BIDS

—what is it? how does it work?

By CPT Richard D. Howell

Biological weapons have been around at least since soldiers projected plague-infected corpses over the walls of besieged castles. Although biological weapons have been with us throughout history, at no time have political and technological circumstances been as favorable as they are now for their wartime use. An array of agents of biological origin (ABOs) can now be produced using common pharmaceutical equipment and processes, thus making them known as the "poor man's nuclear weapon."

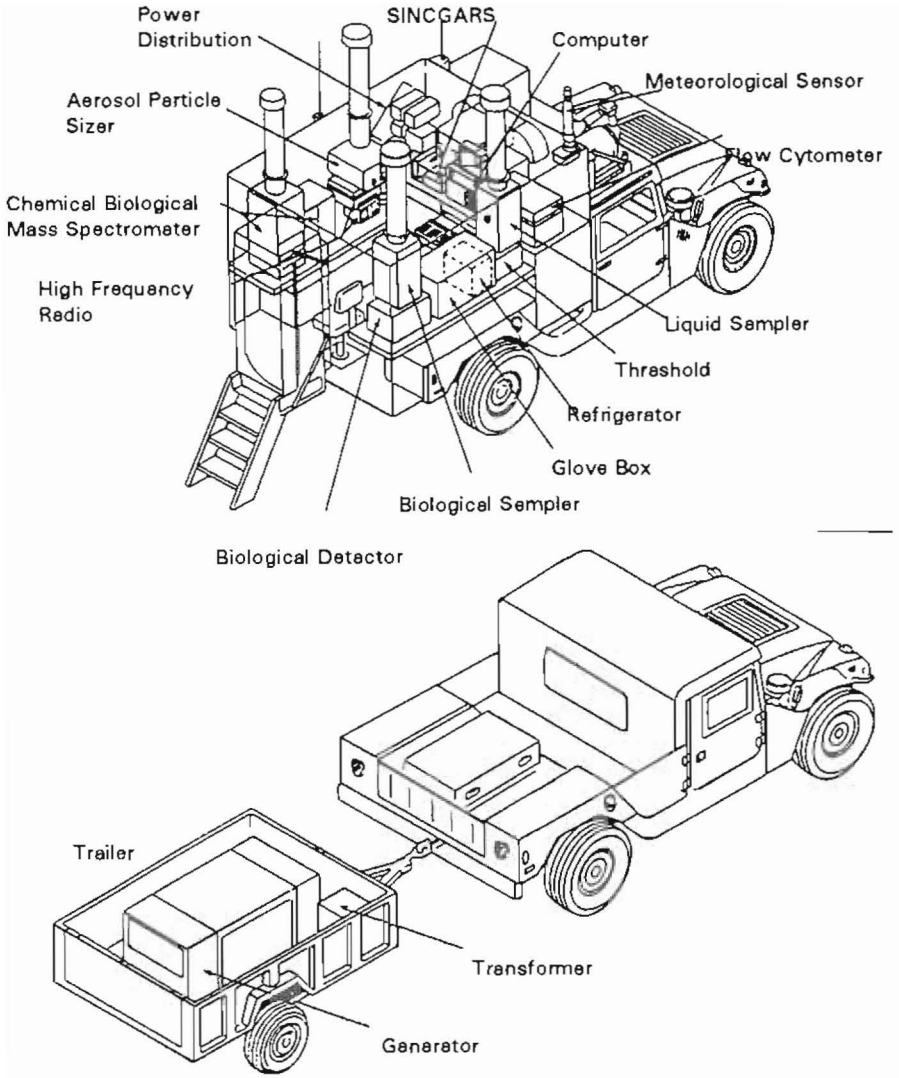
Part of the US response to this primarily Third World threat is the BIDS, the Biological Integration Detection System, now about two years away from fielding. The BIDS configuration currently emerging from the system-definition phase of procurement is a HMMWV-mounted shelter housing modular electronic analytical components. A sample-transport vehicle, a trailer, and a generator complete the system (see figure, next page). This article describes the BIDS and updates the reader on the biological warfare threat it's intended to counter.

Objective

The objective of the BIDS is to mitigate the effects of large-area coverage biological warfare attacks. The four main functions the BIDS must perform are:

- Accurately determine the presence of a biological warfare agent with minimum false positives.
- Produce, preserve, protect, and transport an environmental sample to the appropriate laboratory for definitive identification.

Pathogens		
Organism	Incubation	Symptoms
Coxielle burnetti	14-16 days	Fever, headache, weakness. Low morality rate, but long convalescence period. Slow response to antibiotics. Vaccines available.
Bacillus anthracis (Anthrax)	1-7 days	Carbuncles, swelling, cyenosis. Inhalation of spores usually fatal in 4-5 days, regardless of treatment.
Brucella sp. (Brucellosis)	6-60 days	Fever, pain in muscles and joints
Yersinia pestis (Plague)	4-7	Fever, extreme weekness, death. Vaccines available.
Psittacosis virus	6-15 days	Pulmonary infection, headache, backache
Toxins		
Toxin	Rate of Action	Symptoms
Botulinum	12-72 hours	Vomiting, constipation, sweating, death
Straphylococcus	.5-4 hours	Violent vomiting, cramps, diarrhea. Common food poisoning.
Tricothecane (T2) toxins		Dizziness, bloody vomiting, internal hemorrhage, skin irritation. Yellow rain reported in SE Asia and Afghanistan, produced by fungi. Absorbed through skin. Highly toxic.



•Communicate with command and other BIDS in the area.

•Be capable of frequent relocation and quick set-up.

The Threat

The number of countries developing biological weapons continues to grow, currently as many as thirteen. The ABOs listed in the table (on previous page) are a representative sample of those considered to be of military significance. They include both pathogenic microbes and toxins produced by a variety of organisms. It's of tactical significance that most toxins are, by weight, thousands of times more toxic than standard chemical agents. Some toxins are rapid acting, while most pathogens require an incubation period of at least a few days. ABOs can be delivered anywhere in the theater of operations by rockets, bombs, artillery, and missiles, and some countries have developed special spray devices and aerosol generators to disseminate ABOs. Special forces operating in rear areas are a particular threat with ABOs because of their potential light weight, ease of concealment, and covert dissemination capability.

Biotechnology promises great human benefits, but it has also created new threats, particularly in the area of recombinant DNA. Using this technique, it's possible to insert toxin-producing genes into organisms that ordinarily infect humans without producing significant illness.

Similar techniques may be used to produce large quantities of previously difficult-to-obtain toxins through culturing. The possibilities are nearly limitless. Just as the United States led the way in analyzing and countering the Soviet conventional, chemical, and nuclear threat during the Cold War, we must continuously monitor the development of chem-bio weapons and develop ways to counter them. The BIDS is a big step forward in that direction and provides us the flexibility to detect new ABOs as they appear.

System Development

Instead of waiting for the development of the entire complement of detection technologies needed to detect all potential ABOs, the Chemical Corps is acquiring the BIDS in an evolutionary manner. This will be a three-phased process, starting with an Interim BIDS, followed by a Preplanned Product Improvement (P^3I) version, and culminating with the Objective BIDS. Functional prototypes of the Interim BIDS will be operational by 1996. This configuration will have a limited manual detection capability, able to detect four known ABOs. The P^3I BIDS will be semi-automated, with a detection capability expanded to a total of eight ABOs. The Objective BIDS is intended to be capable of detecting and identifying all ABOs listed in category A of the International Task Force 6 Report (Secret) dated 9 February 1990. It also will be capable of being reprogrammed or modified to detect and identify other ABOs on the battlefield. The detection instruments used in the Interim BIDS are all commercially available and are the result of an extensive market survey in which Battelle Edgewood Operations evaluated 250 different candidates.

Interim System Configuration

The instruments used in the BIDS will provide an overlapping detection capability. If an agent gets past one type of detector, it will most likely be picked up by another. Three air sample intakes protrude from the roof of the shelter. Each air sampler collects air at the rate of 1,000 liters per minute and concentrates particle in size ranges corresponding to ABOs. If particles of the appropriate size range are detected, the M42 alarm is activated and the sample carousel is initiated .

At this point, the second air sampler goes into action and provides a sample for the sample carousel, which has four different components. The ATP detector looks for adenosine triphosphate, an organic substance common to all organisms. The flow cytometer uses light diffraction to detect cells of microorganisms. The immunoassay instruments treat the sample with reagents and antibodies to detect specific antigen-antibody reactions, thus identifying toxins or organisms. Self-contained detector tickets are also to be used to test for a set group of ABOs.

The third air sampler (the XM2) incorporates a collector/concentrator which provided an atmospheric sample embedded in distilled water. The purpose of the second BIDS vehicle is to bring these samples to a stationary in-theater or CONUS laboratory for detailed analysis.

Ancillary Equipment

In addition to the mission-critical detection equipment, the BIDS also requires a number of ancillary systems. For communication, the BIDS design contains a high-frequency, single-side band radio (GRC-193) capable of communicating up to distances of 300 kilometers and multiple subscriber equipment. A single-channel ground- airborne radio system (SINCGARS), and a satellite-supported global positioning system provide local communication and navigation assistance.

The BIDS can be powered from any of four sources. The system is designed to be fully functional using 220VAC or 110VAC external or generator power. The 200A alternator on the HMMWV engine provides 28VDC for emergency use.

The BIDS computer will contain a real-time operating system that will interface with the various detection instruments and control the operation of the system in the P^3I and Object BIDS.

Summary

The BIDS will soon be available to corps commanders as an important asset in deterring the use of biological weapons and guiding the United States response should they ever be used against us. By detecting and identifying biological agents, it will help determine what course of medical intervention is required for casualties and what prophylactics we must provide to friendly personnel in the theater of operations. Most importantly, the BIDS will provide these benefits while growing in an evolutionary manner to meet an ever-changing threat.

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