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DUGWAY PROVING GROUND, Utah -- Dugway Proving Ground will conduct two tests of components for the Biological Integrated Detection System (BIDS) beginning with simulant work in August 1993.

The BIDS will be a box mounted on a High Mobility Multipurpose Wheeled Vehicle (HMMWV) and equipped with a detector suite employing a variety of complementary biological detection technologies. BIDS will provide soldiers in the field advanced warning of a biological threat. This warning will signal the need to don protective clothing and masks. Detection is a critical part of the United States' biological defense program.

First test

One test will be of the Advanced Concept Model of the Bio-Chemical Detector (ACM-BCD). The ACM-BCD is a portable, automatic, point-sampling biological agent aerosol detector. It is designed to continuously sample the ambient air and to detect the presence of specific pathogen and toxin aerosols. Upon detection, the ACM-BCD will sound an alarm and display the type of agent and the relative concentration on a built-in display.

Dugway Proving Ground will test only the biological detector module, one of two modules of the ACM-BCD. The chemical detector module will not be tested at this time.

Testing of the ACM-BCD will be conducted in four phases:

Phase One will be the Simulant Liquid Phase Sensitivity Test to be conducted in the Baker Test Facility with at least 20

trials each using the simulants Bacillus subtilis var. niger (BG) and MS2 coliphage (MS2). Objectives of this phase are to establish the sensitivity threshold and to provide insight into the predictability of the system's response. No specific safety controls or protection are required for testing with simulants.

Phase Two will consist of Simulant Chamber Testing with at least 20 trials to be conducted in the Simulant Exposure Chamber located in Baker Test Facility using simulants BG and MS2 as aerosols. The purposes of this phase are to evaluate the ACM-BCD and associated components under controlled environmental conditions and to determine the threshold-detection level of the BIDS for the selected biological simulants.

Phase Three will consist of Field Simulant Testing with at least 20 outdoor aerosol trials using BG only. The simulant will be disseminated using a micronair™ generator. All persons downwind of the simulant will be required to wear a particle filter mask.

Phase Four will be the Agent Liquid Phase Sensitivity Tests. Testers will conduct at least 20 trials each using Bacillus Anthracis (strain Ames), a virulent strain that causes anthrax; and botulinum toxin A, which causes food poisoning, as liquid challenges only. This phase will be conducted using biosafety level 2 guidelines as established by the Centers for Disease Control.

2ND TEST

The second test for the BIDS will be the test of the Non-Developmental Items (NDI) which will also begin with simulant work in August.

The NDI to be tested include an aerosol particle counter/sizer, a liquid particle counter/sizer, a particle sampler, a manual antibody-based detector, a bioluminescence analyzer, and a detection ticket system. A description of each follows:

XM2 collector. There are one XM2 aerosol and two modified aerosol collectors in the BIDS, each with a specific purpose. One provides an air stream for the aerosol particle counter/sizer; one provides a liquid sample for the bioluminometer, Flow Cytometer, Threshold System, and SMART detection kit; the other provides a liquid sample for laboratory analysis.

Bioluminometer. The bioluminometer uses bioluminescence to detect the presence of biological materials. The XM2 collector provides a liquid sample which is added to a reagent ticket. If ATP (a product of biological respiration) is present, the sample will emit light. The Bioluminometer provides a digital read out to indicate the presence of biological material.

Aerosol particle counter/sizer. This device analyzes the airstream for particles within a predetermined size range. While it will not distinguish between pathogenic and other particulate matter, it is the first component in the system which will indicate the presence of an aerosol representative of a biological attack. An alarm will sound indicating the presence of particles in the desired size range.

Flow Cytometer. The Flow Cytometer detects the presence of bacterial cells using single particle light scattering and

fluorescent measurements. The XM2 collector provides a liquid sample. When a dye is added to the sample and bacteria are present, specific fluorescent energy will be measured and displayed on a computer monitor. The Flow Cytometer will distinguish bacterial cells from other types of biological and non-biological particles.

Threshold System. Detection is based on the pH change produced by the hydrolysis of an enzyme substrate. A computer is used to read the output from the sensor and determines whether specific pathogens are present.

SMART detection kit. The SMART detection kit changes color indicating the presence of specific pathogens. Detection is based on antibody-antigen interaction.

This test also will be conducted in four phases, with Phases One through Three being identical to those for the ACM-BCD test.

In addition to the pathogens and toxins to be used in Phase Four of the ACM-BCD test, the NDI test will also include staphylococcal enterotoxin B (SEB), a toxin; and a vaccine strain of Yersinia pestis as liquid challenges using biosafety level 2 guidelines.

The objectives of these tests are two-fold: to characterize the performance and sensitivity of the ACM-BCD and the NDI components, and to provide information concerning the suitability of this equipment for use in the BIDS.

All agents of biological origin (ABO) are already on hand at Dugway Proving Ground. Dugway testers use killed ABOs as often as

possible to minimize the use of pathogens; however, it is necessary to establish the functionality of the biosensor with unaltered agents. Sensitivity testing requires the use of live materials.

At the conclusion of testing, all potentially contaminated equipment will be decontaminated using established procedures.

Dugway officials have coordinated this project and the installation's emergency response plan with the Utah Department of Health, the Department of Public Safety, and the Tooele County Emergency Management Director. All emergency response personnal will be fully trained prior to testing.

This test will be conducted in full compliance with the National Environmental Policy Act. Dugway's biological protection testing has been addressed in the Biological Defense Research Program Programmatic Environmental Impact Statement, the Life Sciences Test Facility Final Environmental Impact Statement and the Baker Test Facility Environmental Assessment. Additionally, Dugway has prepared a Record of Environmental Consideration and provided it to the State.