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Technology Takes on DRUG SMUGGLERS

Can Drug Detection Technology Stop Drugs From Entering Prisons?

By Stacy Wright and Robert F. Butler

Illicit drug use is a disruptive and dangerous element in the prison environment. In 1996, the Pennsylvania Department of Corrections (DOC) began a comprehensive program of drug interdiction and inmate drug testing and treatment that highlighted this point. Within two years, program evaluators saw a dramatic reduction in inmate drug use, with a corresponding reduction of assaults on staff by 57 percent and on fellow inmates by 70 percent. An additional far-reaching benefit of stopping inmates' drug use is their improved chances for rehabilitation and successful reentry into society.

The National Institute of Justice (NIJ) and the Federal Bureau of Prisons (BOP) are looking for ways to give correctional officers a high-tech helping hand to defeat drug-smuggling attempts aimed at the prison mail system. Once a scientific luxury, drug detection systems that can detect drug residue to levels less than a nanogram (0.000000001 grams) now are affordable, reliable, portable and commercially available. The U.S. Customs Service, law enforcement organizations and correctional institutions already are using these systems in a variety of settings with great success. NIJ and BOP want to know if they will work as successfully in prison mailrooms. To answer that question, NIJ partnered with the Department of Defense's (DOD) Counterdrug Technology Development Program Office (CDTDPO) to study mailroom operations, survey available detection technologies and evaluate those technologies for improving mailroom drug screening.

Drug Interdiction in a Prison Mailroom

Last August, the CDTDPO team visited the mailroom at the U.S. Penitentiary (USP) in Leavenworth, Kan., to observe, document and analyze the processes undertaken by mailroom staff on a typical day. The idea was to obtain practitioner input prior to planning the technical evaluation. The team monitored mailroom personnel throughout the entire process of inspection and distribution of incoming mail — starting with picking up mail at the post office and concluding with the placement of mail in inmates' mailboxes. From their observations, the team concluded that:

- Mail undergoes a thorough, intrusive manual inspection;
- Several thousand items are screened each day by a small number of personnel;
- Relatively small drug quantities are smuggled in individual pieces of mail;
- Drug detection technologies will augment, not replace, existing inspection processes;
- To check every piece of mail, drug detectors would need to support a relatively high throughput rate (several thousand items per day);
- A low false alarm rate is desired; and
- To determine the value of drug detection technology to support prison mailroom inspections, systems should be evaluated in a mailroom or similar environment.

Drug Detection Technologies

Generally, drug detection systems are categorized as trace detectors or bulk detectors. Using trace detectors, inspectors can determine if items have been in the presence of drugs, e.g., touched by people who have been using, handling or hiding drugs. Another use for trace detection is in the nonintrusive inspection of cargo and containers. Drug residue on the exterior, or vapors seeping from the interior, can be detected to signal inspectors that an enclosure needs further scrutiny. Most trace detection sys-

tems in use today are based on ion mobility spectrometry (IMS). The maturing of this technology has made robust, highly portable equipment available with capabilities that, until recently, were confined to the laboratory.

Trace detectors operate in two basic modes: vapor detection and particle detection. Inspectors use convenient handheld "sniffers" for detecting drug vapors. However, drug vapors are not always present and particle detection is more likely to be successful. In the particle-detection mode, the inspector vacuums or swipes the surface of an item of interest. He or she then inserts the collection filter from the vacuum or swipe into the detector's intake device so that the collected particles can be extracted, analyzed and identified. If target drugs are present, the detector alerts the inspector and provides an identification of the substance.

Another available trace detection technology is one that uses a "wipe and spray" method to detect drug residue. A suspected item is wiped with specially treated paper, then sprayed with an aerosol can. The paper's color change indicates the presence of drug residue. Bulk detectors are typically much larger, less mobile and less sensitive than trace detectors. Originally developed for medical imaging and diagnosis, X-ray and computed tomography (CT) scanning are the most commonly used bulk detection technologies. Airport baggage screeners are a well-known example of X-ray equipment. A CT scanner can be thought of as an X-ray system that gathers a large number of X-ray images from many angles, then uses computer reconstruction of the image data to provide a three-dimensional view of an object's interior. X-rays readily penetrate most elements, including metals, and their use in detection equipment allows inspectors to search (nonintrusively) for drugs hidden within a wide range of enclosures from small packages and briefcases to large motor vehicles and cargo containers.

Table 1 gives a general comparison of drug detection systems applicable to mailroom-size operations. Information was taken from vendor literature and has not necessarily been found technically accurate by the government. Also note that the minimum detection levels displayed are representative values. Minimum detection levels are dependent on many factors, including drug type and environmental conditions. For bulk detectors, the method of drug placement and dispersal also affects detection performance.

Some of these systems have been tested thoroughly in the laboratory and some have not. None of them have been evaluated for the mailroom detection tasks identified for prisons. Some concerns include:

- Will use of the detection equipment reduce overall mail screening efficiency?
- Are any of the detectors truly sensitive enough to be of value for the relatively small quantities typical of the mail system?
- Will the false alarm rate be a problem?
- Will vacuuming or swiping batches of mail cause contamination of "clean" mail?
- How will performance be affected by possible background levels of illicit substances found on "clean" mail?
- How reliable is the equipment?
- What is the overall cost of ownership, including training and maintenance costs?

Evaluating the Drug Detection Systems

Based on the observations at Leavenworth, the CDTDPO team recommended performing a technology evaluation of drug detection technologies, as well as a mailroom scenario evaluation for those technologies that showed promise from the technical evaluation. The CDTDPO team chose the Thunder Mountain Evaluation Center (TMEC) to design and perform the evaluations. TMEC personnel have a vast amount of experience evaluating drug detection technologies, and are employees of the federal government so they will see no benefit should one technology outperform the others. Upon recommendation from the CDTDPO team, TMEC personnel have planned a two-phase evaluation based on the evaluation methodology proposed in "An Introduction to Evaluating Biometric Systems."

The first phase of the evaluation is a laboratory-based technology evaluation. As the overall goal is to identify technologies that could assist mailroom drug detection, TMEC has designed the technology evaluation to help select the most promising of the available technologies to be included in the second phase — a mailroom scenario evaluation. TMEC personnel will analyze several drug detection technologies and determine the minimum amount of drugs that need to be present for detection by each system. They then will use the data to decide which technologies are suitable and what drug levels are appropriate for the scenario evaluation.

Table 1: A General Comparison of Drug Detection Systems

TECHNOLOGY	MINIMUM DETECTION LEVEL	CONFIGURATION	TYPICAL COST
Trace Detection	1-10 micrograms	Kit of aerosol spray cans	$500/kit
Trace Detection	Subnanogram	Handheld (IMS)	$25,000
Trace Detection	Subnanogram	Portable (IMS)	$45,000
Bulk Detection	2-10 grams	Half-ton mobile cart (X-ray)	$65,000
Bulk Detection	2-10 grams	3-ton enclosure (CT Scan)	$650,000

Most of the technology evaluations will be conducted at TMEC. However, drugs such as LSD and methamphetamine present contamination, volatility and personnel danger issues that require more specialized laboratory facilities. For these drug types, the technology evaluations will be conducted at another government laboratory.

The second phase of the evaluation is a scenario evaluation that will be performed at a mock mailroom within TMEC. To determine background levels of substances within the postal system, evaluators will mail a large volume of envelopes and packages to the Fort Huachuca, Ariz., post office from multiple locations. Once the mail is received, evaluators will use calibrated trace detection instruments to measure background levels of substances on or in the mail. This information will help estimate the false alarm rates for the detection technologies.

Following background level measurements, each of the technologies will be tested against varying amounts of drugs concealed within mailing envelopes. One team of testers will place drugs in envelopes using typical concealment methods (under stamps and mailing labels, inside the pages of publications, etc.) and carefully document the type, amount and placement of the contraband. Another team, operating the drug detection equipment, will be presented either with mail with concealed drugs or clean mail, without being informed which is which. This team will document if a drug is detected, along with its identity and suspected location.

Conclusion

At the end of testing, a third TMEC team will compare and analyze the data from the concealment and detection operations to determine the performance of the tested systems. From this careful and systematic evaluation, the CDTDPO team expects to be able to objectively determine the sensitivity and accuracy of the evaluated equipment and, in addition, will gather subjective impressions from the test teams regarding the equipment's ease of use, potential throughput, and other pros and cons. The CDTDPO team, with assistance from NIJ and BOP, will use this information to determine if any of the available drug detection systems are ready for an extended operational evaluation at a prison or if further development efforts are required. An evaluation report from this effort will be made available through NIJ and the Counterdrug Technology Information Network (http://www.ctin. com).

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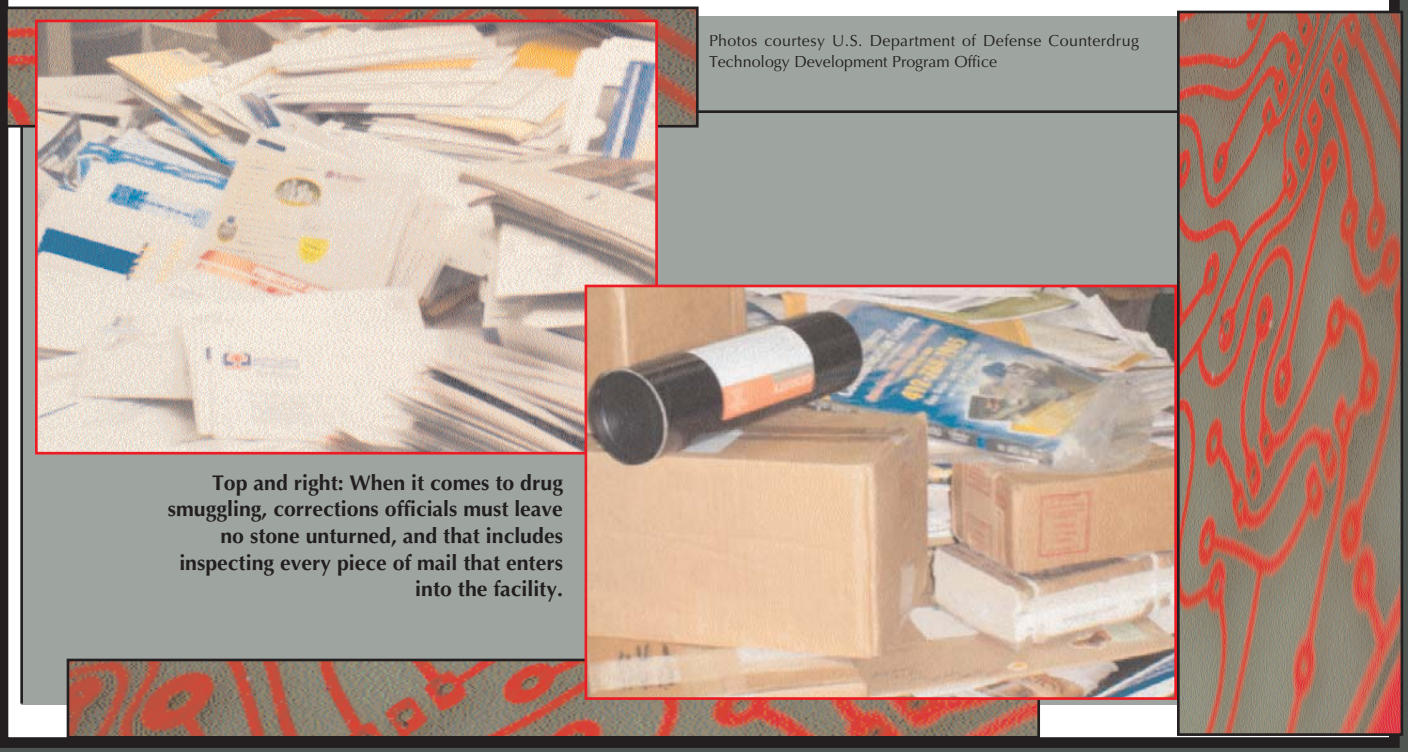

Photos courtesy U.S. Department of Defense Counterdrug Technology Development Program Office

Top and right: When it comes to drug smuggling, corrections officials must leave no stone unturned, and that includes inspecting every piece of mail that enters into the facility.

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