execute the program? If the answer is yes, the team makes the recommendation to the Milestone Decision Authority to proceed into development.

JOCOTAS standard shelters are designed to be safe to operate and protect users from a series of threats; extreme weather, and visual detection are the most common. Chemical Biological Radiological Nuclear (CBRN) agents, electronic eavesdropping and blast and ballistic challenges are also potential performance requirements. It can be expected that the shelter will have transportability requirements, and may have set up and strike times or 'time to mission under canopy" a Marine Corps concept. The specific criteria will vary depending on the type of shelter system. Typical General Purpose Shelters have these technical requirements for extreme weather and durability

- Wind loads: Steady wind of 50 miles per hour for 30 minutes and wind gusts of 65 mph
- Snow loads: 10 pounds per square foot per on roof for a maximum period of 12 hours
- Rain: At a rate of two (2) inches per hour for thirty (30) minutes without leakage
- Wind Driven Rain: Withstands a wind-driven rain at 2 inches per hour.
- Temperature: Fully operable in ambient temperatures between -60 °F to +120 °F
- Flame Resistance: ASTM-D 6413-99 Standard Test. Method for Flame Resistance of Textile (Vertical Test) includes self extinguishing and char length criteria
- Durability: Withstand 50 set up and strike cycles.

The TEMPER Tent and Air Force Small Shelter are Standard Shelters Widely Used in Military Hospitals

All technical requirements are validated by the PM Acquisition Team during Developmental Testing (item does what it is supposed to do). Operational (User) Testing follows and insures that the shelter can be set up, maintained and sustained by the intended recipient. Shelters are used across the military and must be simple to operate, require no special tools and minimal training. Test and Evaluation is done by independent test agency and laboratories. The US Army Aberdeen Test Center is a major agency that supports Government Developmental and Operational Testing. They also accept customer testing projects.

At the end of the development process a Type Classification Package is submitted to the Milestone Decision Authority (MDA) either a General Officer or Senior Executive Service civilian. The MDA is the designated individual with overall responsibility for a program. The MDA has the authority to approve entry of an acquisition program into the next phase of the acquisition process and shall be accountable for cost, schedule, and performance reporting to

higher authority, including congressional reporting it. The MDA insures that the shelter meets the TRADOC's requirements, is safe to operate, has a formal training plan in place and is logistically supported in an economical and sustainable fashion. The military materiel development, testing and initial production cycles can easily span three to five years. Besides the technical and contractual efforts, extensive work must be completed on preparation and validation of military technical manuals, initial provisioning of spares and New Equipment Training (if required).

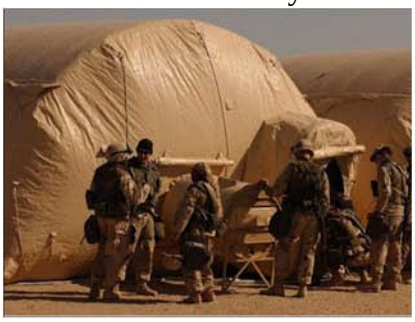
Chemical and Biological Agent Protective Shelters

Shelters utilized in the medical arena have a significant additional requirement to those noted above. They must be hardened against Chemical and Biological Agents. The Joint Program Executive Office for Chemical and Biological Defense (CBD) is the Joint Services single focal point for research, development, acquisition, fielding and life-cycle support of chemical and biological defense equipment and medical countermeasures. The JPM Protection directs and manages the shelters hardening effort. NSRDEC and ECBC provide engineering support and emerging technology to the JPM-P. The JPM achieves the CBD goal by treating the shelter as a closed system with airlocks and its own air supply. A barrier material protects against penetration of the agents and a filter blower system provides clean, agent free air. The blower system has a second function to over pressure the shelter to keep wind driven agents out of the complex and maintain a steady air flow to purge the airlocks.

Two current approaches are in development and application of CB barriers to provide medical units with C/B protective shelters. The Chemical and Biological Protective Shelter (CBPS) has a mission to provide direct battlefield casualty services and can move several times per day. It must be set up and operational in minutes and be capable of being decontaminated and redeployed. The approach taken to meet these criteria was to use a pop up airbeam supported shelter that is constructed out of inherently C/B protective fabric with integral airlocks. The system is simpler to use then other alternatives but the fabric is costly to produce and complex to work with. The JPM and NSRDEC working with several industry partners are actively seeking alternative materials to mitigate this problem. Approximately 200 of the CBPS systems are in the field today. Feedback from the medical community is that they have been extremely useful in treating burn victims due to the clean room type atmosphere related to air filtration and overpressure. A next generation design that provides operators protection while the system is on the move, from Improvised Explosive Devices (IEDs) is currently in the final stages of development.

The alternative to an inherently C/B resistant outer fabric structures is the use of add on liner kits that insert into the shelters and vestibules. Picture a baggie inserted into a box. Vestibules are used as passageways to connect additional shelters to the complex or as airlock entry exit points. The liner option is how Amy's 84 bed, Chemically Protected Combat Support Hospital is hardened. The liner materials are less expensive to produce and easier to work in terms of joining panels together. They are not exposed to the elements, do not have requirements for decontamination and will not be redeployed after use, as a result are very lightweight. Two major drawbacks in liners are extra transport weight and cube, and additional set up requirements. A third issue is if not installed at the onset of a mission everything must be

removed from the shelter to install the liner is needed at a later time. Filtered air and over pressure is still required to complete the set up. The liner approach has expanded into larger structures most recently into the Joint Strike Fighter Decon program.



Chem Bio Protective Shelter **C/B Liner in an 84 Bed Airbeam TEMPER Combat Support Hospital**

How can industry help?

The management of Operational Energy is a key challenge facing the military. DOD leadership recognized early on that energy use in both fixed facilities and contingency bases was a major challenge in current operations that resulted in convoy protection causalities and high fuel costs. Military hospitals are similar to contingency bases with a large concentration of inhabitants who occupy a small fixed site. A high level of energy and water is required creating demand for fuel, thousands of gallons of grey water and several hundred pounds of solid waste per day. In the C/B world the demand for power for air conditioning and heating is exacerbated by the continued input of fresh filtered air from the outside to maintain air quality. In the summer months filtration raises the temperature of the input air by 10° F. In the winter months even with the increased temperature added by filtration 400 CFM of outside air is added for each 32 ft long shelter segment significantly increasing the energy requirements for heating.

The Services, Office of The Secretary of Defense (OSD) Power Surety Task Force and the DOD Joint Committee on Tactical Shelters (JOCOTAS), are working in concert, to develop metrics and technologies that lead to zero footprint basing. To address the issue the Rapid Equipping Force (REF) initiated a number of experiments worldwide to cut energy demand that culminated in the OSD Net Zero (NZ+) Joint Capability Technology Demonstration (JCTD). The 18 month test held at the National Training Center, Ft. Irwin CA demonstrated exterior shades were the most cost effective method to reduce air conditioning costs and liner systems were effective at reducing heating load. Note that solar barriers and current state insulation efforts are ongoing quick reaction programs funded by OSD to provide immediate support to Warfighters in the field. The photo of the Air Force Small Shelter and Airbeam TEMPER both illustrate form fitting solar barriers. Other options include self supporting covers that allow vehicle pass through, forklift operation and the set up and protection of a variety of types of equipment and supplies such a munitions and food stocks

Stand Alone Solar Cover Systems Protecting Munitions, Stryker Warfighters and Work Areas.

OPPORTUNITY Insulating Liners are expensive, bulky and meet only minimal desired requirements. Emerging technologies such as aerogels, advanced phase change composites (APChIC) and collapsible cellular approaches have not matured to an acceptable technology readiness level (TRL) that will enable fielding in the near future. OPPORTUNITY!

In closing as the Executive secretary of JOCOTAS I am routinely asked by colleagues from industry, how can I get my shelter line into the JOCOTAS Standard Family of Tactical Shelters Brochure? It's a short, simple answer; only a Milestone Decision Authority can approve with a Milestone C decision the fielding of a new product. The military has an acquisition process and it is intricate. Although subject to unpredictable cycles the production requirement for a standard military shelter is typically well over 10 years and many times exceeds decades. At least one third of the current softwall shelters in the JOCOTAS Brochure began as industry commercial products.

Best Regards: Frank Kostka can be reached at: frank.kostka@us.army.mil

PAO Release #U11-556 Unlimited Distribution.